Concord Evaluation Group

PLUM LANDING Explore Outdoors: Summative Evaluation Report

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SUBMITTED TO

WGBH BOSTON

SUBMITTED BY

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About Concord Evaluation Group (CEG)

CEG is a woman-owned, small business in the Boston area.

We use a variety of evaluation research methods to assess the impact of educational programs and media.

Our mission is to use our evaluation expertise to help improve learning outcomes and enhance the quality of life, especially for underserved communities.

CEG works with a range of audiences--from preschoolers through adults--within the US and abroad.

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Executive Summary

Background

PLUM LANDING is an NSF-funded, PBS KIDS project that uses animations, games, and hands-on activities to motivate 6- to 9-year-old children to investigate the natural world. The project features Plum, a curious, animated purple alien from Planet Blorb, and her five earthling friends, who embark on epic explorations of Planet Earth—investigating peregrine falcons nesting in a North American shipyard, or shrinking down to the size of ants to learn about insect life in a city park. Through animated and live-action videos, online games, hands-on science activities, and mobile apps, the project uses the power of media to inspire and encourage kids to investigate target science concepts in their own lives. Resources for informal educators and parents, including guides and instructional videos, further the project's ability to reach and teach kids.

Over the last several years, content developers from WGBH Boston and researchers from the Education Development Center (EDC) used an iterative research and design process, during which the project team went through multiple cycles of implementation and revision, to create the PLUM LANDING Explore Outdoors Toolkit (PLUM Toolkit). The PLUM Toolkit consists of digital media resources (animated stories, live-action videos, an online badging system, a digital game, and an app for families), along with hands-on science activities and support materials for parents and caregivers, educators, and program directors—all developed to help urban children reap the educational, mental, and physical health benefits of actively exploring nature.

An implementation study conducted in 2017 by EDC revealed the promise of the PLUM Toolkit for programs that regularly placed a significant focus on exploring nature outdoors, including outdoor prescription programs, municipal park and rec programs, and nature centers serving low-income, urban families (e.g., Appalachian Mountain Club). The summative evaluation sought to understand the promise of implementing PLUM LANDING Explore Outdoors programming in the broader community and at home.

Concord Evaluation Group (CEG) conducted an independent evaluation of the PLUM Toolkit. The summative evaluation consisted of four separate, but related, studies:

1. **Small-scale, self-directed, at-home study –** The first self-directed, at-home study used a qualitative approach to describe how a sample of six families used the PLUM Toolkit, and the short-term outcomes on the parents (n = 6) and kids (n = 6).

2. **Family-facilitated program study –** The second evaluation study described how a sample of six nature-based programs used the PLUM Toolkit with families. It examined the short-term outcomes on kids (n = 22), parents (n = 27), and educators (n = 22).

3. **Outreach partner study –** This study consisted of telephone interviews with a sample of 12 project partners. Some partners were dissemination partners who agreed to distribute the PLUM Toolkit to their members, while others were from organizations that participated in earlier phases of pilot testing of the PLUM Toolkit. The aim of the study was to learn about partner experiences working with the project team, as well as the successes and challenges in using and/or disseminating the PLUM Toolkit.

4. **Larger-scale, self-directed, at-home study –** The original evaluation design called for a fourth study based in afterschool programs. However, project delays and then the COVID-19 pandemic led us to reconceptualize the fourth study as a larger-scale, at-home study due to the stay-at-home orders issued around the country during the pandemic emergency. This study is described in a separate report.

High-Level Findings

Smaller Scale, Self-Directed, At-Home Study

- Families enjoyed the PLUM Toolkit because it was easy to understand and was fun.
- Families found the technology helpful and supportive.
- The PLUM Toolkit inspired children to wonder aloud more about nature and inspired children to share what they have learned about nature and science with others.
- The PLUM Toolkit encouraged families to add more nature exploration activities to their repertoire of outdoor activities.
- The PLUM Toolkit broadened families' ideas about what nature encompassed.
- The PLUM Toolkit helped kids rethink the activities they might enjoy outside.
- Parents reported that their younger kids learned about science and nature concepts from the PLUM Toolkit, but the concepts were not new to the older kids in the sample.
- Parents were more motivated and more comfortable exploring science and nature with their kids after using the PLUM Toolkit —especially those parents who were very uncomfortable before using the PLUM Toolkit.
- Parents reported that they expect to spend more time exploring nature with their kids as a direct result of using the PLUM Toolkit.
- Challenges that families encountered included weather constraints, geographic limitations (e.g., not having local access to a green area or body of water), and beliefs that the PLUM Toolkit was too much work, or was most appropriate for 6-7 year olds versus 8-9 year olds.

Family-Facilitated Program Study

- All 10 educators reported that they planned on using the PLUM Toolkit again in the future and that they would recommend the PLUM Toolkit to other, similar programs, because PLUM was fun, easy to use, well-organized, inexpensive, and helped get kids outside.

- The PLUM Toolkit—including the videos and hands-on activities—helped kids feel more motivated to explore outdoors.

- The PLUM Toolkit enhanced kids' attitudes about nature, including helping them feel more connected to and excited about exploring nature in their own backyards.

- The PLUM Toolkit helped kids learn environmental science content.

- The PLUM Toolkit helped motivate parents to want to spend more time exploring science and nature with their kids.

- The PLUM Toolkit helped parents feel more comfortable and knowledgeable about exploring science and nature with their kids.

- The PLUM Toolkit helped informal educators become more motivated to explore science and nature with the kids in their programs, even though all the programs already focused on nature-based learning.

- The PLUM Toolkit helped informal educators become more comfortable exploring science and nature with the kids in their programs—and gave them more ideas for doing so.

- Families and educators using the PLUM Toolkit did encounter some challenges, mostly with respect to weather and technology.

Outreach Partner Study

- Seven organizations have made dissemination of PLUM an ongoing effort (or have attempted to). Some organizations reported that they made an effort to push information out to their members when PLUM was first made available, but have not done additional outreach beyond that. One organization has disseminated information about PLUM at a single event, but has not done anything to spread the word beyond that, primarily because they weren't familiar enough with PLUM and would need to reach out to WGBH for support in doing additional outreach.

- Partners explained how they decided to use or promote the PLUM Toolkit. For all partners, the one important consideration was that PLUM was free. Another consideration that they all took seriously (because it is supportive of their missions) is that PLUM helped them get people outdoors (consistent with their missions).

- Other features that were important for afterschool programs were the simplicity of the lessons and the amount of preparation required, since afterschool educators typically have very little time to spend preparing or implementing activities with their students.

- Other important features of the PLUM Toolkit were the quality of the materials; the representation of diverse families; the focus on STEM; that the activities required simple, accessible, everyday materials; the full translation into Spanish of PLUM activities and resources; and the engagement of parents. One partner pointed out the importance of the parent engagement element to getting kids engaged and maintaining their interest.

- Several partners commented positively about the affordances offered by the PLUM app, noting that the app provided families and informal educators with ways to easily and quickly help their kids engage with nature anywhere, anytime.

Key Takeaways

1. **PLUM helped build appreciation for nature in diverse environments:** Across settings, the PLUM Toolkit helped adults and kids find nature in their environments, even if they lived in urban settings.

2. **PLUM gave kids more ideas for things they can do in nature:** Across settings, the PLUM Toolkit helped kids think about new or different ways to engage with nature.

3. **PLUM expanded parents' knowledge and comfort level related to exploring science and nature with their kids:** Even among parents who were somewhat comfortable exploring nature to begin with, the PLUM Toolkit helped parents feel even more comfortable exploring the outdoors with their kids and helped them see that doing so can be fun.

4. **Technology enhanced the outdoor experience:** Most parents/families preferred to access materials on their phones rather than printed paper. Outreach partners were very excited about the affordance of technology and decided to mostly promote the app with families. While the facilitated programs used mostly hands-on activities, they were open to using media as well, though they were still figuring out how to do that effectively.

5. **The study indicates ways of rethinking working with partners:** Turnover at national organizations meant that some information, e.g. the availability of a social media toolkit, didn't get passed on. National partners are approached by dozens of organizations with requests that they implement programs, which makes it easier for PLUM to get lost in the crowd. Thus, the team may want to rethink how it works with partner organizations as a result of this. One partner made a suggestion to "*make sure that what we're creating meets their [families and informal educators] needs and not what we think might be their needs."* This is an important reminder. Although the team did work with national partner organizations in the development of the PLUM Toolkit, it is possible that the lessons learned during early stages of development were lost somewhat during scale-up. Should the project team decide to pursue a future plan for wider

dissemination of PLUM to a broader audience, these types of partners (representing the target audience) should be involved from the beginning *and* during scale-up.

Chapter 1: Background

PLUM LANDING Explore Outdoors

PLUM LANDING is an NSF-funded, PBS KIDS project that uses animations, games, and hands-on activities to motivate 6- to 9-year-old children to investigate the natural world. The project features Plum, a curious, animated purple alien from Planet Blorb, and her five earthling friends, who embark on epic explorations of Planet Earth—investigating peregrine falcons nesting in a North American shipyard, or shrinking down to the size of ants to learn about insect life in a city park. Through animated and live-action videos, online games, hands-on science activities, and mobile apps, the project uses the power of media to inspire and encourage kids to investigate target science concepts in their own lives. Resources for informal educators and parents, including guides and instructional videos, further the project's ability to reach and teach kids.

Over the last several years, content developers from WGBH Boston and researchers from the Education Development Center (EDC) used an iterative research and design process, during which the project team went through multiple cycles of implementation and revision, to create the PLUM LANDING Explore Outdoors Toolkit (PLUM Toolkit). The PLUM Toolkit consists of digital media resources (animated stories, live-action videos, an online badging system, a digital game, and an app for families), along with hands-on science activities and support materials for parents and caregivers, educators, and program directors—all developed to help urban children reap the educational, mental, and physical health benefits of actively exploring nature.

An implementation study conducted in 2017 by EDC revealed the promise of the PLUM Toolkit for programs that regularly placed a significant focus on exploring nature outdoors, including outdoor prescription programs, municipal park and rec programs, and nature centers serving low-income, urban families (e.g., Appalachian Mountain Club). The summative evaluation sought to understand the promise of implementing PLUM LANDING Explore Outdoors programming in the broader community and at home.

Summative Evaluation

Concord Evaluation Group (CEG) conducted an independent evaluation of the PLUM Toolkit. The summative evaluation was designed to explore whether implementation of the PLUM Toolkit achieved a variety of intended outcomes on kids, parents, and informal educators (described below). The evaluation described in this report was a mixed-methods study, with both quantitative and qualitative components.

Kids' Outcomes

Expected Impact 1: Kids' environmental **habits of mind** (i.e., questions you need to ask when investigating an ecosystem) will be enhanced as a result of using the PLUM Toolkit.

Expected Impact 2: Kids' **motivation** to explore the environment will increase as a result of using the PLUM Toolkit.

Expected Impact 3: Kids' **attitudes** about nature, including appreciating nature in their local environments and feeling more connected to nature, will be more positive as a result of using the PLUM Toolkit.

Expected Impact 4: Kids will learn environmental **science content** as a result of using the PLUM Toolkit.

Parents' Outcomes

Expected Impact 5: Parents will be more **motivated** to explore environmental science with their kids, as a result of using the PLUM Toolkit.

Expected Impact 6: Parents will be more **comfortable** exploring environmental science with their kids, including knowing how to find nature in local neighborhoods, as a result of using the PLUM Toolkit.

Expected Impact 7: Parents will spend more **time** exploring nature with their kids as a result of using the PLUM Toolkit.

Informal Educators' Outcomes

Expected Impact 8: Educators will be more **motivated** to explore environmental science with kids, as a result of using the PLUM Toolkit.

Expected Impact 9: Educators will be more **comfortable** exploring environmental science with kids, including knowing how to find nature in local neighborhoods, as a result of using the PLUM Toolkit.

Expected Impact 10: Educators will spend more **time** exploring nature with kids as a result of using the PLUM Toolkit.

The summative evaluation consisted of four separate, but related, studies:

1. **Small-scale, self-directed, at-home study –** The first self-directed, at-home study used a qualitative approach to describe how a sample of six families used the PLUM Toolkit, and the short-term outcomes on the parents (n = 6) and kids (n = 6).

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COVID-19 pandemic led us to reconceptualize the fourth study as a larger-scale, at-home study due to the stay-at-home orders issued around the country during the pandemic emergency. This study is described in a separate report.

Chapter 2: Self-Directed, At-Home Study

Overview

This chapter summarizes the results of a small, qualitative study designed to examine the short-term outcomes of the PLUM LANDING Explore Outdoors Toolkit (PLUM Toolkit) on families who tried the PLUM Toolkit resources at home.

The study included six kids (between six and nine years old) and their parents. Families used the PLUM Toolkit at home over a period of two to five weeks. Data was collected using pre-test and post-test interviews conducted via Skype.

Objectives

The at-home study was designed to explore the following outcomes:[1]

Kids' Outcomes

Expected Impact 1: Kids' environmental **habits of mind** (i.e., questions you need to ask when investigating an ecosystem) will be enhanced as a result of using the PLUM Toolkit.

Expected Impact 2: Kids' **motivation** to explore the environment will increase as a result of using the PLUM Toolkit.

Expected Impact 3: Kids' **attitudes** about nature, including appreciating nature in their local environments and feeling more connected to nature, will be more positive as a result of using the PLUM Toolkit.

[1] Each study assessed a different set of outcomes, although there is overlap in several of the studies.

Expected Impact 4: Kids will learn environmental **science content** as a result of using the PLUM Toolkit.

Parents' Outcomes

Expected Impact 5: Parents will be more **motivated** to explore environmental science with their kids, as a result of using the PLUM Toolkit.

Expected Impact 6: Parents will be more **comfortable** exploring environmental science with their kids, including knowing how to find nature in local neighborhoods, as a result of using the PLUM Toolkit.

Expected Impact 7: Parents will spend more **time** exploring nature with their kids as a result of using the PLUM Toolkit.

Study Design

Participant Recruitment

The self-directed, at-home study was designed to collect qualitative data from a small sample of six families who used the PLUM Toolkit over a period of two to five weeks. Study participants were recruited from CEG's database that contains over 2,000 individuals who have previously indicated an interest in being a part of its studies. CEG announced the study opportunity via email newsletter to all 2,000 database members and those who were interested contacted CEG to determine whether they were qualified for the study.

Participants were qualified for the study if they had:

- At least one child between the ages of 6 and 9 years old,
- Access to the internet, and
- The ability to communicate in English for the purposes of participating in video conference interviews.

We offered family dyads (one parent and one child) an incentive of $50 for their participation in the study.

Methods and Procedures

Upon enrollment in the study, each family dyad (family) participated in a video conference call with a senior researcher. The family pre-test interview protocol is contained in Appendix A. The interview protocol was based, in part, on questions developed and used by EDC to collect data during earlier phases of the project.[2] EDC did not collect data from kids and thus we modified some questions so they were accessible to young children.

After conducting the initial interview, CEG instructed families to explore the PLUM Toolkit at their leisure for two to six weeks. Families were instructed to try any or all of the activities available to them.[3]

Families were encouraged to begin by watching a 2-minute video about how to explore nature with their kids. Next, we encouraged parents to review the videos and printable tips for parents available on the website. Families were also encouraged to view the short videos and use the apps available on the website, as well as to try and earn nature badges.

The science activities (and the "big ideas" that they covered) that families tried are listed below in the order they appear on the project website:

- **Waggle Dance -** Bees and flowers depend on each other to survive and thrive.
- **Fly It and Spy It -** Animals live in places where they can find food, water, shelter, and space to survive.
- **Animals Among Us -** City animals learn to live with people by hiding or fleeing from us, or by getting used to being around us.

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[2] Goldstein, M. et al., (2017). PLUM LANDING Explore Outdoors Toolkit: Phase 5 Implementation Study. New York: Education Development Center.

[3] Families were directed to the following website: https://pbskids.org/plumlanding/parents/allresources.html

- **Mission: Water -** Animals need water to survive.
- **Splash and Dry -** Where does rain make puddles and how fast do they disappear?
- **Seed Blaster -** Plants can't move on their own. "Explosive force" is one way their seeds get to new places where they can sprout and grow.
- **Wind Catcher -** Wind blows lots of things from one place to another. So the air often has things—including harmful things—that can affect plants and animals.
- **Evaporation Station -** When water evaporates, it changes into a gas called water vapor, which we can't see. When it cools, water vapor changes back into liquid water.

When families felt that they were done trying out the PLUM Toolkit, they contacted CEG to schedule their final family interview. The final family interview protocol is contained in Appendix B. The final interview enabled CEG to look for trends over time in:

- Kids' environmental science-related habits of mind, motivation, attitudes, and content knowledge.
- Parent's motivation, comfort, and time spent exploring nature with their kids.

In addition, the final interview enabled CEG to gather evaluative feedback on the PLUM resources.

Study Limitations

This study is a small-scale, qualitative study that may shed light on how families use the PLUM Toolkit and its potential for short-term effects. The purpose of the study was to gather rich, qualitative data that could complement findings from the other studies conducted as part of the summative evaluation.

Because the sample is small and was self-selected, it is not fully representative of all the different types of families in the target audience. Families who agree to be a part of studies like this may be more interested in science and/or nature exploration than other families from the general population.

Participants

Summary of Characteristics

We recruited six families for the study. Families were from six different states, including Virginia, North Carolina, Illinois, Florida, California, and New York. The sample included four boys and two girls, along with five moms and one step-dad.

Three of the kids were 6-years old, and the rest were seven, eight, and nine.[4] Two kids were African-American, one was Asian, and three were white. The adults were all white, except for one African-American parent. All of the families categorized themselves as low income.

We asked parents during recruitment whether their kids spent any time outdoors and, if not, why not. Two parents reported that their kids enjoyed spending time outdoors.
The other four parents reported that their kids did not usually spend much time outdoors because:

- *My child is just not interested in spending time in nature (two parents).*
- *Gangs or crime make the nature areas unsafe for my child.*
- *Nature is uncomfortable for my child because of things like heat or bugs.*

We introduce each of the six kids in more detail below.

[4] The 9-year old's younger brother was originally recruited for the study, but his mom said he was "too shy" to do the interviews, so his older brother volunteered to replace him.

Child Profiles

Kala

Kala is a 7-year old girl from rural Virginia. Her mom reports that Kala "loves nature." Kala likes to go hiking with her family. She also likes to do gymnastics outdoors and her family has races and picnics outside. In addition to enjoying nature, Kala likes to watch Netflix and read.

In her second grade classroom, Kala has been exposed to some science. She reports they are mainly learning about "plants, flowers, and bugs" at the moment. She's enjoying it so far.

At home, Kala and her mom do "some" science activities together. Her mom reports that they've, "…made slime and looked at different bugs and leaves and try to catch caterpillars and things like that."

Her mom is very interested in exploring science with Kala and also very comfortable doing so. She reports that they "…have a lot of hiking trails around and walking paths" in their neighborhood, so nature is "all around them." She reports that they typically spend at least a couple times per week exploring nature together.

Carlos

Carlos is a 6-year old boy from rural North Carolina. His mom reports that Carlos likes to go outside a lot and that Carlos has a rock collection in his room. Carlos proudly reports that he has some rocks "from the mountains."

Carlos also likes to ride his bike and play on the playground near his apartment. His favorite outdoor activity is the mini-zip line challenge in the park. He calls it the "ninja" one. According to his mom, he plays outside a couple times every week.

Carlos and his mom describe their neighborhood as containing "lots of nature," including plants and animals, and "lots and lots of dogs." When he's not outside, Carlos likes to play games on his Xbox.

Carlos doesn't remember doing any science in school, although he did recall looking at a map of the planets recently in his classroom. But, he said he didn't learn anything about the planets. He just recalls seeing the map on the wall.

Mom reports that she and Carlos like to go on nature walks together and that she is "very comfortable" exploring nature and science with Carlos.

Kamal

Kamal is an 8-year old boy from urban Chicago. His stepdad reports that Kamal doesn't have the ability to go outside much because of gangs and crime in their neighborhood. Kamal confirms that he would rather play indoors than go outside. When not at school, he likes to play video games on his Nintendo DS and watch YouTube.

At school, Kamal does get a chance to get outdoors. He especially enjoys playing soccer or football with his friends. His stepdad reports that about once a week for about a half hour, they go to the church nearby and play frisbee or soccer in the yard there because, there, they don't have to worry about cars and traffic.

According to Kamal, there "isn't much nature" around him. They live in the city and, while he noted that some people have "gardens and stuff," he doesn't believe that there is "much other nature around."

Kamal doesn't recall doing much science in school, although he did remember doing an experiment once. He couldn't describe the experiment, but he did recall that he liked it.

Kamal's stepdad reports that he is "pretty comfortable" exploring nature and science with Kamal, although he seemed visibly nervous about the idea and started describing his college science classes as a way to explain how prepared he is. He became more relaxed as he learned more about the PLUM resources and realized that he didn't need a "background in chemistry" to do the activities.

John

John is a 6-year old boy from a suburban town in Florida. Despite living in an area with year-round warm temperatures, John's mom reports that he doesn't like to go outside because "he's just not interested." John reports that he would rather play video games indoors than go outside. He also likes to cook (on the day of our interview he described how he made Rice Krispy treats that morning).

When he does go outside, John likes to go fishing, swimming, hunting, and biking. His mom also reports that John "goes around collecting a lot of rocks."

John reports that they have done science in school. John is in the gifted program. Last year they studied animal habitats. His class raised butterflies and released them into the wild. He enjoyed that activity. This year, he is not studying science.

John's mom reports that they do a little science at home. "We got a microscope set for his birthday so he went outside got dirt and tried to collect and with the fishing he's like, 'oh, let's get some worms.' I'm really big on 'hands-on.' We didn't have a TV until like two years ago."

John's mom is "pretty comfortable" exploring science and nature with John. According to both of them, their neighborhood has "lots of nature" in it: "Even though there is volleyball, basketball, tennis, two pools, two playgrounds…there's a body of water behind us so there's a dock. There's so much opportunity for us to look at nature, even in the backyard. Sometimes I just open up the backyard because where I am there is nobody behind me and he can explore back there. He'll take his little trucks and dig." John's face brightens up when mom mentions the trucks. He says, "But, you wouldn't let me do it." His mom explains that she sometimes takes him to her own mother's house where John can "play and make a mess in the dirt and not get my own house dirty!"

Darius

Darius is a 9-year old boy from suburban California. Like John, Darius' mom reports that, despite living in an area with year-round warm temperatures, Darius won't go outside because he "doesn't like to" unless his dad is home from work and able to go outside with him. He does enjoy playing baseball outside with his dad. Darius reports that "when he was younger" he used to collect rocks and leaves outside, but he "doesn't do that now." When indoors, Darius enjoys playing video games.

Darius "guesses" that there is nature where he lives, but he's not sure. At school, Darius had the chance to do a science club, but he chose to do dodgeball instead. Otherwise, he reports that they don't learn about science in their classroom…just math and reading.

Darius' mom reports that she is "absolutely comfortable" doing science activities with Darius. She notes that, although Darius doesn't know whether there is nature in their neighborhood, they are surrounded by trees and lakes and a park.

When asked about what the family does when they explore nature together, Darius' mom describes physical activities mainly, such as riding bikes and taking their two dogs for walks. "In the summer we go to my dad's lake house a lot and we go kayaking and paddle-boarding and Darius just learned to wakeboard." She can't provide an example of a science or nature activity they have done recently.

Jasmin

Jasmin is a 6-year old girl from urban New York City. Her mother reports that Jasmin doesn't like to go outside because of heat or bugs. Jasmin reports that her favorite things are "eating cheesy pizza" and coloring. Despite what her mom reports, Jasmin says she does enjoy playing outside, but only in the pool.

Jasmin has a park in her neighborhood where she can "see nature." She reports that her teacher tells them about science in school. They are learning about water currently and "get to test light stuff and heavy stuff" in the water. She enjoys it so far.

Jasmin's mom reports that she "not comfortable" with doing science with Jasmin because Jasmin is "still very young." Her mom can't think of any examples of science activities they have done before. She feels "fine" about exploring nature with Jasmin, but reports that they really don't do that at all, although she is interested in the idea of it. When the family is outside, they are either playing at the park, taking walks, or Jasmin rides her scooter. Her mom reports that they spend nearly every day outside doing these types of things.

Findings

How Families Used Plum Landing

Despite being strongly encouraged to use several activities, the apps, and the videos, half of the families tried only a single activity (Carlos, Kala, and Kamal's families). Jasmin's family tried two activities, Darius' family tried three, and John's family tried all of the activities. Below is a list of the activities and the families that attempted them:

- Seed Blaster (Carlos, John, Darius, Kala)
- Waggle Dance (John, Jasmin)
- Animals Among Us (John)
- Fly It and Spy It (John, Jasmin)
- Wind Catcher (John, Darius)
- Splash and Dry (John)
- Mission: Water (John)
- Evaporation Station (Kamal, John, Darius)

Only two of the families reported that they watched the videos associated with their activities—Kamal and Jasmin. Kamal and his stepdad watched the video associated with Evaporation Station because "he's a big kid now and he's really into videos." None of the families watched the introductory video or any of the video tips for parents. Some parents reported that they were eager to "jump in" and do the activities, and most were confident that they "didn't need tips," so they didn't bother with the introductory videos.

Despite being asked to do so by CEG, none of the parents downloaded the apps. Two reported that they didn't have room on their phones, while the remainder reported that they didn't have time to use it.

Most families (4 out of 6) reported that they followed the PLUM activity instructions on their cell phones, so they "didn't have to carry around paper," or "because the phone screen is so large, it's like a tablet (Samsung)." Two families reported that they printed out the activity PDFs and referred to them as they did the activities (Kamal, Carlos).

Kids' Outcomes

Expected Impact 1: Kids' environmental **habits of mind** (i.e. questions you need to ask when investigating an ecosystem) will be enhanced as a result of using the PLUM resources.

PLUM activities inspired at least one child in our study to wonder aloud more about nature and inspired at least two children to share what they have learned about nature and science with others.

At pre-test, we found that…

- All parents reported that their kids asked questions about nature and noticed things about nature (first two rows of the table).
- All but one (6-year old Jasmin's mom) reported that their child showed curiosity about nature (third row).

So, we would not expect any changes in these three behaviors (asking questions about nature, noticing things about nature, and showing curiosity about nature), as they were already observed by parents before using PLUM.

The table below summarizes each parent's responses at pre-test and post-test. Positive changes are highlighted in green.

Table 2-1:

Habits of Mind, as Reported by Parents

Name	Kala		Carlos		Kamal		John		Darius		Jasmin	
Age	7		6		8		6		9		6	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Questions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Noticing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Curiosity	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Thinking	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y
Sharing	N	N	Y	Y	N	N	Y	Y	N	Y	N	Y

Note: Y = Yes, N = No

At post-test, we did find some variation in the habits of mind observed by parents (the last three rows in the table). At post-test, Jasmin's mom reported that Jasmin was now *consistently* demonstrating curiosity, thinking aloud, and wondering about nature, whereas before PLUM she was not.

In fact, we were able to see this behavior first-hand during the interview. In the middle of our post-test interview, Jasmin interrupted to wonder aloud about why flowers had petals:

Jasmin	I wanna ask you a question.
Mom:	Do you need to ask Momma a question?
Jasmin:	You know flowers?
Mom:	Yes.
Jasmin:	Why do they have petals?
Mom:	You see? She's asking why the flowers have petals. Normally she never asks me any of these questions. Why do you think they have petals, Melania?
Jasmin:	Because they're flowers.
Mom:	Yeah?
Jasmin:	And the bees eat them.
Mom:	They eat the nectar, right?

We also noted changes in parent reports about kids' eagerness to share what they have learned about nature. Whereas only two parents reported this behavior at pre-test, four parents reported it at post-test.

Again, we were able to notice examples of this behavior first-hand during the interviews. For example, at post-test, Carlos demonstrated his interest in sharing what he learned with us:

Carlos:	We took a ball and see if we caught any bugs underneath the ball, asked questions. We'd have questions, threw the ball, and-
CEG:	And you pretended to be a...
Carlos:	Ant. And thought about what the world would look like if we were an ant. I know something that ants can't survive against.
CEG:	What?
Carlos:	A raindrop! Humans can survive against that one, but an ant can't, because the weight and force of it is too powerful for an ant.
CEG:	Wow, what happens to it?
Carlos:	It dies.
CEG:	Oh, I see.
Carlos:	Yeah, it would die when it hits it.

Jasmin also shared what she learned with us:

CEG:	Can you tell me what you think, maybe, they were trying to tell you or try to teach you?
Jasmin	They were trying to teach me [to] put the bread on the floor or like fruit or something - what they like - or like a flower or something. You put it in there and they'll eat it. They can talk to each other and stuff. And you do the Waggle Dance and stuff.
CEG:	And then what happens?
Jasmin:	And then what happens… You see out the window or the door and you see them eating it. They like it. That's their favorite food.
CEG:	So, who ate it? Was it a bird, or something else?
Jasmin:	Actually, it was a squirrel.
CEG:	Oh, it was a squirrel.
Jasmin:	He keeps coming - the same squirrel every day - knocking the garbage bins, and ripping the garbage bags, and eating all the food. The same squirrel keeps coming back every day.
Mom:	[Since PLUM] She asks a lot of questions. She said, "Where do bees go? How come we don't see the bees?" She was asking, like, "where are they?" Like, "where's the birds?" And, like, the other day we saw, like, maybe like twenty or thirty birds all together, and she said, "Why are they all

> together?" I was like, "They're going to school." You know, it was just, like, they were all flying together, I think, from, like, one house to the other. So it was, like, she doesn't really ask me any of those questions. But, now [after PLUM] she does.

Kala and Kamal's families reported that both kids were still very quiet after using PLUM and were still not eager to share what they learned with their families (before or after PLUM). We should note that these families only tried a single activity, too, so there may be a relationship between amount of exposure and behavioral change.

Expected Impact 2: Kids' **motivation** to explore the environment will increase as a result of using the PLUM resources.

PLUM activities encouraged families to add more nature exploration activities to their repertoire of outdoor activities.

Before using PLUM, families reported that kids' favorite outdoor activities were most likely to be sports-related or physical (non-nature related) activities. Half of the families (Kala, Carlos, and John's families) were able to provide a couple examples of nature activities they had previously done, including nature walks, collecting rocks, and looking for bugs. But, parents uniformly reported that the majority of the time their kids spent outside was spent doing something physical or sports-related. Nature-related exploration played a minor role in their kids' list of outdoor favorites. And, for half the kids, nature exploration was never mentioned before using PLUM.

After using PLUM, all the kids still reported enjoying the same outdoor activities that they reported during the pre-test. But, after using PLUM, four of the kids (Kala, John, Jasmin, and Carlos) reported enthusiastically that they wanted to add PLUM activities to the things they regularly do outside. Carlos said, "I'm gonna do them until all the activities are over. I can do them from the one I want to start with to the one I want to end with."

Doing PLUM didn't necessarily increase kids' motivation to play outdoors, or the amount of time they spent outdoors, but it did appear to impact kids' view of what types of activities they planned to do outside, including adding more nature-related exploration. Four kids emphasized that they plan to try all the remaining activities and the four kids who did the Seed Blaster

activity reported that they plan to do it again, even though they already tried it once. It was clearly a favorite among all the kids who tried it.

Expected Impact 3: Kids' **attitudes** about nature including appreciating nature in their local environments and feeling more connected to nature will be more positive as a result of using the PLUM resources.

PLUM activities broadened families' ideas about what nature encompasses.

At pre-test, four out of six kids reported that they had nature near them. For most, that was limited to "lakes," "trees," or "dogs." After doing PLUM, all the kids reported that they had some kinds of nature near them and their definitions of what constituted nature expanded to include things like "seeds," "bugs," and "things flying through the air."

For example, at pre-test, Kamal reported that there "isn't much nature" around him (he lives in the city of Chicago). But, after using PLUM, he felt that the water and the "things flying through the air" around him "counts as nature," so he expressed a different view of nature as a result of doing the Evaporation Station activity.

In another example, Darius "wasn't sure" during our pre-test interview whether there was nature around him. But, after doing the Seed Blaster activity, he learned that there are "really tiny nature things all over the place."

PLUM activities may have helped kids rethink the activities they might enjoy outside.

Three of the kids ended the study with more positive ideas about 2-3 outdoor activities, two kids ended the study with more positive ideas about 5-6 of the outdoor activities discussed, and one kid's ideas about what is enjoyable to do in nature stayed the same overall. The table on the following page summarizes their reports. Positive changes are highlighted in green and negative changes are highlighted in red.

Table 2-2:

Kids' Interest in Outdoor Activities

Name	Kala		Carlos		Kamal		John		Darius		Jasmin	
Age	7		6		8		6		9		6	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Take a walk outdoors	U	U	M	U	D	D	M	M	U	U	M	M
Play outdoor games like hide and seek or tag	U	U	U	U	U	U	U	U	U	U	M	U
Play a game indoors	U	U	U	U	U	U	D	U	U	U	U	M
Look at trees, plants, and flowers	U	U	U	M	D	M	D	D	M	D	U	U
Read a book	U	U	M	U	M	U	M	M	U	U	U	M
Look for bugs	M	M	D	M	D	M	M	M	D	M	M	D
Look for small animals and birds	M	M	U	U	D	M	M	M	D	M	D	U
Collect rocks or leaves	U	U	U	U	D	M	U	M	D	M	M	D
Play sports	U	U	U	U	U	U	U	U	U	U	D	M
Take pictures of nature	U	U	U	U	D	M	M	M	M	M	M	U
Learn about animals, plants, weather, or water	U	U	U	U	M	M	M	U	M	M	M	U

Note: U = "thumbs up," M = "in the middle," and D = "thumbs down."

For example:

- Carlos was neutral about taking walks outside and negative about looking for bugs before doing PLUM. After PLUM, his interest level in both areas improved (Carlos tried the Seed Blaster activity). At post-test, Carlos explained that he didn't used to like bugs "because they bite," but now he "kinda likes bugs because I like to look for nature."

- At pre-test, Kamal was mostly negative about looking at trees, plants, and flowers; looking for bugs; looking for small animals and birds; collecting rocks or leaves; and taking pictures of nature. After doing only one PLUM activity, he was neutral about these activities rather than negative (Kamal did the Evaporation Station activity).

- Darius was mostly negative about looking for bugs, looking for small animals and birds, and collecting rocks or leaves before PLUM. After PLUM, he was neutral rather than negative (Darius tried three activities—Seed Blaster, Wind Catcher, and Evaporation Station).

On the other hand:

- John's attitudes mostly did not change. He remained fairly neutral about most activities. Although he was more positive about playing a game outside and exploring nature, he was negative about collecting rocks after doing PLUM (John tried every activity).

- Jasmin's attitudes were mixed: She was more positive about playing games outside, looking for small animals and birds, taking pictures of nature, and learning about nature after PLUM. But, she was more negative about looking for bugs or collecting rocks and leaves after doing PLUM (She did the Waggle Dance and Fly It and Spy It activities). She and her Mom were unable to explain why she was more negative about these activities. Jasmin reported that after doing PLUM, she wants "to go to the zoo now and learn more about animals."

We did not discuss the inside activities here as they were included just to balance out the options presented to kids.

When we asked kids to complete the sentence, "When I am outside in nature, I feel…" nearly all the kids replied with the word "happy," even at pre-test. So, we observed no noticeable changes in these results after using PLUM.

Table 2-3:
Kids' Self-reported Feelings about Being Outside

	Kala	Carlos	Kamal	John	Darius	Jasmin
Pre	Happy	Happy	Kind of comfortable	Happy	Happy	Kind of happy
Post	Happy	Happy	Kind of like it	Happy	Happy	Happy

Expected Impact 4: Kids will learn environmental **science content** as a result of using the PLUM resources.

PLUM activities taught the younger kids in the sample about science and nature concepts, but the concepts were not new to the older kids in the sample.

Four of the kids (ages 6 and 7) and their parents reported that the kids learned something about science and nature from PLUM. For example, kids said:

- *Bugs are EVERYWHERE! When we would look in the ground, there was always bugs. Bugs, bugs, bugs, bugs, bugs. Now, I would love to learn about science.* (Carlos)

- *[I learned] there is lots of dust and stuff floating through the air.* (John)

- *The seeds fly through the air. That's how the flowers do it or they can't grow. I didn't know how much seeds are in the air.* (Kala)

- *[I learned] That ants see the world as really big because they are really small. I thought ants thought stuff was really small at first but now we think they're really big because I saw a real ant and they're like this tiny.* (Carlos)

Some kids were not able to expand on what they learned, but their parents reported that they learned science from the experience. For example, Jasmin simply gave a thumbs-up when asked if she learned anything about science or nature from PLUM. She didn't want to expand on her answer. Her mom explained: "I liked that she actually stayed with me at the park, and I was telling her about the bees and the nectar and the plants and everything. And she was listening and following and she was answering questions."

Darius's mom reported that he and his younger (6-year-old) brother learned something from Evaporation Station: "Yeah, they learned some about water evaporation and how seeds are planted and grow into things, so they did definitely learn."

But, Darius and Kamal, the two oldest kids, reported that they learned nothing from PLUM:

- *I didn't learn anything about nature or science. It was like crafty.* (Darius)

- *I learned nothing new. I already knew it.* (Kamal)

Kamal's stepdad added: "Well, he is now eight years old so he's like a big kid. He knew this stuff like years ago. So, I think for his level, if he was five or six, it would have been better but now, he's like eight, he knew what water vapor was, and what happens to water when it dries. So, it really didn't hold his attention." As a reminder, Kamal only ended up trying a single activity.

Parents' Outcomes

Expected Impact 5: Parents will be more **motivated** to explore environmental science with their kids, as a result of using the PLUM resources.

Expected Impact 6: Parents will be more **comfortable** exploring environmental science with their kids, including knowing how to find nature in local neighborhoods, as a result of using the PLUM resources.

Parents were more motivated and more comfortable exploring science and nature with their kids after using PLUM—especially those parents who were very uncomfortable before PLUM.

John's mom reported at pre-test that she did "indoor science" with John, but that she "shied away from messy science" activities outdoors. She reported that she usually let John do "those things at his grandmother's house" instead. But, after trying all the PLUM activities, she reported that "seeing how much fun John had and how easy they were (and not messy)" she realized that "we can do this kind of thing more often and we should do it more often" at home. Moreover, she reported that PLUM changed her view of how "outdoorsy" they truly were, as a family, before they did the activities: "When we first talked with you, I felt like he and I are such outdoorsy people…until I looked at the activities, until we started like going through the activities and actually trying to apply them to our environment. Now, I am like, 'Wow, I don't feel like we're as 'naturey' as we thought we were.' We need to do more of this kind of thing all the time!"

Moreover, John's mom reported that PLUM changed the way she views her surroundings now: "I think when we go to the park it makes me observe my surroundings a little bit. I ask myself

now, ‘What is here? Let's look at what's here. Oh, look at the shape of that tree.’ I am…noticing the nature itself, not just paying attention to the purpose why we're there but being kind of like relevant to the surroundings. I'm saying PLUM makes me think more about my surroundings.”

At pre-test, Jasmin’s mom reported that she was uncomfortable doing anything science-related with Jasmin because “she was still too young.” She reported that she was “pleasantly surprised” by the PLUM activities: “I liked PLUM. And then every time I told her, ‘let’s do the Waggle Dance,’ she would do it, even at the park, without getting embarrassed with the other kids or the other people. So, I liked the whole aspect…it gave us a bond together. I had no idea that she could learn something like this at such an early age. Before this, if I was with her at the park she wouldn't be wanting to look about nature or learn about she would want to play with her friends, go on the swings, the slide. So, it was definitely a good experience because, you know, we never ever have learning experiences at the park. So, this was a first.”

Before PLUM, Darius’ mom was unable to really describe any nature or science activities that they had done as a family, even though she described herself as “absolutely comfortable” doing science. After doing three different PLUM activities, Darius’ mom reported that she was more motivated to “do things like this” in the future with Darius’ little brother, since Darius “didn’t get much out of the PLUM experience” but his little brother did. She explained that while “sports are good for the kids” she also loved seeing the excitement on her son’s face when he made the Seed Blaster or “caught little things” in the wind. She explained further:

Darius' Mom: Well, I really liked the learning part. You learned while having fun. I like being able to do the activities outside as a family. Because usually when we go to the park, we do the same thing, ride bikes or play in the playground. It was just something different to explore.

CEG: Did these make you feel any differently about exploring nature or science with the kids?

Darius' Mom: Yeah it kinda causes them to notice things more, and you know, look for things, instead of just doing your routine outside, you're actually opening your eyes to nature and seeing what's out there. 'Cause you might not notice otherwise.

Kamal's stepdad was initially hesitant about doing PLUM because he expected to need a high level of science knowledge to manage the activities with Kamal. But, after doing the activity, he reported that he was quite relaxed now and realized that "he could do these kinds of things with Kamal outside without any special academic preparation." He reported that he was still nervous, however, about how he would be able to keep Kamal's attention when they are outside (which is not something PLUM purports to help with).

Carlos' mom was "very comfortable" exploring science and nature before PLUM, but she reported that PLUM made her interested in doing more with him: "I didn't think I would want to do more stuff outside with him in nature, but, honestly, I really loved it. I can see us doing this more now. PLUM gave me new things I can try with him, because, as I told you before, I'm not an outdoors person."

Expected Impact 7: Parents will spend more **time** exploring nature with their kids as a result of using the PLUM resources.

Parents reported that they expect to spend more time exploring nature with their kids as a direct result of using the PLUM activities.

The study was not longitudinal, so we did not measure long-term impacts of PLUM on the families. But, in addition to discussing parents' motivation and comfort exploring nature and science with their kids (Impacts 5 and 6), we did discuss parents' *intentions* to spend more or less time exploring nature with their kids as a result of using the PLUM resources.

All parents, except one (Kamal's stepdad), reported that they intended to spend more time exploring nature with their kids and that they would use PLUM activities or similar activities to support that exploration:

- *Definitely, we will use PLUM outside more. Kala loved it and it was fun for me, too.* (Kala's mom)

- *John's not going to let me forget the Seed Blaster activity. I think we'll be outside doing that a lot. I probably won't use the printouts, but we will definitely get outside and*

explore our neighborhood more now that he's excited to look for stuff everywhere. (John's mom)

- *I think so 'cause it gave us new ideas. It could help us go outside more (weather cooperating).* (Carlos' mom)

- *I will do more of this outside with [my younger son]. With Darius, we're definitely open to it, so if there's projects for school like this we have to do, we'll definitely be more eager to do it, because we did have a good time completing them.* (Darius' mom)

- *We definitely will spend more time exploring nature and using PLUM. Jasmin definitely wanted to try all the activities out. I'm sure next time we go to the park she's gonna want to do the Waggle Dance. I'm sure of it.* (Jasmin's mom)

Other Feedback on Plum Landing

All but one of the kids reported that they enjoyed the PLUM activities.

- *They were really fun…nature is my thing!* (Carlos)

- *I loved everything about the activity (Seed Blaster)… Even the bug part. The bug part freaked me out but I still liked it.* (Carlos)

- *They were all pretty fun, but I enjoyed Seed Blaster the best. Making it was fun. It was pretty easy.* (Darius)

- *I loved PLUM!* (Kala)

Parents reported:

- *The activities were very easy to understand. I thought it was very easy to access, very easy to understand. I thought it was put together very nicely.* (Carlos' mom)

- *It seems like it's a good age for him.* (Carlos' mom)

- *John could not wait to do the Seed Blaster activity.* (John's mom)

Three parents reported that they were constrained by weather or geographic limitations:

- *I think some of the activities are not necessarily geographically doable. We don't really have squirrels here. We have like the little lizards and we have a lot of random birds. Just, you know, random birds so we won't really see squirrels. They're just, this isn't a "squirrely" state or something.* (John's mom)

- *It would've been even better if it was geographically relational to our season right now. I'm trying to think of what will we go out and collect…maybe something related to a rock garden, something that kids do around this area?* (John's mom)

- *Most of them were really fun. There's the one, the wind catcher. It was kinda hard for us to do, because it hasn't really been too windy here, and it said to like find some dirty grimy buildings and we don't really have that in our neighborhood. And I guess we could've traveled to the bigger cities to do it but we just didn't do that.* (Darius' mom)

- *We wanted to do the water ones but we didn't get any wet weather.* (Carlos' mom)

Parents of older kids reported that, in their view, the activities seemed too young for 8 and 9 year-olds:

- *If we have a video showing some other kid doing it, he's more of likely to do it. Especially an older kid. He's really into YouTube videos and he watches kids who are bigger than him. He watched PBS Kids when he was five and six, he'd watch Wild Kratts, but he pretty much saw them all. He's not into that anymore. He's into like big things that are, I don't know, a higher level.* (Kamal's stepdad)

Two parents reported that the activities required too much work. Notably, these were the parents of the two oldest kids in the sample, who were also the least enthusiastic:

- *We were going to do the other one with the scenes, but he didn't want to do that because it was too much work. Because we had to get all these tubes and stuff. The instructions were like two pages long. I have a hard time reading the instructions and making sure he's paying attention. Just after ten seconds, he's in his own world sometimes.* (Kamal's stepdad)

- *Some took longer to prepare than others, like the Seed Blaster, you had to build something. So I guess just, you know, I guess it just depends on how much time you have in your hands. We're usually busy after school with homework and sports, and on the weekend, same thing, birthday parties, sports, so it's just hard to like carve out a lot of time to do these.* (Darius' mom)

Two families viewed the animated videos. One family reported enjoying the videos (Jasmin's family), while Kamal reported that he did not enjoy the videos. Kamal's stepdad explained that "he's into YouTubers now" so the PLUM videos seemed too "young" for him.

Finally, John's mom kept a log of their activities and she shared it with us as a way of providing feedback on each activity (see call out below). She noted specifically what adaptations they had to make and what challenges they encountered, including weather and geographic constraints.

1. Seed Blaster 20 minutes
The lighter the weight of the objects put into the tube, the easier it is for the blast to take place. Our objective was to create a confetti pop launch. Because scissors are part of the activity, it's important that an adult helps the child put together the balloon on the tube, and the taping on the tube. It is better to use confetti that is not harmful to the planet, so ripped up leaves from a bush are a good start! But when we attempted...the toilet paper roll wouldn't fit the balloon because the balloon was too small. Fail. lol.

2. Waggle Dance 15 minutes
Fun game of hide and seek with a little boogie. Even if there wasn't bees we could see, we could pretend that there are certain bushes or flowers that might provide food for the bees. Dancing is always a fun activity for any age.

3. Animals Among Us 10 minutes
Good timing! I opened the front door the other day, and John instantly saw a little lizard running into our house. He got down low and immediately tried to get as close as he could, but these little creatures are super fast.

Since this was not our first encounter chasing them in our house, we know we will probably not catch them because they run behind furniture.

4. Fly It and Spy It 10 minutes
We have a lot of ants in our community and at the park, so I have to wash all the balls we take with us to play with. John is not afraid to get dirty, but he does brush off the balls as he is playing with them. Red ants are no fun to get bitten by. We have queen palm trees, and the black ants from there are constantly an enemy. Worms are not that popular in this area.

5. Wind Catcher 1 day
We took a small paper plate, punched a small hole in it, and then hung it with duct tape wrapped around it in an area that has a little bit of wind. After a day, mostly just dirt was attached to the tape on the plate, but John learned that there is a lot of dust and stuff flying through the air.

6. Splash and Dry
We tried, but had to skip this one, there is a bit of a drought in our zip code right now.

7. Mission Water
It only rained one day this week that created puddles, and John knows the water where the birds gravitate to is near a grate in the middle of the road. If the rains are heaving and long, the streets will flood a bit. He can often see birds dancing and jumping and trying to drink from the puddles.

Chapter 3: Family-Facilitated Program Study

Overview

The second component of the evaluation was a qualitative study that included data from six family-focused events facilitated by informal educators at five nature-based, family educational programs from across the country (hereafter referred to as family-facilitated programs).

The six events were based in Alabama (two events), Georgia, Utah, California, and Massachusetts. All of the programs served primarily low-income, urban families, although only three of the programs were actually located *in* urban locations. The rest were located *near* urban locations. The final sample included 10 educators (five from a single location, two from second location, and one from each of the remaining locations), 27 parents/caretakers, and 22 kids who completed surveys on their own or with help from their parents. The kids ranged in age from five to 12, with an average of 7.6 years.

Programs enrolled in the study were provided with the PLUM LANDING Explore Outdoors Toolkit (PLUM Toolkit) and were asked to collect post-test surveys from kids and parents. All informal educators were also surveyed at the end of the program. We conducted telephone interviews with three educators and three parents who were willing to be interviewed after the surveys were collected.

Objectives

The family-facilitated program study was designed to explore the following project outcomes:[5]

Kids' Outcomes

Expected Impact 2: Kids' **motivation** to explore the environment will increase as a result of using the PLUM Toolkit.

Expected Impact 3: Kids' **attitudes** about nature, including appreciating nature in their local environments and feeling more connected to nature, will be more positive as a result of using the PLUM Toolkit.

Expected Impact 4: Kids will learn environmental **science content** as a result of using the PLUM Toolkit.

Parents' Outcomes

Expected Impact 5: Parents will be more **motivated** to explore environmental science with their kids, as a result of using the PLUM Toolkit.

Expected Impact 6: Parents will be more **comfortable** exploring environmental science with their kids, including knowing how to find nature in local neighborhoods, as a result of using the PLUM Toolkit.

Informal Educators' Outcomes

Expected Impact 8: Educators will be more **motivated** to explore environmental science with kids, as a result of using the PLUM Toolkit.

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[5] Each study assessed a different set of outcomes, although there is overlap in several of the studies.

Expected Impact 9: Educators will be more **comfortable** exploring environmental science with kids, including knowing how to find nature in local neighborhoods, as a result of using the PLUM Toolkit.

Study Design

Participant Recruitment

WGBH assisted with recruitment of family-facilitated programs by reaching out to national out-of-school time (OST) program partners to let them know about the study. Programs that expressed an interest in the study contacted CEG directly.

Programs were qualified for the study if they:

- Served urban and/or low-income families with at least one child between the ages of 6 and 9 years old,
- Had access to the internet, and
- Would agree to try at least one PLUM Toolkit activity with a group of families and collect surveys at the end of the session.

We offered family dyads (one parent and one child) an incentive of $25 for their participation in the study. We also offered educators an incentive of $25 each.

Methods and Procedures

Upon enrollment in the study, each program received a set of detailed instructions for accessing the PLUM Toolkit online, using the activities with families, and for administering surveys (online or on paper).

After conducting an orientation meeting with each educator, CEG instructed educators to explore the PLUM Toolkit and to try leading one or more of the activities with a group of families at their center. We did not prescribe which of the activities they should try, but we did

provide them with a list of activities in order of preference in cases where they might be looking for some guidance.[6]

The science activities (and the "big ideas" that they covered) are listed below in order of preference:

- **Seed Toys -** Plants can't move on their own. They depend on wind, water, animals, and explosive force to take their seeds to new places where they can sprout and grow.

- **Waggle Dance -** Bees and flowers depend on each other to survive and thrive.

- **Animals Among Us -** City animals learn to live with people by hiding or fleeing from us, or by getting used to being around us.

- **Fly It and Spy It -** Animals live in places where they can find food, water, shelter, and space to survive.

- **Wild Wind -** City structures change the direction and speed of wind. We can observe wind direction and speed by the wind's impact on bubbles, leaves, and other objects.

- **Hot Water -** When water dries up, or evaporates, it carries away hot air, making things cooler. Heat speeds up that process.

- **Rain Detective -** Before a rainstorm, the amount of moisture in the air and the air pressure change. Those changes affect animals, plants, and the sky.

- **Water Ins and Outs -** Water passes through grassy surfaces, soil, plant leaves, and human skin because they have tiny holes. Water flows or puddles over solid surfaces like pavement.

After completing the activities with families, we asked educators to administer surveys to parents and their kids, in cases where kids could read and write. The surveys were based, in

[6] WGBH provided a list of activities in order of preference—meaning those activities for which they were most interested in receiving feedback. Programs did not have to follow the list in order, or at all, but were provided in case the programs didn't have a clear preference for where to start.

part, on questions developed and used by EDC to collect data during earlier phases of the project.[7] EDC did not collect data from kids during its implementation study. So, we modified a number of questions so they were accessible to young children. We also allowed for parents to assist kids in completing the surveys in cases where kids needed some reading or writing support, instructing parents to respond only as their child instructed and not to add their own comments or responses to the child's survey.

The child surveys (Appendix C) were designed to measure kids' environmental science-related habits of mind, motivation, attitudes, and content knowledge. They also asked kids to evaluate the PLUM Toolkit.

The parent surveys (Appendix D) were designed to measure parent's motivation and comfort. They also asked parents to evaluate the PLUM Toolkit. The parent survey was offered in English and Spanish.

Educator surveys (Appendix E) were designed to measure educator's motivation, comfort, and evaluation of the PLUM Toolkit.

We invited a small subset of families and educators to participate in a follow-up interview by telephone after the study ended to gather more in-depth feedback beyond the survey data (Appendices F and G).

Study Limitations

The study was a small-scale, descriptive study designed to shed light on how families in family-facilitated program settings used the PLUM Toolkit and its potential for short-term outcomes. Because the sample is small, it may not be fully representative of all the different types of families in the PLUM target audience. Despite this limitation, the findings from the study are descriptive and provide some evidence of the level of promise offered by PLUM resources.

[7] Goldstein, M. et al., (2017). PLUM LANDING Explore Outdoors Toolkit: Phase 5 Implementation Study. New York: Education Development Center.

Participants

Program Characteristics

The characteristics of the family-facilitated programs are summarized in the table below. Three of the programs were actually located in urban settings, but all informal educators reported serving urban families in their state. Roughly 80% of the families served by the programs were classified as low income by the informal educators. More than half of the families served by the programs were Latinx, African-American, and/or Asian (51%).

Table 3-1:
Family-Facilitated Program Characteristics

Site	Type	State	Urbanicity	% Low income	% White	% Latinx	% Black or African-American	% Asian
1	Park or Zoo	AL	Rural	90%	40%	10%	40%	10%
2	Park or Zoo	AL	Rural	90%	40%	10%	40%	10%
3	Family Education	CA	Suburban	100%	100%	0%	0%	0%
4	Park or Zoo	GA	Urban	100%	10%	50%	40%	0%
5	Library	MA	Urban	50%	60%	15%	20%	10%
6	Park or Zoo	UT	Urban	50%	50%	40%	10%	0%
	Averages			**80%**	**50%**	**21%**	**25%**	**5%**

Educators reported that the following factors typically prevented the families they served from getting outdoors more often:

- *Nature is uncomfortable for my kids and families because of things like heat or bugs.*
- *My kids and families are just not interested in spending time in nature.*
- *My kids and families might get hurt in a nature area (from animals, or they might fall, or get lost).*
- *My kids and families don't feel welcome among the other people in nature areas.*
- *Gangs or crime make the nature areas unsafe for my kids and families.*

- *It costs too much to do activities in nature.*
- *My kids' and families' health keeps them from doing activities in nature.*

Parents echoed these same challenges with being able to spend time outdoors in their areas. One parent added that she will not let her child play outdoors due to allergies and asthma.

Kids' Characteristics

The kids' background characteristics are summarized in the table below. The sample contained an equal proportion of males and females. The average age of the kids was 7.6 years overall. There were a large number of kids from Alabama because that program held two different events at two different locations (on different dates). In addition, more kids attended the programs in other states than is reflected in the table, but they did not complete surveys.

Table 3-2:
Kids' Background Characteristics

	TOTAL Count & Percent
	N = 22
Gender	
Male	11 (50%)
Female	11 (50%)
State	
Alabama	13 (59%)
Utah	4 (18%)
Georgia	2 (14%)
California	1 (5%)
Massachusetts	1 (5%)

Parents' Characteristics

The parents' background characteristics are summarized in the table below. The majority of the participants were mothers (20 of 27). The rest were fathers (4 of 27) or grandmothers (3 of 27). All participants reported that they were low income. Nineteen out of 27 were white, 5 of 27 were Latinx, and 3 of 27 were Black or African-American.

Table 3-3:
Parents' Background Characteristics

	TOTAL Count & Percent
	N = 27
Role	
Mother	20 (74%)
Father	4 (15%)
Grandmother	3 (11%)
State	
Alabama	15 (56%)
Utah	5 (19%)
Georgia	4 (15%)
California	2 (7%)
Massachusetts	1 (4%)
Race/Ethnicity	
White	19 (70%)
Latinx	5 (19%)
Black or African-American	3 (11%)
Household Income	
Low	27 (100%)

Findings

How Family-Facilitated Programs Used the PLUM Toolkit

The number of programs that implemented each of the activities from the PLUM Toolkit is summarized below. Each of the activities was tested at least once. One program (in UT) met twice so they were able to do five activities total.

- Animals Among Us (n = 3)
- Seed Toys (n = 2)
- Waggle Dance (n = 2)
- Rain Detective (n = 2)
- Fly It and Spy It (n = 1)
- Wild Wind (n = 1)
- Hot Water (n = 1)
- Water Ins and Outs (n = 1)

We asked educators to report on how they prepared for each PLUM Toolkit session. Most educators reported that, for each time and for each activity, they gathered all the materials, prepared all the materials, watched the videos, scouted out a good place to do the activity, made copies of the handouts for families, practiced the activity beforehand, and made a demonstration item for families to see.

We also asked educators to report how they implemented the activities with the families. All educators reported that stayed true to the Toolkit guidance and did the warm-up activities, main activities, and wrap-up activities for each session. At four of the six events (all but the ones in Alabama), the educators reported that they watched all the videos with the families. The Alabama events did not use the videos "because the videos were hard to use outside." All of the programs provided handouts to families at the end of the events. Below is a brief description of each program event:

Alabama: The nature program held two separate events. In one event, they tried two activities, Waggle Dance and Seed Toys. In the other event, they tried one activity, Animals Among Us.

They did not watch the videos at either event. According to one educator, they did make an adaptation, “We went on a hike afterwards.”

California: The nature program tried a single activity, Animals Among Us. An educator reported, “I created my own nature sheets for the activities to help with further learning with our group.”

Georgia: The nature program tried two activities, Animals Among Us and Hot Water. One educator reported, “We would often add in our own simple craft to do at the end of the program (if there wasn't one included in the lesson) for kids to take something home. We supplemented many of our lessons with our own collections of animal skins and skulls to enhance the visual and sensory experience.”

Massachusetts: The nature program tried two activities, Rain Detectives and Water Ins and Outs. One educator reported, “Kids love playing in water.”

Utah: The nature program in Utah held two sessions, so they were able to try five activities: Rain Detective, Seed Toys, Waggle Dance, Fly It and Spy It, and Wild Wind. One educator reported, “We added a craft to Rain Detective as well as Waggle. For Waggle Dance we made little bees out of a can that were filled with rolled paper so that they could hang them and have the native bees lay their eggs in them. For Rain Detective we made little rainmakers out of toilet paper tubes. Generally, games and crafts worked well, especially ones that weren't very weather dependent.”

Kids’ Outcomes

Expected Impact 2: Kids’ **motivation** to explore the environment will increase as a result of using the PLUM Toolkit.

PLUM activities—including the videos and hands-on activities—helped kids in family-facilitated programs feel more motivated to explore outdoors.

When we asked kids to tell us whether the PLUM activities made them want to learn more about science, 21 out of 22 kids reported that they did. Most parents confirmed this, with 24 of 27 reporting that the PLUM activities made their kids want to learn more about science.

Likewise, we asked kids to tell us whether the PLUM activities made them want to spend more time exploring outdoors. Again, 21 out of 22 kids reported that they did. Nearly all the parents—26 of 27—confirmed that the PLUM activities made their kids want to spend more time outdoors.

Kids told us they enjoyed…

- *Being outside in nature.*
- *Just exploring more nature.*
- *Seed party and habitat building.*
- *Using our imaginations to create a way to get seeds from one side to another.*
- *I liked the Coyote and Rabbit game.*
- *Got to make a fun bird sound craft, running games were fun.*
- *Fun and got to meet new kids.*
- *Games like bee and pollen.*
- *It was really fun, and I like that we learned about animals.*
- *I liked that we had hands-on activities and outside activities.*
- *I thought it was very cool. I liked the seed activity. I didn't think it would work because of the paper clip. I thought it would be too heavy.*
- *Making things so I understood how things work. Spending time with my parents and brother learning about nature.*

Expected Impact 3: Kids' **attitudes** about nature, including appreciating nature in their local environments and feeling more connected to nature, will be more positive as a result of using the PLUM Toolkit.

PLUM activities in family-facilitated settings enhanced kids' attitudes about nature, including helping them feel more connected to and excited about exploring nature in their own backyards.

All 22 kids—no matter how old they were—reported that they enjoyed the PLUM activities. All 27 parents agreed that their kids had fun with the PLUM activities. This finding was further

corroborated by the educators—all but one educator reported that the kids in their programs had fun with the PLUM activities. One educator wasn't sure.

Educators noted:

- *Kids loved the Waggle Dance especially. They had fun running around and gathering pollen as well.*
- *The kids were active and enjoyed the activities.*
- *The hands-on activities were great and my kids loved them.*
- *The demonstration was simple and understood by the students. It was a great hands-on experience for them.*
- *Simple running/chasing games are always fun and easy to explain.*
- *The Waggle Dance worked really well because it was an interactive game and the kids seemed to really enjoy playing games.*
- *I think Fly It and Spy It worked the best. The kids LOVED looking for bugs and I think they really enjoyed that one the most.*
- *The kids loved the craft for Wild Wind, I think they played the most with that craft and luckily that craft was easy for them to do and there was no way anyone could get hurt with it.*

We asked kids whether the PLUM activities helped them think of new things they could do outside—20 out of 22 reported that they did.

We asked kids whether they recognized that their neighborhood had animals, plants, weather, and water that they could explore—19 out of 22 recognized that they had nature in their neighborhoods.

We also asked kids whether the PLUM activities helped them think of new places they could explore in their neighborhoods—16 out of 22 reported that they did. Most parents agreed (22 out of 27).

Expected Impact 4: Kids will **learn** environmental science content as a result of using the PLUM Toolkit.

PLUM activities in family-facilitated settings helped kids learn environmental science content.

We asked kids whether the PLUM activities helped them learn something new that they didn't know before—22 out of 22 reported that they did. For example, some kids told us they learned:

- *How to walk quietly like an animal.*
- *How animals use camouflage to hide.*
- *Bees can dance.*
- *How bees work together, how seeds can travel, spotting different trees, birds, and insects. Also about rain.*

Most parents agreed—24 of 27 agreed or strongly agreed that the PLUM activities helped their kids learn about science and 25 of 27 agreed or strongly agreed that the PLUM activities helped their kids learn about nature.

Parents told us that their kids learned:

- *How flowers grow.*
- *How to water a plant and plant structure.*
- *How plants spread their seeds and also about the wind and the direction of the wind.*
- *How plants transfer water from roots to flower.*
- *The natural difficulties bees face.*
- *Bees do a dance.*
- *How colors make dangerous animals more striking.*
- *How to hear the hidden animals.*
- *Sounds made by animals. Because certain sounds are important, animals depend a lot on sound to communicate and survive.*
- *What is around her in our town.*
- *They learned about the diversity we can experience in even a very small area and how teaming with life even a small patch of grass can be.*

All 10 educators reported that the PLUM activities taught the kids in their programs about nature and nearly all the educators—9 of 10—agreed or strongly agreed that the PLUM activities taught the kids in their programs about science.

Educators told us:

- *The kids learned how seeds disperse and how bees communicate.*
- *It was eye opening for many to see just how much wildlife can be discovered, and how many activities can be performed, even in a small park with limited trails.*
- *It was more of awareness of what is around them.*
- *I think they learned a lot about bees, seeds, rain, wind, and small wildlife.*

Parents' Outcomes

Expected Impact 5: Parents will be more **motivated** to explore environmental science with their kids, as a result of using the PLUM Toolkit.

PLUM activities in family-facilitated settings helped motivate parents to want to spend more time exploring science and nature with their kids.

All but one parent (26 of 27) reported that they enjoyed the PLUM activities. All but one also reported that the PLUM activities made them feel more like exploring nature with their kids. Twenty-four of 27 reported that the PLUM activities made them feel more like exploring science with the kids.

Parents told us they enjoyed watching their kids have fun while learning, hands-on activities, learning something themselves, and the use of media and play. Parents reported that motivating factors included:

- *Watching the kids enjoy [PLUM].*
- *Nature facts, plants, animals.*
- *Hands-on learning.*
- *That the kids got to play outside.*

- *Seeing him having fun learning without knowing he was learning.*
- *Learning about bees myself!*
- *I enjoyed going outside to do the activities; and I think there was seed yoga that was fun and planting the sunflower seeds. The activities were very simple to make and it made me feel like it would be easier than I thought to do activities like this at home.*
- *I learned a lot in a low-pressure environment. It was extremely relaxing and enjoyable!*
- *That the lessons allowed my son to express himself.*
- *That they get to watch videos about what they are going to be learning.*
- *Watching my kids run around and be excited about God's beautiful creation.*
- *Being involved with my kids while learning about nature's wonderful glories.*
- *Seeing my kids having interest in discovering new things related to nature.*

All but one educator (9 out of 10) confirmed that the parents in their program enjoyed the PLUM activities. One reported, "[PLUM] got the parents participating." One educator wasn't sure whether parents enjoyed the activities.

Expected Impact 6: Parents will be more **comfortable** exploring environmental science with their kids, including knowing how to find nature in local neighborhoods, as a result of using the PLUM Toolkit.

PLUM activities in family-facilitated settings helped parents feel more comfortable and knowledgeable about exploring science and nature with their kids.

Nearly all parents—26 of 27—reported that the PLUM activities helped them have more ideas for exploring nature together with their kids.

Most parents—24 of 27—reported that the PLUM activities helped them feel more comfortable teaching their kids about the world by exploring nature with them.

Most parents—22 of 27—also reported that the PLUM activities made them more comfortable helping their kids learn science.

Informal Educators' Outcomes

Expected Impact 8: Educators will be more **motivated** to explore environmental science with kids, as a result of using the PLUM Toolkit.

PLUM activities helped informal educators in family-facilitated settings become more motivated to explore science and nature with the kids in their programs, even though all the programs already focus on nature-based learning.

All 10 educators reported that they had fun with the PLUM activities. Nine of the 10 educators reported that the PLUM activities made them more motivated to explore *science* with the kids in their programs, while eight of the 10 educators reported that the PLUM activities made them more motivated to explore *nature* with the kids in their programs. The others reported that they already were highly motivated.

Expected Impact 9: Educators will be more **comfortable** exploring environmental science with kids, including knowing how to find nature in local neighborhoods, as a result of using the PLUM Toolkit.

PLUM activities helped informal educators in family-facilitated settings become even more comfortable exploring science and nature with the kids in their programs—and gave them more ideas for doing so.

Nine of the 10 educators reported that the PLUM activities made them feel more comfortable helping their kids learn science and helping their kids learn about the world by exploring nature with them.

All 10 educators reported that the PLUM activities gave them more ideas for how to explore nature together with the kids in their programs.

Other Feedback on the PLUM Toolkit

All 10 educators reported that they plan on using the PLUM Toolkit again in the future and that they would recommend the PLUM Toolkit to other, similar programs, because PLUM was **fun, easy to use, well-organized, inexpensive, and gets kids outside**. For example, they told us:

- *[PLUM] offers good programs that are easy to use.*
- *[PLUM was a] great experience for kids for almost no cost.*
- *Kids need to spend more time outside, and this is the perfect way to do that!*
- *I would recommend the program to others. It was hands-on learning, and it was in nature. Kids don't get out in nature much anymore since they are playing on devices.*
- *The lessons are well written, fun, and inexpensive to execute.*
- *The [PLUM] curriculum has a lot of fun activities.*
- *I was very impressed with how organized these lesson plans were and the information on them was great. I also loved the crafts and games.*
- *As an educator, I like how the lessons are laid out. They are relevant no matter where you live.*
- *We have a monthly after school nature program and activity ideas [like PLUM] are always welcome.*

We asked educators how PLUM differs from other programs they have used in the past. They told us PLUM offers:

- *More structured lessons.*
- *[More] hands-on activities and gets kids outside in nature.*
- *[A more] educational approach than some of our programs. Great!*

Educators described some challenges they faced with respect to technology, time management, differentiating the lessons for kids with different learning needs, and weather:

- *The videos were hard to use outside.*
- *We did not have access to technology at the park to show videos or use apps.*
- *Time management...some activities took longer than others.*

- *There was a lot of unstructured time when a few finished early.*
- *I think there was a little too much down time during the activity...which allowed for a few behavior problems with some kids.*
- *We have a lot of very young kids and kids with developmental disabilities who struggled with the scientific learning aspects.*
- *The Rain Detective was a little information-heavy and I think they might have gotten a little bored with that one a little bit. They still enjoyed it, they just enjoyed the others a little bit more I think.*
- *It was a little tricky because we did this in the colder months so things that had to do with evaporation just would not work such as the one where you tie a plastic bag around a plant and come back later to see the water inside the bag. So the lessons that did not require it to be hot outside worked well.*

One program raised concerns specifically about the approach used in one lesson:

- *Animals Among Us one was a little conflicting because we teach a program here where we teach that when you see wildlife it's best to leave them alone and just watch us from a distance. We didn't love that that lesson plan encouraged kids to try and get as close as they can to wildlife because that is usually what leads to human/wildlife conflict such as when people get too close to moose because they want to get a selfie with it and they the moose attacks them.*

Parents also commented on the challenges they faced in using the PLUM activities, related mainly to weather, insects, lack of educator preparation, time management, and technology. For example, parents told us:

- *My child noticed the teacher read from paper a lot.*
- *Sometimes it was unclear at first what our teachers were trying to teach with the activities.*
- *It took longer than I expected.*
- *The timing of the lessons was not clear.*
- *We aren't much of a television/screen family so did not watch the links provided.*
- *Hard for the kids to watch the videos.*

- *[Too much] heat*
- *[Didn't like the] rain*
- *[Too many] Bugs*
- *[It was] a little long for kids.*

Finally, some kids also reported on what they didn't like about the PLUM activities. For example, they told us they didn't like:

- *Walking.*
- *Rain*
- *I got my feet in the bog.*
- *I didn't know the other kids.*
- *The craft took a lot of cutting.*
- *Not that many kids [attended].*
- *The show was hard to watch on the small screen, hard to hear, too many kids.*
- *The screen was too small to see and not loud enough.*

Chapter 4: Outreach Partner Study

Overview

We conducted telephone interviews with individuals representing 12 different organizations that partnered with the project team on either pilot testing earlier iterations of the PLUM Toolkit or on disseminating information about the PLUM Toolkit to its members locally, across the country, or around the world.

Objectives

The outreach partner study was focused on learning about partners' experiences working with the project resources and team, as well as the successes and challenges they faced in using and/or disseminating the PLUM Toolkit. While the study was not designed specifically to address the expected impacts listed in the Background chapter of this report, much of the data gathered during these interviews actually does shed light and provide some context for the findings related to project outcomes discussed throughout the report. We have highlighted such instances in the Findings section below.

Study Design

Participant Recruitment

WGBH provided CEG with a list of 14 outreach partners. CEG contacted the partners to schedule one-on-one telephone interviews that lasted roughly 30 minutes each. Partners were not offered an incentive for their participation in the study. Two potential participants declined to be interviewed because they had not followed through on disseminating or using the PLUM Toolkit due to too many competing priorities within their organizations (not due to lack of interest in PLUM).

The outreach partner interview protocol (Appendix H) was designed to learn about partners' experiences with the PLUM Toolkit and working with the project team.

Participants

To protect the confidentiality of the interviewees, we have summarized them only by the type of organization they are and their missions (paraphrased) in the table below. While participants were unable to provide exact data on the demographics of the communities they served, all partners indicated that their focus is on under-served communities at a minimum, while some partners strive to reach out to all members of the general public.

Table 4-1:

Participant Types and Organizational Missions

ID	Environmental Focus?	Organization Type	Mission
1	Yes	Nature program	To connect people with nature.
2	Yes	Non-governmental organization (NGO)	To create healthy environments for children.
3	Yes	Community organization	To connect Latino communities with the outdoors.
4	No	Advocacy group	To ensure all children have access to affordable, quality educational programs.
5	Yes	Advocacy group	To create healthy environments for children.
6	No	Advocacy group	To create a world that honors the diverse ways children learn and create.
7	Yes	Community organization	To provide healthy outdoor experiences for children.
8	Yes	Nature program	To connect people to the outdoors.
9	No	Afterschool program	To create a community that improves health and empowers families.
10	Yes	Nature program	To connect children with nature.
11	Yes	Community organization	To connect African-American communities with the outdoors.
12	Yes	Conservancy organization	To reimagine parks as catalysts for social good.

How is PLUM Being Used?

Curriculum

We spoke with a couple of partners who have tried using PLUM with families and/or kids served by their organizations. One of the organizations has successfully adapted PLUM activities into their curriculum, while one of the organizations has not succeeded yet due to challenges recruiting families to participate or informal educators needing support to implement the activities. For example:

- *We incorporated it into our curriculum. For our families, we have a curriculum of maybe 30 different activities that we use. We've also started to train a group of volunteers and we took what we felt were the ones that worked the best in the field, the ones that resonated with people the most, and incorporated them either completely, or took some of the pieces of them and added it in.*

- *We are looking to deliver at least one outing that incorporates the toolkit. We've made two attempts already, and they fell short. One involved an outing where there was only one child there and they weren't able to complete the full activity because the mother and child had to leave early. And then, at the other one, the volunteer leader who delivered the activity kind of went off...and didn't follow the lesson plan, exactly. So we can't really count it as a PLUM activity. Volunteers need a lot of support sometimes.*

Dissemination

We spoke with several organizations that have spread information about PLUM to their members. One organization disseminated information about PLUM at a single event, but had not done anything to spread the word beyond that, primarily because they weren't familiar enough with PLUM and would need more support from WGBH to do additional outreach:

- *We run an annual event and I reached out to WGBH looking for partners. No one from WGBH could come to the event, but they sent some materials from the show and about 250 Scholastic books. That's how we came to know Plum Landing. They gave us these really cool goody bags for the kids. They just sent it to us and there was no explanation*

about it. We poked through it and it looks pretty self-explanatory as far as the little book goes for the kids, you know, discovering your neighborhood and writing things down, but we didn't actually get any pre-information regarding content. So, during our event, we had hundreds of children come through and we passed them out to all the kids. They got books and they got the Plum Landing promotional packet…It's always preferable if we have a representative from that particular organization, but they just didn't have anybody. I'd say in the future it would be great if somebody was there or they could go over and let us know exactly what the content was and how they would like it to be engaged with our members.

Other organizations reported that they made an effort to push information out to their members when PLUM was first made available:

- *Part of our dissemination of the Plum Landing materials was through our blog which is mostly geared towards program director level practices. We also worked on a webinar that included WGBH talking about environmental education in afterschool…We also have a STEM curriculum and activities page on our website, and Plum Landing is linked there.*

  There was a big campaign to get [PLUM] out, especially when it was first coming live. We don't really talk about it anymore. A lot of the parent resources are really useful for folks when they're thinking about what to do with their families. The videos are really helpful, they're really short and sweet. There's tips and tricks for parents on getting kids out. They just boil it down really simply. I think it's also really accessible because the videos are super short.

- *We did a webinar on Plum Landing in November 2017 and the resources that could be useful to our member organizations….We posted it on our website. It reached 54 people as of this year.*

Seven organizations have made dissemination of PLUM an ongoing effort (or have attempted to):

- *We wrote a blog post featuring not just Plum Landing, but also connecting it back to Design Squad Global, which was published on our website, and we also did some pretty big push outs to our network about the materials. We also did a webinar and the webinar featured Plum Landing and Design Squad Global and it featured some of our community partners.*

- *We put a webinar on. Unfortunately, we didn't have a great turnout because of the federal shutdown. That definitely impacted our large reach, but we will be posting it on our training portal once we get that up. We recorded the webinar. But, you know, we put out the announcement for the webinar in our e-newsletter. We also promoted it on our social media, and then we had WGBH write up a guest blog post for our website.*

- *We've promoted it on our social media platforms, which have a pretty wide following.*

- *We've used Plum Landing online tools to help get parents and people who attend our events excited and energized, or to get people organized around specific family nature themes. We used it recently at our national training where we had all 80 leaders that are volunteers who we train about Plum Landing, and then we've had some ongoing education about the platform and how people can use it as one of many tools to help people get outside and have meaningful experiences.*

- *As I communicate with family nature clubs within our network, I mention PLUM. And we distribute the kits to family nature club leaders. Most recently, at a national training we had in partnership with National Park Service, we introduced Plum as a resource among many for facilitating outdoor connection. We also have a webinar coming up and have linked to PLUM from our e-newsletter.*

- *On our website, for the educator section, we have listed all the Plum Landing educational worksheets because we feel that those are really helpful for educators when talking about how to work in outdoor time and nature into their work. Also, we were able to hire a position that is called the Partnerships and Programs Coordinator. This person has been going to a lot of educational conferences, and like train the trainer meetings where she will distribute the educational material, those PLUM worksheets. We've given away hundreds and hundreds of them.*

- *Once I learned about Plum, we just started promoting it through tons of communication channels. So, if I was writing a blog on like fun weekend adventures for families, I would weave in Plum and say, "Go outside and depending on the weather you can use the scavenger hunt app. You can use the online activities if it is a rainy day. You can use some of the actual educator activities, hands-on games and crafts kind of thing to talk about wellness and physical activity and nature with kids." So we used to start layering in the resource to as many places as possible. I'm super sold on STEM as a pathway, and STEM and outdoors is a pathway to help kids get more physical activity. I go to a lot of key out-of-school meetings and do presentations on health and wellness. So one thing I like to do within my sessions is always integrate activities and talk about resources that will help educators meet national standards. So I've definitely mentioned it at conferences a lot.*

Although WGBH did develop a social media kit for dissemination partners to use, several of the partners were not aware their organizations had ever received the kits. It's possible that they came on board after the kits were shared with the organizations. One partner told us: "I would suggest that, if they would like more, they would have more hands-on approach on what they want promoted, and how. They were very much saying, 'we want it promoted,' 'please help us promote this,' but gave us no guidance on how to do it."

Feedback on PLUM Media

Several partners commented positively about the affordances offered by the PLUM app, providing families and informal educators with ways to quickly and easily help their kids engage with nature anywhere, anytime.

- *I think people can definitely use the app, like moms and parents and stuff as they're just like, "What do I do to keep my kid entertained while they're walking?" Oh, you can count the butterflies or look for the different leaves. I think those are some just great suggestions...Like, a good use of smartphones and tech-friendly, in a beautiful way.*

- *I also like that it could just be in your pocket. So, say we're waiting for the bus on the field trip, and you're like, "Oh, my kids are getting antsy. What can we do?" I think it's*

just really pocket-ready for some quick activities to do. [It gives people a way of] actually engaging with being outside.

- *I really love the app. It's so easy and if you have a reluctant kid who does not wanna be outside, does not wanna engage, but really loves technology. You open up the app and there's like counting games, like the count the number of squirrels you see, count the number of dogs you pass, count the number of dogs in cars. As you're walking you can intentionally engage the kids in their environment which really starts to make a difference. I think they really start then to notice, and look, and point things back out to you. You know I really love that app for its simplicity.*

- *The lesson plans are not accessible for some of the families we work with. I felt they were really good for educators, but not so much for the parents of the families that we were working with, but they love the Plum Landing app. So, we would promote that a lot, the different photo scavenger hunts, and scavenger hunts are one of the activities that we'd promote for our program. It's a great way for kids to get outside and find things in nature, so, we have that linked on our website. I think there's a big thing with using the technology as a resource in a new way to do things outside. It is more fun for them than trying to follow a worksheet.*

One partner, who has tried the PLUM Toolkit activities with their families, noted that using the PLUM videos was a challenge in a nature-based setting:

- *How can you do this in a park where there's no connectivity? Some of the curriculum was like "show this video first," and we are like "How the heck are we going to do that?" [If we were standing outside] right now, I'm not sure how we'd play this video. There's also like the glare factor of the screen and tiny screen with 20 people standing around it and things like that. Like those things were just not practical.*

Distinguishing Features

Partners explained how they decided to use or promote the PLUM Toolkit. For all partners, the one important consideration was that PLUM is free. Another consideration that they all took seriously is that PLUM gets people outdoors.

One feature that was important for afterschool programs was the simplicity of the lessons and the amount of preparation required, since afterschool educators typically have very little time to spend preparing or implementing activities with their students. These comments are likely to partially explain the findings from the afterschool study in cases where educators were not able to implement PLUM activities with full fidelity.

- *We typically look for tools that are helpful within the classroom context, but also can be taken up by non-school staff. Capacity is often a challenge for these kind of collaboratives and so we're really looking for the lightest lifts but with the biggest impact for kids. So the fact that, PLUM came with resources, but they were flexible, was really attractive to us and for our partners.*

- *[In deciding which activities to use with my afterschool program] I think there were more than ten activities in each box. I looked for ones that were not the most supply heavy. I mean they provided us with all the supplies, but for what I'm doing, when I have about an hour to program and not a lot of prep, I chose ones that I knew I could complete within an hour. Especially with a group of 12 kindergarten and first graders, I didn't choose ones that were really supply and prep heavy. Using videos wasn't really primarily important, and also I don't use any technology in my programming except for maybe a bird call every now and then on my phone. We're not in a classroom setting where we have computers anyway.*

- *Things that don't necessarily look like the school day are immediately more appealing to us and our audiences. Another thing that we look for is something to be modular. Afterschool programs operate in many different ways and have many different structures. There's not really just one picture of what an afterschool program looks like. That means that materials that we're promoting to the field need to be flexible and need to be adaptable – they can be done in one stint or expanded upon for weeks or months or however long the program wants to engage with that. So, that's another positive element of the Plum Landing curriculum.*

Another feature that was important to partners was the quality of the materials. For example:

- *We want to support high quality, beautifully produced materials that help kids interact and enjoy nature, explore nature, explore outdoors, and I think the main draw for me is that you know that WGBH is going to create good media. It's going to look good, and all the resources, the website and the toolkits and the training videos are going to be good. PLUM is the quality that you expect from PBS Kids.*

- *The materials were beautifully produced and interactive and colorful and user-friendly.*

Another feature that was important to partners was the representation of diverse families:

- *The representation of black people as doers and knowledge-holders was the key [for us].*

- *PBS is a trusted brand to bring a lot of diversity where people are accessing nature, and showing urban and rural environments. So, I think that that definitely makes a difference than the more traditional toolkits out there or platforms or media that you've seen.*

Another important feature to many, but not all, partners was the STEM focus:

- *I think what's the distinguishing factor for us probably is that [PLUM is] intentionally trying to teach science. And we're not necessarily intentionally trying to teach anything other than a love of being outside and the connectiveness of being with your family. So, that makes PLUM different and interesting for us.*

An important feature to some partners was that the activities required simple, accessible, everyday materials:

- *One great thing about Plum are the supplies needed to do the activities are very approachable. It's stuff folks already have on hand...I think that is really important and a great thing about the resource.*

Another important feature to some partners was the fact that PLUM is available in Spanish:

- *It's very unique to find a resource that is completely translated into Spanish. A lot of the resource providers that we work with just don't have the budgets to do that.*

One partner pointed out the importance of the parent engagement element to getting kids engaged and maintaining their interest. This is consistent with our findings which demonstrated better outcomes with respect to motivation, attitudes, and learning among kids, when parents were involved (in the at-home study and the family-facilitated study).

- *STEM education is done best when it connects students to their community around them. And sometimes that's through solving a problem within the community. I think that when you connect to the environment around you, you start to feel more connected to your community and are more likely to engage in solutions to the problems that it may have. So, essentially for the younger age groups like Plum Landing targets, that I think is the first step to environmental consciousness and it's a great one. Especially with the family engagement element as well. When parents are also involved and it helps maintain student interest. So, the fact that the Plum Landing materials also come with a bunch of parent materials is really great, as well as the bilingual element of some of the materials as well.*

Future Directions

One partner had the following suggestion about future directions:

- *One of the things that they can do better, and that we also can do better too, is just making sure that we're fully talking to families and educators themselves and really making sure that what we're creating meets their needs and not what we think might be their needs. We have to be especially thoughtful about that when working in communities where we don't live. [Sometimes we can become] a little "ivory tower," or a little too academic and we resort to the science behind things rather than making sure that we're really realistic about kids' interests and families capacity.*

Appendix A: Self-Directed, At-Home Study—Pre-Test Interview Protocol

Note: These instruments have been reformatted to conserve space in the Appendix. They were formatted for optimal readability when used in data collection.

Thank you for making the time to talk with me today. I'd just like to tell you more about the study, learn more about your family, and give you a chance to ask me any questions before you try the activities. Do you have any questions for me before we start?

To help with my notes, I'd like to audio record this interview. Is that OK with you?

[Start recording – The questions below can be asked in any order, depending on the attention span of the child.]

To child:

- What kinds of things do you like to do when you're not at school?
- How do you like to spend time indoors? How do you like to spend time outdoors?
- How often do you spend time outdoors?
- Is there nature where you live? Please tell me about that.
- Does your neighborhood have animals, plants, weather, and water that you can explore? Please tell me about that.
- Do you like science? Do you like learning about it or not so much?
- I have a list of some things that other kids like to do and some kids don't like to do. I'm going to read the list and ask you whether you like it, OK? You can give me a thumbs up, thumbs down, or in between. OK?

    - Take a walk outdoors
    - Play outdoor games like hide and seek or tag
    - Play a game indoors
    - Look at trees, plants, and flowers
    - Read a book
    - Look for bugs
    - Look for small animals and birds
    - Collect rocks or leaves
    - Play sports
    - Take pictures of nature
    - Learn about animals, plants, weather, or water

- Please complete the following sentence with one word: When I am outdoors in nature I feel _____.

To parent:

- As you know, we are studying a program about nature and science. Some parents do science with their children at home and some do not. Would you say you do science activities with your child? Please explain.
- How about your experiences exploring nature with your child, if you have any?
- How comfortable would you say you are exploring science or nature with your child? Please explain.
- How interested are you in exploring science or nature with your child? Please explain.
- Are there places in your neighborhood where you know you can explore nature? Please explain.
- On average, how much time do you typically spend together exploring nature with your child?
- What kinds of outdoor activities do you and your child do together?
- Do you ever notice the following things about your child:

    - Asking questions about nature (e.g., "What animals and plants live here?" or "How did this plant start growing here?")
    - Noticing things about nature (e.g., that bees are usually found near flowers, or that puddles in the sun dry up faster than puddles in the shade)
    - Thinking about nature (e.g., wondering how changes in the weather could affect animals and plants or thinking about why certain animals and plants look the way they do)
    - Showing curiosity about nature (e.g., asking why certain animals and plants look the way they do, or following an ant to see where it goes)
    - A desire to share new information and ideas about nature (e.g., telling me something he or she learned in school, or describing an interesting thing they saw in nature)
    - Asking to go outside a lot

Appendix B: Self-Directed, At-Home Study—Post-Test Interview Protocol

Thank you for making the time to talk with me today. I'm just following-up on your family's experience with the Plum Landing resources. I'd like to learn a little more detail about what worked and what didn't and to learn more about how you and your child felt about Plum Landing. Do you have any questions for me before we start?

To help with my notes, I'd like to audio record this interview. Is that OK with you?

[Start recording – The questions below can be asked in any order, depending on the attention span of the child.]

To parent:

Let's begin by looking at the Plum website together to jog your memory.

- Can you please tell me which of the Plum Landing resources you used?
- How about the videos?
- And, did you try any of the apps?
- Do you do anything else on the website?
- What type of device(s) did you use to explore Plum Landing?

To child:

- How do you like to spend time indoors? How do you like to spend time outdoors?
- How often do you spend time outdoors?
- Is there nature where you live?
- Does your neighborhood have animals, plants, weather, and water that you can explore?
- Do you like science? Do you like learning about it or not so much?
- I have a list of some things that other kids like to do and some kids don't like to do. I'm going to read the list and ask you whether you like it, OK? You might remember doing this last time we talked. You can give me a thumbs up, thumbs down, or in between. OK?

    - Take a walk outdoors
    - Play outdoor games like hide and seek or tag
    - Play a game indoors

    - Look at trees, plants, and flowers
    - Read a book
    - Look for bugs
    - Look for small animals and birds
    - Collect rocks or leaves
    - Play sports
    - Take pictures of nature
    - Learn about animals, plants, weather, or water

- Please complete the following sentence with one word: When I am outdoors in nature I feel _____.
- Now, let's talk about Plum Landing. Did you have fun trying out Plum Landing with your family?
- What did you enjoy about Plum Landing? [Probe for specific activities, videos, apps, etc.]
- What did you not like about Plum Landing? [Probe for specific activities, videos, apps, etc.]
- What new things did you learn (that you didn't know before) from Plum Landing? Please tell me about that.
- What did Plum Landing teach you about science? Please tell me about that.
- What did Plum Landing teach you about nature? Please tell me about that.
- Did Plum Landing make you feel more or less like learning about science? Please tell me about that.
- Did Plum Landing make you feel more or less like spending time outdoors exploring nature? Please tell me about that.
- Did Plum Landing help you think of new places you could explore in your neighborhood? Please tell me about that.
- Did Plum Landing help you think of new things you can do outside? Please tell me about that.

To parent:

- Can you talk in general terms about what the Plum Landing experience was like? Was it fun, did you enjoy it, etc.
- How was Plum Landing different, if at all, than other things you do with your child(ren)? And, when I say Plum Landing, I am referring to all the things you did on the website or offline, hands-on activities or apps.
- What did you like about Plum Landing? [Again, probe for specific components]
- What did you not like about Plum Landing? [Again, probe for specific components]
- Did Plum Landing make you feel any differently about exploring science or nature with your child? Please explain.
- Did Plum Landing make you feel any more or less comfortable exploring science or nature with your child? Please explain.

- Did Plum Landing make you feel any more or less like you wanted to explore science or nature with your child? Please explain.
- Did Plum Landing give you any new ideas about ways to explore nature with your child? Please explain.
- Did Plum Landing make you feel like you were more able to explore science or nature with your child? Please explain.
- On average, how much time do you typically spend together exploring nature with your child? Has this changed as a result of the Plum Landing activities? If so, please explain.
- Do you think your experience with Plum Landing will change the kinds of outdoor activities your family will do in the future? If so, please explain.
- Have you noticed any of the following in your child after doing the Plum Landing activities?

    - Asking questions about nature (e.g., "What animals and plants live here?" or "How did this plant start growing here?")
    - Noticing things about nature (e.g., that bees are usually found near flowers, or that puddles in the sun dry up faster than puddles in the shade)
    - Thinking about nature (e.g., wondering how changes in the weather could affect animals and plants or thinking about why certain animals and plants look the way they do)
    - Showing curiosity about nature (e.g., asking why certain animals and plants look the way they do, or following an ant to see where it goes)
    - A desire to share new information and ideas about nature (e.g., telling me something he or she learned in school, or describing an interesting thing they saw in nature)
    - Asking to go outside more than before

- Did you or your child learn anything from the activity that you didn't know before? Please explain.
- Is there anything else you'd like us to know about your experience with the Plum Landing activities?

Appendix C: Family-Facilitated Program Study—Child Survey

We are doing a survey of kids who used the PLUM LANDING activities to learn what they think about science and nature.

Please answer the questions as honestly as you can.

If you do not understand a question or don't want to answer it, you may skip it. Thank you!

---

1. Name _____
2. What state do you live in? _____
3. Where did you do the family activity today? _____
4. How old are you? _____
5. Are you a… *(Choose one)*
    a. Boy
    b. Girl
6. Does your neighborhood have animals, plants, weather, and water that you can explore? *(Choose one)*
    a. Yes
    b. No
    c. I don't know
7. After doing the Plum Landing activities, did you want to learn more about science? (Choose one)
    a. Yes
    b. No
    c. I don't know
8. After doing the Plum Landing activities, did you want to spend more time outdoors exploring nature? (Choose one)
    a. Yes
    b. No
    c. I don't know

9. Did the Plum Landing activities help you think of new places you could explore in your neighborhood? (Choose one)
    a. Yes
    b. No
    c. I don't know

10. Did the Plum Landing activities help you think of new things you can do outside? (Choose one)
    a. Yes
    b. No
    c. I don't know

11. Did the Plum Landing activities help you learn something new that you didn't know before? (Choose one)
    a. Yes
    b. No
    c. I don't know

12. What did you learn from Plum Landing?

13. Did you like the Plum Landing activities? (Choose one)
    a. Yes
    b. No
    c. I don't know

14. What did you like about the Plum Landing activities?

15. What did you NOT like about the Plum Landing activities?

Appendix D: Family-Facilitated Program Study—Parent Survey

We are doing a survey of parents who used the PLUM LANDING activities to learn what they think about science and nature. Please answer the questions as honestly as you can. If you do not understand a question or don't want to answer it, you may skip it. Thank you!

---

1. Your name (first and last) _____
2. Your child's name (first and last) _____
3. Your child's age _____
4. What state do you live in? _____
5. Where did you do the family activity today? _____
6. Are you a… *(Choose one)*
    a. Mother
    b. Father
    c. Other: _____
7. Are you… *(Choose all that apply)* [Optional]
    a. White or Caucasian
    b. Latino/a
    c. Asian
    d. Black or African-American
    e. Indian or Middle Eastern
    f. Native Hawaiian or Other Pacific Islander
    g. American Indian or Alaskan Native
8. How many computers (including mobile devices and tablets) does your family own? *(Choose one)*
    a. None
    b. One
    c. Two
    d. More than two

9. Some people can't spend time in nature for different reasons. Are any of these reasons true for you and your child? *(Choose all that apply)*
    a. Nature is uncomfortable for my child, because of things like heat or bugs.
    b. We don't have any way to get to a nature area.
    c. There are no places with nature near our home.
    d. My child is just not interested in spending time in nature.
    e. Gangs or crime make the places with nature unsafe for my child.
    f. My child might get hurt in places with nature (from animals, or he/she might fall, or get lost).
    g. My child's health keeps my child from doing activities in nature.
    h. It costs too much to do activities in nature.
    i. I will not let my child spend time in nature because _____.

Please tell us what you think of the PLUM LANDING activities.

10. Did the PLUM LANDING activity make your child feel *more* or *less* like she/he wants to learn about science?
    a. More
    b. Less
    c. I don't know

11. Did the PLUM LANDING activity make your child feel *more* or *less* like he/she wants to spend time outdoors exploring nature?
    a. More
    b. Less
    c. I don't know

12. Please mark an X in the boxes to tell us how much you agree or disagree with the following sentences:

The PLUM LANDING activity helped MY CHILD…	**Strongly Disagree**	**Disagree**	**In the Middle**	**Agree**	**Strongly Agree**
…Think of new places he/she could explore in our neighborhood.					
…Learn about science.					
…Learn about nature.					

13. If your child learned something about science or nature by doing the PLUM LANDING activity, please describe what you think he or she learned.

14. Did **your child** enjoy the PLUM LANDING activity? *(Choose one)*
    a. Yes
    b. No
    c. I don't know

15. Did **you** enjoy the PLUM LANDING activity? *(Choose one)*
    a. Yes
    b. No

16. What did you enjoy about the PLUM LANDING activity?

17. What did you not enjoy about the PLUM LANDING activity?

18. Please mark an X in the boxes to tell us how much you agree or disagree with the following sentences:

The PLUM LANDING activity helped ME…	**Strongly Disagree**	**Disagree**	**In the Middle**	**Agree**	**Strongly Agree**
…feel more like exploring **nature** with my child.					
…feel more like exploring **science** with my child.					
…feel more comfortable helping my child learn science.					
…feel more comfortable teaching my child about the world by exploring nature with him/her.					
…have more ideas for exploring nature together with my child.					

Appendix E: Family-Facilitated Program Study—Educator Survey

Please tell us about your experience with the PLUM LANDING activities. Your responses will be kept private and your name will not be associated with your responses in our final report to the PLUM LANDING team. Please feel free to write as much as you would like. Thank you!

You do NOT need to answer all the questions in this survey -- Please skip any questions that are not relevant to your organization.

1. Name:

2. Email:

3. What organization do you represent?

4. What is your role in your organization?

5. Where are you located?

6. Where are the kids and families you serve located?

7. Would you classify this area as: *(Choose one)*

    a. Urban
    b. Suburban
    c. Rural

8. Please help us understand the ethnic/racial composition of the kids and families you serve (ballpark estimates are fine):

    _____% White
    _____% Latino/a
    _____% African-American
    _____% Asian
    _____% Other (please specify):

9. Please help us to understand the socio-economic status of the kids and families you serve (ballpark estimates are fine):

   _____% High income
   _____% Middle income
   _____% Low income

10. Some people can't spend time in nature for different reasons. Are any of these reasons true for the kids and families in your program? *(Choose all that apply)*
    a. Nature is uncomfortable for my kids and families, because of things like heat or bugs.
    b. We don't have any way to get to a nature area.
    c. There are no nature areas near our program.
    d. My kids and families are just not interested in spending time in nature.
    e. Gangs or crime make the nature areas unsafe for my kids and families.
    f. My kids and families might get hurt in a nature area (from animals, or they might fall, or get lost).
    g. My kids and families don't feel welcome among the other people in nature areas.
    h. My kids' and families' health keeps them from doing activities in nature.
    i. It costs too much to do activities in nature.
    j. My program will not let my kids and families spend time in nature because _____.

Please tell us how you used the PLUM LANDING activities.

11. How many families participated? _____

12. Which PLUM LANDING activities did you lead with families? *(Choose all that apply)*
    a. Seed Toys
    b. Waggle Dance
    c. Animals Among Us
    d. Fly It Spy It
    e. Wild Wind
    f. Hot Water
    g. Rain Detective
    h. Water Ins and Outs

[Note: Each of these choices will lead to a series of questions for each unit. You may skip the ones you didn't do.]

Seed Toys Questions

13. How did you prepare in advance of the day of the activity? *(Choose all that apply)*

a. Gathered all the materials
b. Prepared all the materials
c. Watched the video “Plant Your Socks”
d. Scouted out a good place to do the activity
e. Troubleshot safety concerns
f. Made copies of the handouts for families
g. Made a demonstration item for families to see
h. Practiced the activity
i. Other: _____

14. Which of the following did you do with families? *(Choose all that apply)*
    a. Watched the video “Plant Your Socks”
    b. Did the Warm-up: Bossy Gardener
    c. Did the Seed Blaster activity
    d. Did the Seed Copter activity
    e. Did the Wrap-up
    f. Gave families a chance to play the Seed Racer game online
    g. Gave families copies of the handouts to take home
    h. Other: _____

Waggle Dance Questions

15. How did you prepare in advance of the day of the activity? *(Choose all that apply)*
    a. Gathered all the materials
    b. Prepared all the materials
    c. Watched the video “The Brick-Eating Ivy Mystery”
    d. Scouted out a good place to do the activity
    e. Troubleshot safety concerns
    f. Made copies of the handouts for families
    g. Practiced the activity
    h. Other: _____

16. Which of the following did you do with families? *(Choose all that apply)*
    a. Watched the video “The Brick-Eating Ivy Mystery”
    b. Did the Warm-up: Bee Race
    c. Did the Waggle Dance activity
    d. Did the Wrap-up
    e. Gave families a chance to explore some more by looking for “bee dance” videos online
    f. Gave families copies of the handouts to take home
    g. Other: _____

Animals Among Us Questions

17. How did you prepare in advance of the day of the activity? *(Choose all that apply)*
    a. Gathered all the materials
    b. Prepared all the materials
    c. Watched the video "The Haunted Shipyard Mystery"
    d. Scouted out a good place to do the activity
    e. Troubleshot safety concerns
    f. Made copies of the handouts for families
    g. Practiced the activity
    h. Other: _____

18. Which of the following did you do with families? *(Choose all that apply)*
    a. Watched the video "The Haunted Shipyard Mystery"
    b. Did the Warm-up: Flee the Coyote!
    c. Did the Animals Among Us activity
    d. Did the Wrap-up
    e. Gave families a chance to explore some more by reporting black squirrels on the Squirrel Mapper website
    f. Gave families copies of the handouts to take home
    g. Other: _____

Fly It, Spy It Questions

19. How did you prepare in advance of the day of the activity? *(Choose all that apply)*
    a. Gathered all the materials
    b. Prepared all the materials
    c. Watched the video "Wild, Wild Life"
    d. Scouted out a good place to do the activity
    e. Troubleshot safety concerns
    f. Made copies of the handouts for families
    g. Practiced the activity
    h. Other: _____

20. Which of the following did you do with families? *(Choose all that apply)*
    a. Watched the video "Wild, Wild Life"
    b. Did the Warm-up: Raider Ants
    c. Did the Fly It and Spy It activity
    d. Did the Ant's Eye View activity
    e. Did the Wrap-up
    f. Gave families a chance to explore some more by observing pigeons
    g. Gave families copies of the handouts to take home
    h. Other: _____

Wild Wind Questions

21. How did you prepare in advance of the day of the activity? *(Choose all that apply)*
    a. Gathered all the materials
    b. Prepared all the materials
    c. Watched the video "The Manta Ray Mystery"
    d. Scouted out a good place to do the activity
    e. Troubleshot safety concerns
    f. Made copies of the handouts for families
    g. Practiced the activity
    h. Other: _____

22. Which of the following did you do with families? *(Choose all that apply)*
    a. Watched the video "The Manta Ray Mystery"
    b. Did the Warm-up: Run Like the Wind?
    c. Did the Follow the Wind activity
    d. Did the Windy City activity
    e. Did the Wrap-up
    f. Gave families a chance to explore some more by discussing the Beaufort scale
    g. Gave families copies of the handouts to take home
    h. Other: _____

Hot Water Questions

23. How did you prepare in advance of the day of the activity? *(Choose all that apply)*
    a. Gathered all the materials
    b. Prepared all the materials
    c. Watched the video "Cook an Egg"
    d. Scouted out a good place to do the activity
    e. Troubleshot safety concerns
    f. Made copies of the handouts for families
    g. Practiced the activity
    h. Other: _____

24. Which of the following did you do with families? *(Choose all that apply)*
    a. Watched the video "Cook an Egg"
    b. Did the Warm-up: Running Hot and Cold
    c. Did the Hot Water activity
    d. Did the Wrap-up
    e. Gave families a chance to explore some more by playing Race for Cover
    f. Gave families copies of the handouts to take home
    g. Other: _____

Rain Detective Questions

25. How did you prepare in advance of the day of the activity? *(Choose all that apply)*
    a. Gathered all the materials
    b. Prepared all the materials
    c. Watched the video "Where Does All the Snow Go?"
    d. Scouted out a good place to do the activity
    e. Troubleshot safety concerns
    f. Made copies of the handouts for families
    g. Practiced the activity
    h. Other: _____

26. Which of the following did you do with families? *(Choose all that apply)*
    a. Watched the video "Where Does All the Snow Go?"
    b. Did the Warm-up: Sherlock's Race
    c. Did the Rain Detective activity
    d. Did the Wrap-up
    e. Gave families a chance to explore some more by making a Rain Clue rhyme
    f. Gave families copies of the handouts to take home
    g. Other: _____

Water Ins and Outs Questions

27. How did you prepare in advance of the day of the activity? *(Choose all that apply)*
    a. Gathered all the materials
    b. Prepared all the materials
    c. Watched the video "The Hidden Alligator Mystery"
    d. Scouted out a good place to do the activity
    e. Troubleshot safety concerns
    f. Made copies of the handouts for families
    g. Practiced the activity
    h. Other: _____

28. Which of the following did you do with families? *(Choose all that apply)*
    a. Watched the video "The Hidden Alligator Mystery"
    b. Did the Warm-up: Falling Raindrops
    c. Did the Water Ins and Outs activity
    d. Did the Wrap-up
    e. Gave families a chance to explore some more by watching the Where Does the Snow Go? video
    f. Gave families copies of the handouts to take home
    g. Other: _____

Please tell us what you think of the PLUM LANDING activities.

29. Generally, what worked well?

30. Generally, what did not work well?

31. Did you make any adaptations that made the PLUM LANDING activities work better for your program? If so, please describe:

32. In what ways, if any, are the PLUM LANDING activities different from other activities you have done with kids and families?

33. Please mark an X in the boxes to tell us how much you agree or disagree with the following sentences:

The PLUM LANDING activities helped the kids in my program…	**Strongly Disagree**	**Disagree**	**In the Middle**	**Agree**	**Strongly Agree**
…Learn about science.					
…Learn about nature.					

34. If the kids learned something about science or nature by doing the PLUM LANDING activities, please describe what you think they learned.

35. Did **the kids** enjoy PLUM LANDING? *(Choose one)*
    a. Yes
    b. No
    c. I don't know

36. Did **the parents** enjoy PLUM LANDING? *(Choose one)*
    d. Yes
    e. No
    f. I don't know

37. Did **you** enjoy PLUM LANDING? *(Choose one)*
    g. Yes
    h. No

38. Please mark an X in the boxes to tell us how much you agree or disagree with the following sentences:

The PLUM LANDING activities helped ME…	**Strongly Disagree**	**Disagree**	**In the Middle**	**Agree**	**Strongly Agree**
…become more motivated to explore **nature** with the kids in my program.					
…become more motivated to explore **science** with the kids in my program.					
…become more comfortable helping the kids in my program learn science.					
…become more comfortable teaching the kids in my program about the world by exploring nature with them.					
…have more ideas for how to explore nature together with the kids in my program.					

39. Would you recommend the PLUM LANDING activities to other programs like yours? Why or why not?

40. Do you plan to continue using the PLUM LANDING activities? Why or why not?

Appendix F: Family-Facilitated Program Study—Parent Interview

Thank you for making the time to talk with me today. I'm just following-up on your family's experience with Plum Landing from [date]. I'd like to learn a little more detail about what worked and what didn't and to learn more about the impact on you and your child. Do you have any questions for me before we start?

To help with my notes, I'd like to record this interview. Is that OK with you?

[Start recording]

1. Can you please say a little bit about your own background and experience doing science activities with your child?
2. How about your experiences exploring nature, if you have any?
3. So, what made you interested in the [program name]'s program?
4. So, you did the XYZ activity, is that correct?
5. Did the program give you any handouts to take home?
6. Have you continued doing any of the Plum activities at home? If so, please explain.
7. What did you think of Plum Landing? In your survey, you said XYZ. Can you please say a little more about that?
8. How about your child? In your survey, you said XYZ. Can you please say a little more about that?
9. Did you experience any changes in comfort exploring science or nature with your child after using Plum? Please explain.
10. Did you experience any changes in motivation to explore science or nature with your child after using Plum? Please explain.
11. On average, how much time do you typically spend together exploring nature with your child? Did this change as a result of Plum? If so, please explain.
12. Did the kinds of outdoor activities you and your child do together change as a result of using Plum? If so, please explain.
13. Have you noticed any changes in your child as a result of doing the Plum activities?
14. Have you noticed any of the following in your child after doing Plum?
    a. asking questions about the natural world (e.g., *"What animals and plants live here?" or "How did this plant start growing here?")*
    b. noticing things about the natural world (e.g., *that bees are usually found near flowers, or that puddles in the sun dry up faster than puddles in the shade*)
    c. thinking about the natural world (e.g., *wondering how changes in the weather could affect animals and plants or thinking about why certain animals and plants*

look the way they do)

d. showing curiosity about nature (e.g., *asking why certain animals and plants look the way they do, or following an ant to see where it goes)*
e. a tendency to share new information and ideas about nature (e.g., *telling me something he or she learned in school, or describing an interesting thing they saw in nature)*
f. asking to go outside more often than before

15. Is there anything else you'd like us to know about your experience with Plum Landing?

Appendix G: Family-Facilitated Program Study—Educator Interview

Thank you for making the time to talk with me today. I'm just following-up on your program's experience with the Plum Landing activities from [date]. I'd like to learn a little more detail about what worked and what didn't and to learn more about the impact on you and educators like you. Do you have any questions for me before we start?

To help with my notes, I'd like to record this interview. Is that OK with you?

[Start recording]

1. Can you please say a little bit about your own background and experience leading science activities with families?
2. [If not already discussed] What kinds of things does your program typically do together outdoors in nature with families?
3. So, what made you or your program interested in trying out the Plum Landing activities?
4. Overall, how did the activities go? Please explain.
5. Did the Plum Landing activities meet your expectations? Why or why not? In your survey, you said XYZ [remind them of their good and bad feedback, if any and follow-up on anything that needs clarification]. Can you please say a little more about that?
6. How was the Plum Landing activity different, if at all, than other activities you do with your kids and families? What was it like to add the physical activity?
7. How easy or difficult was it to integrate the Plum Landing activities into your everyday programming? Please explain.
8. How much of a fit is the Plum Landing activities for your program? Please explain.
9. Are there changes you would make to the Plum Landing activities if you used it again? Please explain.
10. Has the motivation of you/your educators to explore science with families changed, for better or worse, after using the Plum Landing activities? Please explain.
11. On average, how much time do you typically spend together exploring nature with your families? Has this changed as a result of the Plum Landing activities? If so, please explain.
12. Is there anything you took from your experience with the Plum Landing activities that could inform how you do programming with families?? If so, please explain.
13. Is there anything else you'd like us to know about your experience with the Plum Landing activities?

Appendix H: Outreach Partner Study—Interview Protocol

1. Name and Title (enter multiple names, if several people participated in the interview):
2. What is your organization's mission?
3. What is your role in your organization?
4. Where are you located? What is your geographic reach?
5. Please help us understand the ethnic/racial composition of the individuals you serve (ballpark estimates are fine):
6. [Keep this one flexible so they can answer in any manner that works for them and the data they have]:

   _____% White

   _____% Latino/a

   _____% African-American

   _____% Asian

   _____% Other (please specify):

7. Please help us to understand the socio-economic status of the individuals you serve (ballpark estimates are fine):

   [Same guidance as #6]

   _____% High income

   _____% Middle income

   _____% Low income

8. How did you make members of your organization aware of the PLUM LANDING Toolkit?

   [Probe for the following possibilities, noting that some contracts did not include all these items below:

   Ask for specifics, e.g., which conferences they promoted at, etc. and ask them to rate the activity in terms of how successful they were using these strategies?

Probe whether they think providing a physical activity kit increases the likelihood that members will do the activities?]

- *Linking to Toolkit on their website*
- *Promotion at conferences*
- *Promotion on social media*
- *Promotion in email newsletters to members*
- *Blog post mentioning Toolkit*
- *Host or co-host (with WGBH) webinar*
- *Recruit programs to try materials, including sending physical kits to select member programs.*
- *Anything else I didn't mention?*

9. Did you use WGBH's social media toolkit with sample posts? Please describe how and what worked/what didn't.
10. What made you decide the PLUM LANDING materials would be appropriate to share with your members? Did the inclusion of media in this Toolkit make a difference in this decision? How about the Toolkit's focus on STEM? Physical activity?
11. How did you decide what to share with your members? [Probe on why they chose to share some things over others; Try to get at thought/decision process.]
12. What obstacles have you encountered, if any, to sharing the Toolkit with others?
13. What could WGBH have done to make it easier to promote or share the Toolkit with your members?
14. How were the Toolkit resources received by your members? What, if any, feedback did you get about member success in using the materials in their programming? What, if any, feedback did you get about the Toolkit components: videos, hands-on activities, apps, and the background videos for parents and educators?
15. How do the Toolkit resources compare with other resources that you promote among your network?
16. Do you plan to continue sharing the PLUM LANDING Toolkit in the future? Please explain:
17. How well did the PLUM LANDING Toolkit enhance your organization's mission, if at all?
18. Please tell us about the process of working as a PLUM LANDING dissemination partner with WGBH. What positive feedback do you have? What improvements could the PLUM LANDING team make?
19. Have you actually used the PLUM LANDING Toolkit with kids or families?
    a. If so, which ones have been your favorite? Please explain:
    b. Which ones have been your least favorite? Please explain:

c. Have you observed any positive or negative results on the children's and families' interest in environmental science or the outdoors? If so, please describe:

20. Is there anything else you would like to tell us about PLUM LANDING?