Science from the Start: Final Evaluation Summary

Sciencenter, Ithaca, NY

Submitted by:

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September 2016

Description of Project

Science from the Start (SFTS) was a two-year early childhood program funded by IMLS, with matching funds from the Sciencenter. The goal of SFTS was to empower teachers, parents, and caregivers to do more science with their students and children. Although the SFTS program continues today,[1] this final summary report describes the results of the initial two-year pilot project only. In accordance with standards for evaluation reports, the past tense will be used throughout.

The largest part of the SFTS program consisted of two kinds of workshops, one for early childhood Head Start educators, and the other for parents and caregivers of young children who were enrolled in Head Start programs. Activities for the program were adapted from the ECHOS (Early Childhood Hands On Science) curriculum. Each workshop series included seven different units: magnets, weather, botany, feathers, blocks, water, and air, with approximately two sessions for each of the units. During the first year of the program, both workshop series began early in 2015 and followed the Head Start school calendar, continuing through August 2015. The second year of the program began in October 2015 and continued through the summer 2016.

The Educator Series: The educator series was offered approximately one time per month throughout the school years. All workshops were held at the Sciencenter in Ithaca, and each lasted approximately 90 minutes. During Year One a total of eight workshops were held; during Year Two, nine were held. The format and agenda for the workshops evolved and changed throughout the two years, based largely on feedback from the 50 teachers who participated. Ultimately the workshops included time to review the next few ECHOS lessons, with the Sciencenter staff modeling teaching, and significant time for teachers to discuss and prep materials at their tables with other Head Start teachers. This took a lot of the pressure off the teachers who indicated in interviews how much they appreciated not having to prep much before they taught a lesson, since they got time to do it at the monthly workshops.

The Parent/Caregiver Series: At the beginning of the project, the parent/caregiver workshops were each approximately 3 hours long, and held on Saturdays. Later they were moved to various weeknights. Initially, the workshops were not always well attended; sometimes it was the day of the week, sometimes the time of day. Most of the caregivers worked outside the home and had very long days. It was further determined that caregivers did not want to be "taught." For

[1] In fact the Sciencenter has received additional funding from IMLS in order to collaboratively develop a new national model for Head Start-museum collaborations.

example, early in the program it was suggested that the workshops be called Family Events rather than Parent Training. The goals of the program needed to be communicated in a different, more subtle way to these caregivers.

Different formats for the workshops were tried and refined. The original program design had Family Workshops held monthly at the Head Start centers. But attendance was not as high as hoped for, especially at the Groton site. By the end of the two years, after attempting various solutions, Sciencenter staff had settled on two approaches that seemed to work well.

For Groton, the center with the lowest attendance at the original iteration of Family Workshops, they began bringing table-top activities, connected to the current ECHOS theme to Head Start centers at pick-up time. This served as an innovative way to connect with those parents, and provided an opportunity to promote the evening Family Workshops which typically took place within the same week. A few of the families chose to participate only during these pick up time activities, but Sciencenter reported that ultimately many of those families began attending the Family Events.

The main change Sciencenter made to the Family Events was to move them to the museum and hold them monthly during a weekday evening, which included dinner. So between Year One and Year Two the workshops became evening Family Events held at the Sciencenter, with activities facilitated by Head Start teachers. The name was also intentionally changed from Parent Training or Family Workshops, to Family Events, at the suggestion of TCAction staff who believed parents were responding negatively to the idea of being "trained". During Year One a total of 16 workshops were held; during Year Two a total of nine Family Events were held. With this new format, attendance at the Family Events grew steadily month after month, including increased attendance by families from Groton.

Another significant change by the end of the two years was that while the Sciencenter staff hosted the Family Events, developed the activities, and were on hand throughout the evening to offer guidance and support, all the table-top activities were now facilitated by the Head Start teachers, with a specific center taking the lead each month. This also helped to bring in additional families from their centers, since the families knew the teachers. Sciencenter staff developed a document called *Inquiry Questions and Brainstorming for Family Events* that was designed to give teachers the tools to observe parent-child science engagement, and encouraged teachers to support the parents so they would do more of the facilitation of their own family's learning.

Additional SFTS Activities: In addition to the monthly educator and parent/caregiver workshop series mentioned above, there were also 11 additional teacher workshops at the Downtown Ithaca Children's Center (DICC), and 95 twice-weekly *Science Together* museum programs for drop in parents/caregivers from October 2014 to August 2015, and then eight six-week sessions from October 2015 to June 2016 at Sciencenter. In total 941 adults and 1012 children participated in *Science Together* programs.

An important part of the program was the collaboration between Sciencenter staff and Headstart Tompkins Community Action (TCAction). In any effective collaboration it is important that all

partners have an important and clear role to play and share similar expectations for the outcomes. The project leads at the museum and at TCAction worked closely together over the course of the program to develop it into something they could agree was a successful model. TCAction saw strong parent/caregiver participation that grew over time, and the museum saw their partnership with the teachers strengthen. One of the Sciencenter SFTS program leads also visited several Centers to observe Early Head Start classrooms and coach these teachers about ways to incorporate science into their activities with very young children. These observations resulted in some very useful adaptations of the ECHOS activities for the Early Head Start teachers.

Overview of the Evaluation

An integral part of the development of the SFTS program was a developmental evaluation conducted by Dr. Deborah Perry of Selinda Research Associates, Inc. (SRA), and Dr. Lorrie Beaumont of Evergreene Research & Evaluation, LLC. (ERE). Unlike traditional types of evaluation, developmental evaluation is: (a) ongoing throughout the project, (b) highly collaborative; and (c) fully integrated into the development process (Gamble, 2008; Patton, 2011).

At the beginning of this evaluation study, the focus was on how the workshops might be improved so that they would be able to achieve their stated goals and objectives. During the course of the two years, the focus shifted from program improvement to assessing the contributions of the program on educators and parent/caregivers and their engagement with science activities. Three research questions guided this evaluation:

1) How can the workshops in each series be improved to maximize the likelihood that the program goals and objectives will be met?
2) To what extent and in what ways have parents and caregivers increased their understanding of and comfort in using inquiry to enhance their child's science learning?
3) To what extent and in what ways have the Head Start educators learned to use inquiry in their science teaching and activities in the classroom?

The evaluation consisted of five phases: (a) planning and project management; (b) an initial site visit by the two external evaluators; (c) ongoing data collection and consultation; (d) a second (final) site visit by one of the evaluators; and (e) final analysis and write up. Following is a summary of each of these phases.

Planning and Project Management. Planning for the SFTS program began in the fall 2014 and included an Advisory meeting held in November during which Lorrie Beaumont discussed various evaluation concepts and introduced two research-based frameworks for engaging parents and children with science: the *Adult-Child Interaction Inventory* (Beaumont, nd); and *What Makes Learning Fun?* (Perry, 2012).

Shortly after the Advisory meeting, a four-member core evaluation team was established consisting of Deborah Perry (SRA), Lorrie Beaumont (ERE), Michelle Kortenaar (Sciencenter), and Victoria Fiordalis (Sciencenter) each with a specific role and responsibilities: Deborah (project manager), Lorrie (lead researcher), Michelle (client), and Victoria (project liaison). Throughout the remainder of the project, all team members met during regularly scheduled video

phone meetings held approximately once a month. During the initial meetings, a detailed evaluation plan was collaboratively developed, *Evaluation Plan for Science From The Start At Sciencenter, Ithaca, NY*. This plan served as a blueprint for the rest of the project.

Initial Site Visit. In early March 2015, Deborah and Lorrie made a three-day site visit to Ithaca to conduct an all-day professional development workshop with Sciencenter staff and a few additional invited guests. During the site visit, Lorrie and Deborah also had a tour of Downtown Ithaca Children's Center (DICC), and also observed a SFTS parent/caregiver workshop that Sciencenter staff presented at Franziska Racker Centers (FRC). This site visit is described in detail in the document *EB2: Site Visit One Summary*.

Data Collection and Consultation. Data was gathered by Sciencenter staff during most of the SFTS program workshops, including both parent/caregiver and teacher workshops. Data was in the form of observations, written surveys, as well as face-to-face discussions, and real-time feedback such as post-it notes. Under the guidance of SRA/ERE researchers, trained Sciencenter staff used an iterative process to test evolving versions of the written survey, as well as different components of the two workshop series and accompanying materials. Throughout the project, SRA/ERE provided ongoing guidance, feedback, and recommendations, and also conducted additional off-site critical reviews of selected draft materials as they were developed. As part of this ongoing consultation and recommendations, SRA/ERE wrote a series of five evaluation briefs:

- *EB1: Post-Workshop Written Survey for Head Start Educators*
- *EB2: Site Visit One Summary*
- *EB3: A Brief Summary of the WMLF Principles Adapted for the SFTS Program*
- *EB4: Mid-Project Evaluation Summary*
- *EB5: Site Visit Two Summary*

Second Site Visit. In April 2016, Lorrie made a four-day final site visit to observe the SFTS program, and interview key participants and stakeholders. This site visit is described in detail in the document *EB5: Site Visit Two Summary*.

Final Analysis and Write Up. After the second site visit, the SRA/ERE researchers made a final sweep through all the data, and compiled the findings as they emerged throughout the project. The remainder of this document will summarize those findings.

This evaluation project had an operating budget of 22 people days and $3,000 in travel. We knew going into the project that the budget was extremely tight, with the expectation that we would likely go over budget. The final accounting revealed a total of approximately 33 people days, and $3,000 for travel.

Selected Findings & Reflections

Design and Format of the Program

The program started out with a strong (and ambitious) design. Throughout the project, it was continually refined, revised, and improved based on the ongoing feedback and evaluation data. While maintaining the same core philosophy and goals, the program at the end of the project was significantly stronger than the original one, with improved scheduling, revised program formats,

and the addition of activity modifications for Early Head Start teachers. To track the program's progress and evolution the museum's project team experimented with multiple types of internal program evaluation. They ultimately settled on an instrument adapted from the *Team-Based Inquiry Guide* from the National Informal STEM Education Network, (NISE Net), which included observations and reflections about how each workshop or Family Event went.

Length of Family Workshops. After trying different schedules, times, and days, the project settled on holding the family workshops once a month at the Sciencenter on a Thursday evening from 5:30-7pm. Each evening consisted of a series of five activities through which families rotated. The activities corresponded to the ECHOS unit the children and teachers were working on at their Centers. Teachers from the Centers served as facilitators for the activities. Their main role was to find ways to engage the caregivers, so that caregivers were the ones doing the main facilitation, instead of the teachers. Dinner was available during the first hour so that everyone would be ready to assemble in the theatre space for a song, story and/or experiment as a wrap up to the evening. During the first hour families not only rotated through the activities, but also explored the exhibits together.

There was evidence that some families wanted the event go longer; initially it had been held from 5:30-7:30pm. Our recommendation however is to keep the current schedule. Because of the museum's hours, it would be difficult to start it any sooner and still accommodate the time necessary to set up for the program. And on the other end, data indicated that many of the young children ran out of steam (including having "melt-downs") right about 7pm. Sciencenter staff decided to resolve this desire for having a longer event by having it officially end at 7pm, but allowing families that wanted to stay a little longer to do that. In addition, from an informal learning design standpoint, research has shown that curiosity is piqued when visitors leave wanting a little more.

Family Participation

We were interested in tracking the number of families that participated in the program during both years. Following is a brief summary of attendance numbers.

	Year 1		*Year 2*	
possible # of family participants	*240*		*240*	
total # of family participants	91	38%	107	45%
families who participated 1x	60	66%	59	55%
families who participated 2x	18	20%	22	21%
families who participated 3 or more times	13	14%	26	24%

Eight of the 26 families that participated 3 or more times in Year Two, attended every one of the eight events. In addition, 26 of the 91 families that participated in Year One (29%), returned for Year Two. Over the two-year period, a total of 172 different families participated in SFTS.

There has been an impressive increase in attendance, and especially in repeat attendance. This is encouraging, as increased confidence in doing science with children improves with repeat exposure. Head Start staff have reported that the SFTS family workshops are among the best attended of any of their efforts to engage parents. The Sciencenter staff in collaboration with

TCAction have worked diligently to encourage participation, making changes to the program, the schedule, and the venue in order to remove barriers whenever possible. This iterative process continues as they strive to make the program as accessible as possible to as many Head Start families as possible.

Family Involvement with Science

There were two primary things this program hoped to achieve: (a) for parents/caregivers to gain the confidence and tools to facilitate science exploration with their children; and (b) for parents/caregivers to develop an understanding of the role of the Sciencenter and feel welcome to visit.

There were many indications that both goals were achieved. Parent/caregivers were given significant amounts of support, including modeling by Sciencenter staff and Head Start teachers, home visits that reinforce the ECHOS curriculum, and simply-worded iCard take-home activities that use materials readily available in the home so parents don't have to shop or feel uncomfortable about working with unfamiliar materials. After each Family Event families were given take home sheets that suggested a follow up activity related to the ECHOS unit children had been exploring at Preschool. For example during the Bee Unit, parents took home directions for an activity called "Go on a Bee Hunt" and "Buzz Like a Bee". As one parent explained, "So if he shows an interest in something [at the museum] I'm like, 'Oh, well we did that at the Sciencenter so why don't we take it to the next step and do this.' So I feel like I can expand it or do a next step when he shows interest."

In addition to parents/caregivers increasing their ability (and confidence) to facilitate science exploration with their children, there was also a shift among some Head Start staff. Initially when they led the activities, most of them tended to focus on working directly with the children. By the end of the program however, more of them were focusing their efforts on working with the family group, empowering the parents/caregivers to take the lead.

While Sciencenter attendance outside of the events by program participants was not specifically tracked, museum staff did observe some families return to visit the museum on their own time. In addition, after each Family Event, TCAction noted an increase in the number of families asking for documents so they can apply for free family membership at the Sciencenter through the museum's Membership Access Program (MAP)[2].

The data also indicated that 52 of the 172 families that participated in the program during the two years of the program (just over 30% of participants) now have memberships in the museum. Many rural families rarely if ever have the opportunity to visit the Sciencenter. Receiving memberships and recognizing that they could get there by bus broke down the barriers for them.

Program Contributions for Teachers

In addition to Head Start families developing stronger relationships with science and science activities, there were also positive outcomes for Head Start teachers. Some teachers indicated that they appreciated being able to develop new relationships with teachers at other Head Start

[2] This program makes memberships available free of charge to families with children who qualify for free or reduced-cost lunch at school.

centers. This began to emerge particularly once the Sciencenter staff began seating teachers of like-aged children at the same tables instead of being seated with others from their center.

Many teachers also enthusiastically expressed how much they appreciated the responsiveness and passion of the Sciencenter staff. Data also indicated that many felt less intimidated by science, they felt well equipped with the ECHOS curriculum kits, and ultimately realized that science is something children respond to very early, even babies who observe the world around them!

A few teachers indicated they had begun to look for more ways to connect the curriculum with community members. For example, one teacher invited a beekeeper to come and talk with the children during the bee unit. This teacher began to see this as a natural way to extend her unit, by reaching out to community members. There are many such opportunities to encourage deeper community involvement. Sciencenter staff might want to help the different Head Start centers begin to develop science-related relationships with additional community members.

During the course of the program Sciencenter staff reported observing evidence of "authentic assessment" in Head Start classrooms where teachers—on their own—were (for example) creating graphs and charts that recorded scientific observations or other phenomena, or displaying photographs of children engaged with the ECHOS science activities.

Contributions for Sciencenter Staff

While the primary audiences for the SFTS program were Head Start families and teachers, the program also contributed to Sciencenter staff. Data indicated that going through the evaluation process helped them develop the discipline to incorporate evaluative thinking into the process of a developing a program such as this. For example, they indicated that they have gotten better at asking questions such as "What would success look like, and how will we know when we've gotten there?"

One of the challenges identified in the mid-project summary report (EB4) was the difficulty for Sciencenter staff to actively collect data while also delivering a successful program. To deal with this, the museum brought in some interns as well as an additional educator whose role was to focus exclusively on collecting data. As mentioned above, they also began using a process known as Team Based Inquiry.[3] This enabled the SFTS team to decide on the questions they needed answered, and the methods they would use. They then reflected on and analyzed the data together. This resulted in a process that was relevant and efficient.

Conclusion

Overall it has been delightful working with Sciencenter staff on this project. Their passion, thoughtfulness, and commitment to developing a high quality program, are commendable. The SFTS program started out with a strong design, but it became even stronger due to the hard work of an exceptional team. The program development was a great example of the importance of iteration in an innovative program such as SFTS. Both partners (TCAction and Sciencenter) really listened and responded to each other. Using a developmental evaluation model, the SFTS

[3] http://nisenet.org/catalog/team-based-inquiry-guide

project team was encouraged to try different data collection and data management methods, which ultimately led to a Sciencenter custom-designed approach they had ownership of. We encourage the team to continue gathering data, critically observing the program and its participants, talking with and listening to the Head Start teachers and families, and improving the program even further. Early childhood science education is critically important, and science museums are rich resources for Head Start centers. This program has made great inroads on developing Head Start/museum collaborations and contributing to rewarding experiences with science for our youngest members of society.

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Suggested citation:

Selinda Research Associates, & Evergreene Research & Evaluation. (2016). *Science from the Start: Final evaluation summary*. Unpublished manuscript, Sciencenter, Ithaca, New York.