Concord Evaluation Group

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Evaluation of Peep and the Big Wide World Resources for Spanish-speaking Families

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Background

The animated series *PEEP and the Big Wide World (PEEP)*, developed by WGBH Boston, is designed to teach science and math to children aged three to five years old. "Set in and around a pond, a bush, and a tin can, the show follows a newly hatched chicken named Peep, and his friends Chirp and Quack (a robin and a duck), on their daily adventures. Surrounding them is a large urban park — a place of great wonder and mystery, a place they are forever eager to explore, a place they call 'the big wide world.' Each half-hour episode contains two stories which highlight specific science concepts, plus two live-action shorts presenting real kids playing and experimenting with these concepts in their own big wide worlds."[1]

WGBH's goals this season were to reach families and their preschool children, particularly Latino families, with contextualized science and math content developed especially for them, and address the need for more informal science programming for Latino families.

To support the use of the Peep materials by Spanish-speaking families, WGBH developed a set of episodes, including live action shorts, and hands-on activities in Spanish. WGBH also worked with five public television stations and their outreach partners in 2011 and 2012 as demonstration sites for engaging Latino families in informal science learning. The partner stations were located in AZ, TX, UT, WA, and NC.

In 2012, WGBH hired Concord Evaluation Group (CEG) to evaluate the impact of the resources and outreach efforts on Spanish-speaking children and their families. Specifically, the evaluation was designed to assess the extent to which *PEEP* achieved its stated impacts. WGBH's expected impacts and the indicators of success are summarized in the following table.

[1] From the PEEP website http://www.peepandthebigwideworld.com/about/show.html

Table 1:
Impacts and Indicators

Impact	Indicators
I. PEEP will empower parents to feel more equipped, more confident about their ability, and more inclined to facilitate science and math exploration with their preschoolers.	a. Parents who are exposed to the Peep resources will report feeling more equipped and confident to facilitate science and math exploration with their preschoolers than parents who are not exposed to the PEEP resources. b. Parents who are exposed to the Peep resources will report feeling more inclined to do STEM activities with their preschoolers than parents who are not exposed to the PEEP resources.
II. PEEP will help preschoolers effectively apply inquiry skills, including making predictions and observations, problem-solving, and an overall discovery-based orientation in the hands-on explorations of their environments.	a. Children exposed to the Peep resources will report that they were engaged by them. b. Children exposed to the Peep resources will be more likely to effectively apply science process skills, including making predictions and observations, problem-solving, an overall discovery-based orientation in the hands-on explorations of their environments than children, asking questions about how things work in the world, making references to the physical world (e.g., water, light, sound) when playing, and showing curiosity for their surroundings who are not exposed to the Peep resources.
III. PEEP will provide its community engagement partners appropriate resources for the families, both English- and Spanish-speaking, that they serve.	a. Partners will report that the resources are appropriate for their Spanish-speaking audiences. b. Partners will provide evidence that young children and their parents are engaged by the materials. c. Partners will provide evidence that the

Impact	Indicators
	show and the outreach materials leave the families more equipped to recognize, appreciate, and understand the scientific or mathematical concepts. d. Partners will provide evidence that the show and outreach materials have helped preschoolers effectively apply science process skills, including making predictions and observations, problem-solving, and an overall discovery-based orientation in the hands-on explorations of their environments. e. Partners will provide evidence that the show and outreach materials have helped preschoolers ask questions about how things work in the world, make references to the physical world (e.g., water, light, sound) when playing, and show curiosity for their surroundings.

Methods and Procedures

Study Design

The evaluation employed a mixed-method design and three distinct study components:

1. **National Family Study:** A national, home-based experiment in which Spanish-speaking families who used the Peep resources were compared to Spanish-speaking families who did not use the Peep resources using a Web-based survey (post-test only control group design).
2. **In-Depth Family Study:** An experiment conducted in the metro Boston area in which Spanish-speaking families who used the Peep resources were compared to Spanish-speaking families who did not use the Peep resources using in-person interviews and observations of playtime (post-test only control group design, with a qualitative component).
3. **Outreach Partner Study:** A survey of Peep outreach partners conducted at the end of the project using a Web-based survey.

National Family Study Design

CEG recruited study participants by using its national panel of families who have expressed an interest in previous studies conducted by CEG and by reaching out to preschools and Head Start centers in states with large populations of Spanish-speaking families (TX, AZ, CA, NV, and FL). We provided panel members and preschools with information about the study and invited interested parents to contact us directly to see if their families qualified to participate in the study. To qualify for the study, families needed to:

- Have at least one 3-5 year old child living at home,
- Speak Spanish, and
- Have the ability to watch videos streaming from a computer (at home or anywhere they preferred).

We offered families a financial incentive of $10 for their participation in the study. From the pool of eligible families, CEG randomly assigned families to one of two groups, Treatment or Control (Figure 1). Random assignment provides rigor to the study design because it helps to ensure that the background characteristics of participants are distributed as fairly and as equally as possible across the groups.[2] Equivalency across the groups with respect to key variables, like

[2] Boruch, R.F. (1997). *Randomized Experiments for Planning and Evaluation: A Practical Guide*. Thousand Oaks, CA: Sage Publications.

interest in science or educational level of the parents, enables us to say with confidence that any observed differences between two groups with respect to, say, science knowledge are likely due to the intervention (using Peep resources) and not due to differences in the families' backgrounds.

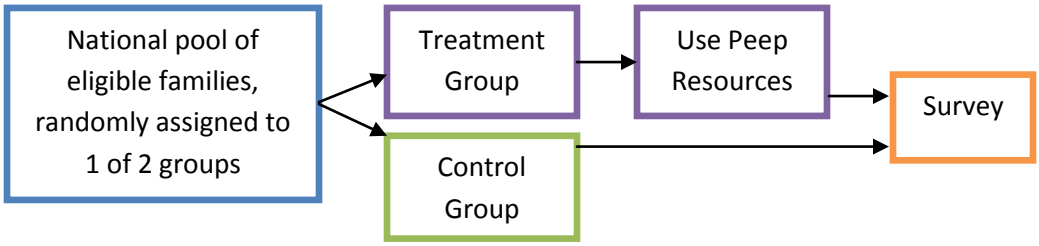


Figure 1. The experimental design of the National Family Study.

As illustrated in Figure 1, families that were assigned to the Treatment Group were provided with access to Peep episodes and hands-on activities in Spanish, while families in the Control Group were not. We encouraged Treatment Group families to use the resources as many times, and in any manner, desired over a period of 2-3 weeks. The episodes and activities covered three content areas: **shadows, ramps, and patterns.** The specific episodes and activities are listed in Appendix A.

Each Peep episode included an animated segment (i.e., the *PEEP* animated story), plus two live action shorts that showed "real kids" engaging in scientific explorations that were designed to reinforce the concepts covered in the animated segments of the episodes. The animated segments were 8:45 minutes, and the live action segments were 1:30 minutes.

After families in the Treatment Group had an opportunity to use the Peep resources, the preschool child and one parent completed a survey together to assess the extent to which:

- Parents felt equipped and confident to help their preschoolers explore science and math.
- Parents felt inclined to facilitate science and math exploration with their preschoolers.
- Parents observed that their preschoolers applied inquiry skills, including making predictions and observations, problem-solving, and an overall discovery-based orientation in the hands-on explorations of their environments after using Peep.

Families assigned to the Control Group were not provided with any Peep resources before completing the survey together. We did, however, provide Control Group families with access to the Peep resources at the end of the study. The surveys, and the constructs they measured, are described in more detail in the Survey Instruments section.

In-Depth Family Study

CEG recruited in-depth family study participants by reaching out to eastern Massachusetts churches, newspapers, legal aid, community centers, preschools and family literacy centers that primarily served Spanish-speaking families. In reaching out, we provided information about the study (in Spanish and English) and invited interested parents to contact us directly to see if their family qualified to participate in the study. To qualify for the study, families needed to:

- Have at least one 3-5 year old child living at home,
- Speak Spanish, and
- Have the ability to watch videos streaming from a computer *or play a DVD on a computer* (Families in the in-depth family study had the option of watching the Peep episodes on DVD if they could not stream videos from their computers).

Since we required families to travel to a location for the study interview (a conference room at CEG, WGBH, or the local public library), we offered families in the in-depth family study a higher financial incentive ($75) than the one offered to families in the national study.[3]

As in the national study, CEG randomly assigned eligible families to one of two groups, Treatment or Control (Figure 2).

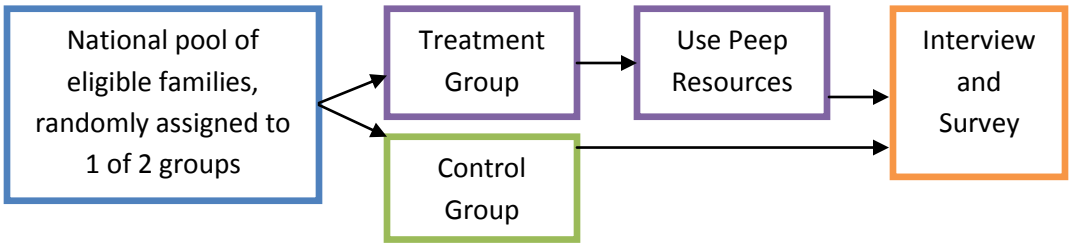


Figure 2. The experimental design of the In-Depth Family Study.

[3] Families had the option of doing the interview at their homes, but only one family wanted to do the interview at their home.

As illustrated in Figure 2, families that were assigned to the Treatment Group were provided with access to Peep episodes and hands-on activities in Spanish, while families in the Control Group were not. Again, we encouraged Treatment Group families to use the resources as many times, and in any manner, as desired over a period of 2-3 weeks. After families in the Treatment Group had an opportunity to use the Peep resources, the preschool child and one parent completed a survey together online and then were scheduled to meet with a Spanish-speaking researcher (who was a native English speaker, but also spoke Spanish) and a native Spanish-speaking interpreter (for added assurance that the researcher and the families would be able to communicate effectively).

During the interviews, we encouraged parent and child to play together with three different sets of common household items that could be used during science play:

1. Set 1 contained a shallow box top that could be used as a shadow box, a flashlight, a plastic cup, a wooden cord pull (commonly found on blinds or shades), and a plastic doll's chair.
2. Set 2 contained an empty 3-inch binder, and several shapes that could be rolled down the side of the binder, including a small pom pom ball, aluminum foil rolled into a ball shape, a rubber pencil grip, and a toy car.
3. Set 3 contained beads of various sizes and shapes, coins, and paper clips.

Rather than directing the families to play in any particular way, we simply laid out the materials, one set at a time, and encouraged them to see how they might play with the items. The researcher provided only minimal prompting and intervened only when families had questions or appeared to be "stuck" without any ideas about how to proceed.

Families assigned to the Control Group were not provided with any Peep resources before completing the survey or participating in the interview. Again, we provided Control Group families with the Peep resources at the end of the study.

Outreach Partner Survey

WGBH partnered with five public television stations as demonstration sites for engaging Latino families in informal science learning. The stations included:

1. UNC-TV in Raleigh-Durham, North Carolina
2. KCTS in Yakima Valley, Washington
3. KUED in Salt Lake City, Utah
4. KAET-TV in Phoenix, Arizona

5. KLRN in San Antonio, Texas

The stations, in turn, partnered with local community organizations such as libraries, literacy centers, and others to disseminate the Peep resources to families and educators. At the end of the grant, we surveyed the stations as well as their local community partners, when applicable, using a Web-based survey.

Study Instruments

National and In-Depth Family Studies

We developed two survey instruments in Spanish and English for the National Family Study:

1. National Treatment Group Survey
2. National Control Group Survey

And, two survey instruments in Spanish and English for the In-Depth Family Study:

1. In-Depth Treatment Group Survey
2. In-Depth Control Group Survey

For the In-Depth Family Study, we also developed an Observation/Interview Protocol. The study instruments (summarized in Appendix B and C) were designed to assess the following constructs:

Table 2:
Constructs Measured across Family Study Instruments

Construct Measured	National Surveys	In-Depth Surveys	In-Depth Interview & Observation
Parents' confidence and ability to *facilitate science and math exploration with their preschoolers.* (Impact I)	Self-report	Self-report	Direct observation
Parents' motivation to do STEM activities with their preschoolers. (Impact I)	Self-report	Self-report	Self-report
Parents' and children's reports of the degree to which children were engaged by Peep. (Impact II)	Self-report	Self-report	Self-report

Construct Measured	National Surveys	In-Depth Surveys	In-Depth Interview & Observation
Children's ability to effectively apply science process skills, including making predictions and observations, problem-solving, and an overall discovery-based orientation in the hands-on explorations of their environments. (Impact II)	Self-report	Self-report	Direct observation
Children's ability to ask questions about how things work in the world, make references to the physical world (e.g., water, light, sound) when playing, and show curiosity for their surroundings. (Impact II)	Self-report	Self-report	Direct observation

All of the National Family Study surveys were administered online. Families were provided with careful instruction about how to access and complete the surveys from home. Due to the young age of the target audience, we instructed parents how to help their children click on buttons or type in responses without interfering with the children's answers to the questions. We call this type of survey administration "parent assisted." Thus, in each family the parent acted merely as a typist for the child who provided his or her own answers to the questions. The surveys also contained questions that were specifically designed for parents themselves. We provided written instructions for survey administration to the parents, plus email follow-up and, when necessary, telephone support.

Finally, the survey questions were pilot tested by 6 families prior to conducting the evaluation study to ensure that the survey administration procedures were reliable and that the questions themselves were clear and comprehensible. Pilot testing was iterative—that is, when we made changes to questions during pilot testing, we re-tested the new items with other pilot test families to ensure that the changes were sufficient.

Outreach Partner Survey

We developed a single survey instrument Outreach Partner Survey (Appendix D). The survey was designed to assess partners' experiences using the Peep resources, and to gather their advice on best practices for reaching out to Spanish-speaking families. The survey also contained additional items that were used to provide background or contextual data.

Participants

National Family Study

The total sample size for the National Family Study was 112 families, representing 6 states. Slightly more than half of the children in the sample were male (55.4%). The study included slightly more 5 year olds (37.5%) than 4 year olds (32.1%) and 3 year olds (30.4%).

All of the families (100%) in our sample were Hispanic or Latino. Among all Hispanic families, 6.3% also categorized themselves as Black or African-American, while another 3.6% listed their family as Asian in addition to Hispanic.

Most of the families in our sample (85.7%) reported that their household financial situation was about the same as the average family. The proportion of families that reported their household financial situation was worse than the average family was 10.7% (the proportion of persons below poverty level in the U.S. is currently 14%).

The proportion of parents in our sample with a Bachelor's Degree (32.1%) was only slightly higher than the national average of 28%. The distribution of demographic and background characteristics across the groups is summarized below. There were no statistically significant differences between the Control Group and the Treatment Group with respect to these characteristics, thus, it appears that randomization was successful at distributing key variables across the groups.

Table 3:
National Study Participant Demographic and Background Characteristics

	Control Group (N = 57)	Treatment Group (N = 55)	TOTAL (N = 112)
State			
AZ	5 (8.8%)	10 (18.2%)	15 (13.4%)
CA	31 (54.4%)	10 (18.2%)	41 (36.6%)
FL	16 (28.1%)	18 (32.7%)	34 (30.4%)
NJ	0 (0.0%)	2 (3.6%)	2 (1.8%)
NY	2 (3.5%)	8 (14.5%)	10 (8.9%)
TX	3 (5.3%)	7 (12.7%)	10 (8.9%)

	Control Group (N = 57)	Treatment Group (N = 55)	TOTAL (N = 112)
Gender			
Boy	28 (49.1%)	34 (61.8%)	62 (55.4%)
Girl	29 (50.9%)	21 (38.2%)	50 (44.6%)
Age			
3	17 (29.8%)	17 (30.9%)	34 (30.4%)
4	22 (38.6%)	14 (25.5%)	36 (32.1%)
5	18 (31.6%)	24 (43.6%)	42 (37.5%)
Preschool or daycare			
Child attends preschool or daycare	46 (80.7%)	44 (80.0%)	90 (80.4%)
Child does not attend school or daycare	11 (19.3%)	11 (20.0%)	22 (19.6%)
Subjects covered in preschool or daycare			
Math	34 (59.6%)	25 (45.5%)	59 (52.7%)
Science	*33 (57.9%)*	*19 (34.5%)*	*52 (46.4%)**
Household financial situation			
Worse than average	5 (8.8%)	7 (12.7%)	12 (10.7%)
Average	49 (86.0%)	47 (85.5%)	96 (85.7%)
Better than average	3 (5.3%)	1 (1.8%)	4 (3.6%)
Highest household education level			
High school graduate or less	10 (17.5%)	12 (21.8%)	22 (19.6%)
Associate degree or certificate prog	6 (10.5%)	11 (20.0%)	17 (12.2%)
Some college credit, but no degree	12 (21.1%)	9 (16.4%)	21 (18.8%)
Bachelor's degree	20 (35.1%)	16 (29.1%)	36 (32.1%)
Master's degree	3 (5.3%)	3 (5.5%)	6 (5.6%)
Doctorate or professional degree	3 (5.3%)	4 (7.3%)	7 (6.3%)
Unknown	3 (5.3%)	0 (0.0%)	3 (2.7%)

* The difference between the Treatment and Control Groups was significant: Control Group children were more likely to learn about science in their preschools than were Treatment Group children (Chi-square $_{(df = 1)}$ = 5.233, p = .022).

Most of the children in the sample attended preschool or daycare (80.4%). About half the children (53%) learn about math in preschool, according to their parents (the difference between the Treatment and Control groups was not significant with respect to learning math). However, *children in the Control Group were significantly more likely to learn about science in their preschools than were children in the Treatment Group.*

We included families in the study who had previously watched Peep on TV, but randomization ensured that we equally distributed the families with Peep

exposure between the Control and Treatment groups—13 families in the Control Group and 12 families in the Treatment Group had prior exposure to Peep.

We also wanted to ensure that families in both groups had an equal predisposition to engaging in STEM (science, technology, engineering, and math) activities. So, we asked parents to indicate, from among the following activities, which were the Top 3 that they would most like to do with their children. The STEM-related activities are marked as such:

- Listen to or play music with your child
- Draw pictures
- Look at the stars at night (STEM)
- Observe insects and animals outdoors (STEM)
- Play sports
- Collect acorns or rocks or other things from nature (STEM)
- Grow a garden or indoor plants (STEM)
- Read stories
- Build with blocks (STEM)

We gave each parent one point for each STEM-related activity they chose and totaled the number of STEM activities for each family. Since families could only choose up to 3 activities, scores ranged from 0 to 3 points. There was no significant difference between the groups: Families in the Control Group reported an average of 1.2 STEM activities (standard deviation = 1.02) and the Treatment Group reported an average of 0.9 STEM activities (standard deviation = 1.01). Thus, the families in the groups had an equal predisposition to engage in STEM activities.

Related to this question, we also asked parents to report how often their family has visited the following places in the past year to learn which families might be more inclined to seek out informal STEM learning opportunities, such as the ones available at local…

- Science museums
- Children's museums
- Art museums
- Libraries
- Aquaria
- Zoos
- Nature centers
- Local parks
- Playgrounds

We asked parents to indicate the frequency of their visits on a scale of 1 ("We never visit because we are not interested.") to 4 ("We visit often -- several times per year"). We removed from the analysis any family that indicated that they could not visit a place because it was not located close to them. The table below shows that families from both groups visited all these places with equal frequency.

Table 4:
Frequency of Family Visits to Places with Informal Education Opportunities in the Past Year – National Study

	Group	N	Mean	Std Dev	p Value[4]	Effect Size[5]
Science museum	Treatment	51	3.02	.616	.188	.265
	Control	50	2.84	.738		
Children's museum	Treatment	52	2.60	.774	.086	-.336
	Control	53	2.87	.833		
Art museum	Treatment	48	2.52	.772	.405	-.170
	Control	50	2.66	.872		
Library	Treatment	54	3.78	.572	.271	.219
	Control	56	3.64	.699		
Aquarium	Treatment	50	3.02	.622	.225	.237
	Control	52	2.85	.802		
Zoo	Treatment	55	3.44	.688	.051	.384
	Control	54	3.13	.912		
Nature center	Treatment	48	2.90	.692	.579	-.106
	Control	51	2.98	.812		
Local park	Treatment	55	3.82	.434	.207	-.230
	Control	57	3.91	.342		
Playground	Treatment	54	3.76	.547	.967	.016
	Control	57	3.75	.689		

[4] The "t-test" is used to assess whether the averages of the two groups are statistically different from one another. The "p value" associated with the t statistic tells us the probability of rejecting the null hypothesis (that the two groups are equal) when the null is actually true (a false positive). A probability lower than p = .05 is considered "statistically significant" in education research, meaning the chance of a false positive is very slim (less than 5%).

[5] Effect size is a measure of the strength of the relationship between two variables and is an alternate measure (versus the t-statistic) of the magnitude of that relationship. Some researchers consider effect size to be more relevant than reporting inferential statistics and their associated p values because the effect size cannot be influenced by sample sizes (whereas inferential statistics can be). When comparing the averages of two independent groups, .20 is generally considered a small effect size, .50 is a medium effect size, and .80 is a large effect size [Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112*(1)*, 155-159.]

We also asked parents to report whether they believed that they needed to know "a lot" about math or science before they could teach their kids about the subjects. As summarized in the tables below, parents from both the Treatment Group and the Control Group tended to disagree with these two statements. There were no significant differences between the groups with respect to their agreement levels.

Table 5:
Parents' Beliefs about What They Need to Know to Teach their Children about Science and Math – National Study

	Group	N	Mean	Std Dev	p Value	Effect Size
You need to know a lot about science to help your kids learn science.	Treatment	55	2.64	.890	.092	-.249
	Control	57	2.86	.875		
You need to know a lot about math to help your kids learn math.	Treatment	55	3.27	.891	.063	.286
	Control	57	3.02	.855		

Finally, we asked parents to indicate the extent to which their children were naturally curious or enjoyed science or math-related activities such as:

- Counting
- Asking questions
- Arranging toys in different ways, sorting things by color or shape or in other ways
- Solving problems or doing puzzles
- Coming up with his or her own ideas about why things work the way they do
- Learning how things work
- Making guesses and predictions about things
- Being very curious about things

Parents indicated on a scale of 1 (Strongly disagree) to 4 (Strongly agree) the extent to which each of the above characteristics described their children. We compared the Treatment Group and the Control Group to explore whether there were differences with respect to any of the items listed above. As summarized in the table below, we found no significant differences between the groups with respect to these characteristics.

Table 6:
Children's Predisposition to STEM Activities -- National Family Study

My child…	Group	N	Mean	Std Dev	p Value	Effect Size
…likes to count things.	Treatment	55	3.60	.760	.798	-.046
	Control	57	3.63	.522		
…likes to ask a lot of questions.	Treatment	55	3.75	.751	.634	.103
	Control	57	3.68	.602		
…likes to arrange toys in different ways, or sort things by color or shape or other ways.	Treatment	55	3.56	.764	.162	.254
	Control	57	3.39	.559		
…likes solving problems or doing puzzles.	Treatment	55	3.53	.716	.487	.134
	Control	57	3.44	.627		
…comes up with his or her own ideas about why things work the way they do.	Treatment	55	3.56	.856	.721	-.067
	Control	57	3.61	.620		
…likes to learn how things work.	Treatment	55	3.53	.813	.288	-.202
	Control	57	3.67	.546		
…often makes guesses and predictions about things.	Treatment	55	3.33	.944	.701	.079
	Control	57	3.26	.813		
…is very curious about things.	Treatment	55	3.76	.607	.928	.018
	Control	57	3.75	.474		

In-Depth Family Study

The total sample size for the In-Depth Family Study was 36 families, representing Boston as well as cities and towns in the eastern Massachusetts area. Slightly more than half the children in the sample were female (55.6%). The In-Depth study included slightly more 4 year olds (41.7%) than 5 year olds (30.6%) and 3 year olds (27.8%). All of the families (100%) in our sample were Hispanic or Latino and 100% of the children in the sample attended preschool or daycare, including Head Start. *Unlike the National Family Study, there were no differences between the Treatment and Control Group with respect to whether children learn about math or science at their preschools:* 75% of parents reported that their children learn about math and 58% reported that their children learn about science at their preschools.

As in the National Family Study, most of the families in our In-Depth sample (80.6%) reported that their household financial situation was about the same as the average family. The proportion of families that reported their household financial situation was worse than the average family was 16.7%, which is slightly higher than the national average of 14% below poverty.

The proportion of parents in our sample with a Bachelor's Degree (11.1%) was much lower than the proportion in the National Family Study (32%) and the U.S. national average of 28%. The distribution of demographic and background characteristics across the groups is summarized below. There were no statistically significant differences between the Control Group and the Treatment Group with respect to key background variables.

Table 7:
In-Depth Study Participant Demographic and Background Characteristics

	Control Group (N = 18)	Treatment Group (N = 18)	TOTAL (N = 36)
Gender			
Boy	8 (44.4%)	8 (44.4%)	16 (44.4%)
Girl	10 (55.6%)	10 (55.6%)	20 (55.6%)
Age			
3	5 (27.8%)	5 (27.8%)	10 (27.8%)
4	7 (38.9%)	8 (44.4%)	15 (41.7%)
5	6 (33.3%)	5 (27.8%)	11 (30.6%)
Household financial situation			
Worse than average	2 (11.1%)	4 (22.2%)	6 (16.7%)
Average	15 (83.3%)	14 (77.8%)	29 (80.6%)
Better than average	1 (5.6%)	0 (0.0%)	1 (2.8%)
Highest household education level			
High school graduate or less	12 (66.7%)	9 (50.0%)	21 (58.3%)
Associate degree or certificate program	1 (5.6%)	0 (0.0%)	1 (2.8%)
Some college credit, but no degree	2 (11.1%)	3 (16.7%)	5 (13.9%)
Bachelor's degree	1 (5.6%)	3 (16.7%)	4 (11.1%)
Master's degree	1 (5.6%)	2 (11.1%)	3 (8.3%)
Doctorate or professional degree	1 (5.6%)	0 (0.0%)	1 (2.8%)

Again, we included families in the study who had previously watched Peep on TV—6 families in the Control Group had prior exposure to Peep, while 8 of the Treatment Group families had.

As with the National Family Study, we also wanted to ensure that families in both groups had an equal predisposition to engaging in STEM (science, technology, engineering, and math) activities. So, we asked parents to indicate, from among the following activities, which were the Top 3 that they would most like to do with their children. Again, since families could only choose up to 3 activities, scores ranged from 0 to 3 points. There was no significant difference between the groups: Families in the Control Group reported an average of 1.1 STEM activities (standard deviation = .72) and the Treatment Group reported an average of 1.1 STEM activities (standard deviation = .64). Thus, the families in the groups had an equal predisposition to engage in STEM activities.

Also similar to the National Family Study, we asked parents to report how often their family has visited the following places in the past year to learn which families might be more inclined to seek out informal STEM learning opportunities. Again, we removed from the analysis any family that indicated that they could not visit a place because it was not located close to them.

Table 8:
Frequency of Family Visits to Places with Informal Education Opportunities in the Past Year – In-Depth Study

	Group	N	Mean	Std Dev	p Value[6]	Effect Size
Science museum	Treatment	10	2.60	.699	.206	**-.621**
	Control	9	3.11	.928		
Children's museum	Treatment	16	2.56	.814	.271	-.420
	Control	12	2.92	.900		
Art museum	Treatment	10	2.40	.843	.792	.288
	Control	6	2.17	.753		
Library	Treatment	18	3.89	.323	.198	.460
	Control	18	3.67	.594		
Aquarium	Treatment	17	2.35	.606	.130	**-.625**
	Control	11	2.82	.874		
Zoo	Treatment	18	2.78	.548	.962	-.071
	Control	12	2.83	.835		
Nature center	Treatment	10	3.10	.876	.350	.449
	Control	6	2.67	1.033		
Local park	Treatment	18	3.89	.323	.232	**.533**
	Control	16	3.56	.814		
Playground	Treatment	18	3.89	.323	.598	.245
	Control	18	3.78	.548		

[6] Instead of using the t-test to examine differences between the groups, we used the non-parametric Mann-Whitney Test due to the non-normal distribution of the variables.

Although none of the observed differences were statistically significant (using the cutoff point of $p > .05$ to define significance), this may be due to the small sample sizes that resulted from excluding families who were not located near a specific place. In this case, the effect size is likely a better indicator of the differences between the groups, since the effect size is not sensitive to sample size. In this case, *the Control Group families appear to have visited zoos and aquaria more frequently than the Treatment Group families while the Treatment Group families were more likely to have visited local parks than the Control Group families during the past year.*

As in the National Study, we asked parents to report whether they believed that they needed to know "a lot" about math or science before they could teach their kids about the subjects. As summarized in the tables below, as in the National Study, parents from both the Treatment Group and the Control Group tended to disagree with these two statements. As we observed in the National Family Study, there were no significant differences between the groups with respect to their agreement levels.

Table 9:
Parents' Beliefs about What They Need to Know to Teach their Children about Science and Math – In-Depth Study

	Group	N	Mean	Std Dev	p Value	Effect Size
You need to know a lot about science to help your kids learn science.	Treatment	18	3.17	.786	.362	.12
	Control	18	3.06	1.056		
You need to know a lot about math to help your kids learn math.	Treatment	18	3.17	.857	.366	.11
	Control	18	3.06	1.056		

Finally, we asked parents to indicate the extent to which their children were naturally curious or enjoyed science or math-related activities. As with the National Family Study, we compared the Treatment Group and the Control Group to explore whether there were differences and found no significant differences between the groups (see table below) with respect to these characteristics.

Table 10:
Children's Predisposition to STEM Activities – In-Depth Family Study

My child…	Group	N	Mean	Std Dev	p Value	Effect Size
…likes to count things.	Treatment	18	3.61	.501	.744	.010
	Control	18	3.56	.511		
…likes to ask a lot of questions.	Treatment	18	3.67	.485	.471	-.240
	Control	18	3.78	.428		
…likes to arrange toys in different ways, or sort things by color or shape or other ways.	Treatment	18	3.22	.647	.074	.616
	Control	18	2.83	.618		
…likes solving problems or doing puzzles.	Treatment	18	3.44	.616	.803	-.090
	Control	18	3.50	.707		
…comes up with his or her own ideas about why things work the way they do.	Treatment	18	3.50	.514	.479	.244
	Control	18	3.33	.840		
…likes to learn how things work.	Treatment	18	3.39	.502	.240	-.395
	Control	18	3.61	.608		
…often makes guesses and predictions about things.	Treatment	18	3.17	.618	.140	.514
	Control	18	2.72	1.074		
…is very curious about things.	Treatment	18	3.56	.511	.217	-.415
	Control	18	3.78	.548		

Outreach Partner Survey

As described earlier, WGBH partnered with five public television stations across the country as demonstration sites for engaging Latino families in informal science learning. These stations, in turn, partnered with local community organizations such as libraries, literacy centers, and others to disseminate the Peep resources to families and educators. The organizations reported serving diverse populations, as summarized in the table below. For example, respondents from Salt Lake City reported that 10-40% of the families they serve are Hispanic/Latino, 2-3% are African-American, and 10-80% are low income.

Table 11:
Proportion of Underserved Families Served by Organizations

Location and Organization	Proportion of Families that are Hispanic/Latino	Proportion of Families that are African-American	Proportion of Families that are Low Income
Phoenix, AZ			
Public TV Station	65%	10%	19%[7]
Raleigh-Durham, NC			
Public TV Station	8%	22%	16%[8]
Cooperative Extension	50%	20%	90%
Child Care Center	25%	45%	Unknown
Preschool	12%	85%	95%
County Partnership	30%	40%	60%
Salt Lake City, UT			
Public TV Station	40%	2%	80%
Children's Museum	10%	3%	10%
San Antonio, TX			
Public TV Station	80%	10%	80%
Public Library	95%	4%	100%
Yakima Valley, WA			
Public TV Station	20%	10%	30%

[7] Percentage of individuals in Phoenix living below poverty level. From 2010 U.S. Census data, available online: http://quickfacts.census.gov/qfd/states/04/0455000.html
[8] Percentage of individuals in North Carolina living below poverty level. From 2010 U.S. Census data, available online: http://quickfacts.census.gov/qfd/states/37/3755000.html

Findings

Parents who used the Peep resources were better equipped to facilitate science and math exploration with their preschoolers, and thus were more confident, than parents who did not use PEEP (Impact I, Indicator a). Moreover, Peep provided an opportunity for positive family interactions.

We asked parents to report, on a scale of 1 ("Strongly disagree") to 4 ("Strongly agree") the extent to which they agreed with the following ways that Peep may have impacted their own ability to explore STEM activities with their children. The average level of agreement in the National and In-Depth samples was high – that is, **parents who used Peep resources reported that Peep gave them new ideas about exploring STEM and, therefore, gave them greater confidence to explore STEM activities.**

Table 12:
Impact of Peep Materials on Parents
(Scale = 1 to 4)

	National Study (N = 55)		In-Depth Study (N = 18)	
	Average Agreement	Standard Deviation	Average Agreement	Standard Deviation
The Peep materials gave me ideas about how to explore math and science topics with my kid(s).	**3.69**	.663	**3.56**	.511
The Peep materials made me more confident that I can help my kid(s) learn about math and science.	**3.69**	.573	**3.22**	.548

Most parents in the National and In-Depth Treatment Groups (96% of the National sample and 88% of the In-Depth sample) reported using the Peep "Tips for Parents" sheet designed to help parents learn how to facilitate science and math exploration with their children. Of the parents who used the Tips sheet, **100% reported that it helped them learn how to facilitate science and math exploration.**

When we asked parents in the Treatment Group to comment on how the Peep resources impacted them, **parents reported that the Peep resources were easy to understand and fun to use. They also reported that the Peep resources encouraged interaction between parents and children, and that the interaction helped them both learn.**

Parents reported:

- *I actually learned a lot. It was easy to understand seeing kids in action.*
- *My child told me he liked "making observations and spending time together." It gave me thoughts about how to spend some quality time together.*
- *We were able to bond and, through our interaction, we both learned!*
- *I am learning a lot. I never thought of having my kids lay down outside and trace their bodies. I loved the activities. The activities are great to teach to the children. I wouldn't change anything.*
- *The activities were educational and fun. Things are well explained and easy to understand. The animated characters were very likeable.*
- *We have learned NEW WAYS to do things around the house using objects and being more creative in our outside activities.*
- *The activities were easy to follow and understand. I liked that it was a step by step approach.*
- *Watching the kids on the video do it first made it easier for us to do it.*
- *I liked that Peep showed us different ways of thinking.*
- *Besides sharing with my son I liked how easy and simple it was to play and learn in a simple and fun way.*
- *I like that Peep is an interactive show and that was in Spanish.*
- *The Peep activities were interesting, simple and fun for anyone to do.*

Our observation of parents in the In-Depth Family Study provides additional evidence that the Peep resources had a positive impact on parental confidence and ability and on the interaction between child and parent. We analyzed the parent-child interactions during play and coded all parent behaviors. Some parental behaviors were proactive, such as “Parent models for the child how to accomplish a task or to figure something out.” Other behaviors were supportive, such as “Parent gives praise or encouragement.” Other parental behaviors were coded as neutral or non-interactive, such as “Parent plays independently.” These categories and the behaviors that were included within them were:

Proactive or Parent-Initiated Behaviors

- Parent and child play together in parent initiated role
- Parent asks child a question
- Parent explains a concept to child
- Parent gives verbal instructions to child (tells them what to do)
- Parent physically manipulates objects to cue the child to next step
- Parent sets up or modifies environment
- Parent models for the child how to accomplish a task or do an activity
- Parent asks child for help to accomplish a task or to figure something out
- Parent talks to researcher about what child is doing (ex: "He loves this part, she always does it that way, he has trouble sharing, he likes to think up new ways of doing things.")

Encouraging or Supportive Behaviors

- Parent gives praise or encouragement
- Parent monitors and controls child's frustration
- Parent smiles at child or nods to reinforce that he or she is using the objects in appropriate ways
- Parent uses hand gestures to encourage child to persist and keep going
- Parent moves physically closer to the child

Passive or Neutral Behaviors

- Parent plays independently
- Parent and child play together in child initiated role
- Parent answers child's question
- Parent observes child at play

We observed that **parents in the Treatment Group were significantly more likely than parents in the Control Group to engage in proactive, parent-initiated behaviors and encouraging or supportive behaviors with their children.** Treatment Group parents were 12% more likely to engage in proactive behaviors than parents in the Control Group. Parents in the Treatment Group were also significantly less likely than parents in the Control Group to remain only passive or neutral during playtime.

Table 13:
Parental Behaviors Observed

Group	Proactive or Parent-Initiated	Encouraging or Supportive	Passive or Neutral	Total Behaviors
Treatment	277 (66.3%)	85 (20.3%)	56 (13.4%)	418 (100%)
Control	205 (59.4%)	61 (17.7%)	79 (22.9%)	345 (100%)

Note: Chi-square (df = 2) = 11.742, p = .003.

During our playtime observations, we noted that parents who had used Peep resources (parents in the Treatment Group) were more at ease playing with their children and tried to engage and encourage their children more frequently than parents in the Control Group. We observed that parents in the Control Group (those with no Peep exposure) were hesitant to play at first and opted more often for watching their children play, rather than engaging with them. As summarized in Appendix E, this difference was most notable when the families were playing with the ramp activity set.

Given that the Treatment Group and the Control Group were equally matched on key background and demographic variables, we are confident that the differences observed between the groups are attributable to the intervention—that is, **using *Peep* had a positive impact on parents' abilities and their confidence to facilitate science and math exploration in this study.**

We asked parents in the Treatment and Control Groups (National and In-Depth) to report, on a scale from 1 ("Strongly disagree") to 4 ("Strongly agree") their level of agreement with a set of statements designed to assess whether they knew how (i.e., "felt equipped") to engage their children in STEM-related activities, including:

- Teaching my child to use light to make shadows.
- Playing with my child to see what happens when you put different objects on ramps and slides.
- Helping my child make patterns using blocks or colored beads or buttons or other objects.
- Helping my child explore our home or community for new places or things.
- Working with my child to solve simple problems.
- Showing my child how things work.
- Encouraging my child to ask questions.
- Encouraging my child to guess or make a prediction about how something works—and then test his or her ideas.

As summarized in Table 14 below, **parents in the In-Depth Family Study Treatment Group (after using Peep resources) were more likely than parents in the Control Group to report that they felt capable of helping their children explore specific topics like shadows, ramps, and patterns.**

Table 14:
Parents' Self-reported Ability to Engage Children in Specific STEM Activities – In-Depth Family Study

I know how to…	Group	N	Mean	Std Dev	p Value	Effect Size
…teach my child to use light to make shadows.	Treatment	18	3.67	.485	.050[9]	.57
	Control	18	3.39	.502		
…play with my child to see what happens when you put different objects on ramps and slides.	Treatment	18	3.56	.511	.068	.51[10]
	Control	18	3.28	.575		
…help my child make patterns using blocks or colored beads or buttons or other objects.	Treatment	18	3.67	.485	.027[11]	.67
	Control	18	3.28	.669		

However, when we asked parents about more general STEM-related activities such as "problem solving" the differences between the groups disappeared. As summarized in Tables 15 and 16, there were no general STEM activities for which we observed a difference between the groups, and the differences observed in the In-Depth Family Study were not replicated in the National Family Study.

Table 15:
Parents' Self-reported Ability to Engage Children in General STEM Activities – In-Depth Family Study

I know how to…	Group	N	Mean	Std Dev	p Value	Effect Size
…help my child explore our home or community for new places or things.	Treatment	18	3.78	.428	.209	.04
	Control	18	3.67	.485		
…work with my child to solve simple problems.	Treatment	18	3.72	.461	.500	.00
	Control	18	3.72	.461		
…show my child how things	Treatment	18	3.67	.485	.500	.00

[9] t (34) = 1.689.
[10] Although the t-test statistic is not significant at the p<.05 level, the effect size is moderate, indicating that the difference between the groups is meaningful.
[11] t (34) = 1.996.

I know how to…	Group	N	Mean	Std Dev	p Value	Effect Size
work.	Control	18	3.67	.485		
…encourage my child to ask questions.	Treatment	18	3.50	.514	.258	.00
	Control	18	3.61	.502		
…encourage my child to guess or make a prediction about how something works—and then test his or her ideas.	Treatment	18	3.61	.608	.158	.34
	Control	18	3.39	.698		

Instead, most parents in the National Family Study and the In-Depth Family Study reported that they knew how to engage their children in STEM-related activities (all of the average agreement levels were close to "4", even in the Control Groups). In addition, the effect sizes were small. It is likely that we observed a "ceiling effect" – that is, most parents' agreement levels were already high to begin with and there was little room for improvement.

Table 16:
Parents' Self-reported Ability to Engage Children in STEM Activities -- National Family Study

I know how to…	Group	N	Mean	Std Dev	p Value	Effect Size
…teach my child to use light to make shadows.	Treatment	55	3.62	.652	.220	.14
	Control	57	3.53	.601		
…play with my child to see what happens when you put different objects on ramps and slides.	Treatment	55	3.45	.789	.349	-.08
	Control	57	3.51	.685		
…help my child make patterns using blocks or colored beads or buttons or other objects.	Treatment	55	3.62	.757	.487	.01
	Control	57	3.61	.590		
…help my child explore our home or community for new places or things.	Treatment	55	3.49	.814	.092	-.26
	Control	57	3.67	.546		
…work with my child to solve simple problems.	Treatment	55	3.56	.811	.084	-.28
	Control	57	3.74	.444		
…show my child how things work.	Treatment	55	3.69	.605	.262	-.11
	Control	57	3.75	.434		

I know how to…	Group	N	Mean	Std Dev	p Value	Effect Size
…encourage my child to ask questions.	Treatment	55	3.65	.700	.401	-.05
	Control	57	3.68	.540		
…encourage my child to guess or make a prediction about how something works—and then test his or her ideas.	Treatment	55	3.64	.649	.484	.02
	Control	57	3.63	.555		

This may be a result of parents with good levels of confidence self-selecting into the study. In the future, it may be interesting to replicate the study with a sample of families who self-identify during recruitment as lacking confidence in the areas of math and science exploration or parents whose children are not in preschool (where the behaviors may be modeled by teachers for parents to learn).

Parents who used the Peep resources reported feeling more inclined to do math and science activities with their preschoolers than parents who were not exposed to the PEEP resources (Impact I, Indicator b).

We asked parents to report, on a scale of 1 ("Strongly disagree") to 4 ("Strongly agree") the extent to which they agreed with the following ways that Peep may have impacted their own ability to explore STEM activities with their children. The average level of agreement in both the National and In-Depth samples was high – that is, **parents who used Peep resources reported that Peep motivated them to do more STEM activities in the future with their children.**

Table 17:
Impact of Peep Materials on Parental Motivation

	National Study (N = 55)		In-Depth Study (N = 18)	
	Average Agreement	Standard Deviation	Average Agreement	Standard Deviation
I am more likely to do math and science activities with my kid(s) than before I knew about Peep.	3.62	.593	3.22	.548

In both the National Study and the In-Depth Study, **nearly all parents who used Peep reported that they were likely to try other Peep activities with their children in the future.**

Table 18:
Parent Intentions to Use Peep Again

	National Study (N = 55)	In-Depth Study (N = 18)
Proportion of parents likely to try other Peep activities in the future, with their child.	53 (96.4%)	18 (100%)

We also asked parents in the National sample to report how likely it was that their family would visit the following places in the coming year on a scale of 1 ("Not likely at all") to 4 ("Very likely"). Our hypothesis was that families exposed to *Peep* might be more inclined to seek out informal STEM learning opportunities, such as the ones available at local…

- Science museums
- Children's museums
- Art museums
- Libraries
- Aquaria
- Zoos
- Nature centers
- Local parks
- Playgrounds

As summarized in the table below, we observed that among the families in the National Family Study, **families in the Treatment Group were more likely than families in the Control Group to report intentions to visit science museums and aquaria in the coming year.** The reader may recall that families from both groups reported visiting these places with equal frequency during the previous year. So, we are confident that any differences observed with respect to intentions to visit these places is likely due to the families' use of the Peep resources and not due to differences in the families' backgrounds.

Table 19:
Likelihood that Families Will Visit Places with Informal Education Opportunities in the Coming Year – National Study

	Group	N	Mean	Std Dev	p Value	Effect Size
Science museum	**Treatment**	**55**	**3.67**	**.610**	**.046**	**.32**
	Control	**57**	**3.47**	**.630**		
Children's museum	Treatment	54	3.59	.687	.248	.12
	Control	57	3.51	.601		

	Group	N	Mean	Std Dev	p Value	Effect Size
Art museum	Treatment	55	3.53	.716	.085	.27
	Control	57	3.33	.764		
Library	Treatment	55	3.84	.420	.366	.07
	Control	57	3.81	.480		
Aquarium	**Treatment**	**55**	**3.75**	**.517**	**.041**	**.35**
	Control	**57**	**3.54**	**.683**		
Zoo	Treatment	55	3.78	.459	.314	.08
	Control	57	3.74	.518		
Nature center	Treatment	55	3.60	.627	.264	.21
	Control	57	3.46	.709		
Local park	Treatment	55	3.89	.315	.068	-.28
	Control	57	3.96	.186		
Playground	Treatment	55	3.84	.462	.113	-.23
	Control	56	3.93	.322		

Recall that in the In-Depth Family Study, Control Group families reported visiting zoos and aquaria more frequently than the Treatment Group families while the Treatment Group families were more likely to have visited local parks than the Control Group families during the past year. We observed that among the families in our In-Depth Family Study, **after using the Peep resources, families in the Treatment Group were significantly more likely to report that they planned to visit zoos and nature centers in the coming year than were families from the Control Group,** despite the fact that Control Group families reported visiting them more frequently than Treatment Group families the prior year (the effect sizes were large, too).

Another difference we observed was that after using Peep, Control Group families were no longer statistically more likely to visit aquaria than Treatment Group families (based on frequency of prior visits). So, using Peep helped to close that gap between the groups.

Treatment Group families were still more likely than Control Group families to report that they planned to visit local parks, but this finding was expected, given that Treatment Group families reported visiting local parks more frequently the previous year.

Table 20:
Likelihood that Families Will Visit Places with Informal Education Opportunities in the Coming Year – In-Depth Study

	Group	N	Mean	Std Dev	p Value	Effect Size
Science museum	Treatment	18	3.17	.786	.426	.07
	Control	18	3.11	.963		
Children's museum	Treatment	18	3.28	.826	.358	.12
	Control	18	3.17	.985		
Art museum	Treatment	18	2.72	.958	.362	.12
	Control	18	2.61	.916		
Library	Treatment	18	3.89	.323	.321	.17
	Control	18	3.83	.383		
Aquarium	Treatment	18	3.33	.840	.187	.29
	Control	18	3.06	.998		
Zoo	**Treatment**	**18**	**3.56**	**.616**	**.041**	**.60**
	Control	**18**	**3.06**	**.998**		
Nature center	**Treatment**	**18**	**3.59**	**.857**	**.019**	**.82**
	Control	**18**	**2.83**	**.985**		
Local park	**Treatment**	**18**	**3.94**	**.236**	**.035**	**.63**
	Control	**18**	**3.61**	**.698**		
Playground	Treatment	18	3.94	.236	.280	.18
	Control	18	3.89	.323		

Children and parents reported that children were engaged by the Peep episodes and activities (Impact II, Indicator a).

We asked children to tell us how much they enjoyed the Peep video resources and activities. Nearly all children reported that they enjoyed the videos and the activities and that they would like to do more Peep activities in the future.

Table 21:
Children's Perceptions of the Peep Resources

	National Sample (N = 55)	In-Depth Sample (N = 18)
Did you like watching the Peep cartoons?	52 (94.5%) said "Yes"	18 (100.0%) said "Yes"
Did you like watching the Peep videos that showed real kids and adults?	55 (100.0%) said "Yes"	16 (88.9%) said "Yes"

	National Sample (N = 55)	In-Depth Sample (N = 18)
Did you like doing the Peep activities with your family?	55 (100.0%) said "Yes"	18 (100.0%) said "Yes"
Would you like to do more Peep activities with your family?	43 (78.2%) said "Yes"	18 (100.0%) said "Yes"

Children reported:

- *I liked doing the activities and spending time with my Mom.*
- *I liked shadow dancing with my Mom.*
- *Peep is so cute and Quack is so funny!*
- *Quack likes to think he's the best at everything. It made me laugh so hard.*
- *My big brother liked to watch Peep with me.*
- *I want to watch Peep on TV. When is it on?*

In nearly half of the interviews with Spanish-speaking families in the In-Depth Family Study, parents reported that there are very few "wholesome" and "educational" television shows that are currently offered in Spanish for their preschool-aged children. One parent told us, "I believe (Peep in Spanish) is a good way to learn to spend more quality time with the children. I don't let my kids watch TV now because there is nothing safe for them to watch alone. Most TV shows for kids in Spanish are really inappropriate."

Another parent reported, "The majority of Latin TV shows for kids today are too mature. We need something like this on TV for kids who don't speak English yet."

While another said, "Even though my kids don't speak perfect English yet, I plan to let them watch the English version of Peep on TV until the Spanish one comes on. Please ask them to put Spanish Peep on TV!"

In both the National Study and the In-Depth Study, **nearly all parents who used Peep reported that they would recommend Peep to other Spanish-speaking families and that they would recommend Peep to their child's teacher.**

Table 22:
Parent Intentions to Recommend Peep to Others

	National Study (N = 55)	In-Depth Study (N = 18)
Proportion of parents that may recommend Peep to other Spanish-speaking families.	54 (98.2%)	18 (100%)
Proportion of parents that may recommend Peep to their child's teacher.	52 (94.5%)	18 (100%)

Parent reports confirmed what the children told us. Almost all parents reported that their children enjoyed the videos and activities.

Table 23:
Parental Reports of Children's Reaction to Peep

	National Sample (N = 55)	In-Depth Sample (N = 18)
Child was excited by the animated (cartoon) videos.	55 (100.0%) agreed	17 (94.4%) agreed
Child was excited by the live action segments (with real people).	54 (98.1%) agreed	16 (88.9%) agreed
Child was excited about the Peep activities.	54 (98.1%) agreed	17 (94.4%) agreed

Parents also reported:

- *We loved Peep!*
- *Peep opens another world she is now ready to explore.*
- *My son was humming some of the rhythms and has been wanting to do more things on the website. He looks forward to Peep just more than ever. We chose to watch it in Spanish instead of English and I found it just as engaging.*
- *The videos are very curious, and humorous. They also have good stories.*
- *We liked the engaging characters and animation. They are very funny.*

- *I thought the voices, accents, and speech were the appropriate speed for my kids.*

- *I liked that we can do Peep at home with household materials and I do not buy anything for them.*

- *The activities are creative and easy to make.*

Children who used the Peep resources applied science process skills (including observation, prediction, and problem-solving) in the hands-on explorations of their environments (Impact II, Indicator b).

In the In-Depth Family Study, we observed children's playtime behaviors and coded those that demonstrated science process skills, such as "Child predicts what might happen if/next."

Science Process Skills

- Child plays and explores the objects independently without being prompted by anyone
- Child notices and describes similarities and differences between objects
- Child tries out multiple objects during play (and may ask "What will happen if I…?")
- Child recalls past experiences and applies them in a new situation (including Peep videos or activities)
- Child predicts what might happen if/next
- Child brainstorms solutions, trying them out and learning from mistakes
- Child draws conclusions and/or "makes theories" about why something happened
- Child shares ideas and discoveries with others
- Child makes connections with past experiences and tells a story
- Parent and child play together in child-initiated role

In addition to other non-science process behaviors:

Support Seeking Behaviors

- Child looks for reassurance from parent
- Child asks for instructions from parent or researcher (wants to know what to do)
- Child asks for a definition or what something means

Reactive Behaviors

- Child answers parent's question

- Child plays with shadows, ramps or patterns with prompting from researcher
- Child plays with shadows, ramps or patterns after parent suggests it

Specifically, **while playing with ramps, we observed that children in the Treatment Group were significantly more likely than children in the Control Group to apply science process skills.** We noted this difference during our observations. Families in the Treatment Group often referred to the Peep activities involving ramps or told our researchers about what they did together to learn about ramps. One child reported, "We went to the school playground and rolled balls down the slide!" Another parent reported, "All my kids loved doing the ramp activity together, even the older ones. Now, my son wants to keep going back to the park to try rolling things down the slide."

Table 24:
Children's Behaviors Observed while Playing with Ramps[12]

Group	Science Process	Support Seeking	Reactive	Total Behaviors
Treatment	387 (83.8%)	11 (2.4%)	64 (13.9%)	462 (100%)
Control	219 (75.3%)	14 (4.8%)	58 (19.9%)	291 (100%)

Note: Chi-square (df = 2) = 8.853, p = .012.

We did not observe significant differences in children's science process skills when the families were playing with shadows and patterns. Children in both groups demonstrated an equal amount of science process skills during those activities and the percent of science process-related behaviors was high in both groups (see Appendix E).

To gather additional evidence of the impact of Peep on children's behaviors, we asked parents to report on their children's behavior at home while engaging in the Peep activities and watching the Peep episodes. In the National and In-Depth Family Studies, parents who used Peep resources reported that they observed their children applying science process skills while doing the activities. The average level of agreement in both samples was high for each of the following behaviors:

[12] The amount of time that families were given for each activity was limited to 10 minutes. Families could finish playing before the 10 minutes expired, but when an activity reached the 10 minute mark, we cleaned up and moved on to the next activity.

Table 25:
Science Process Skills Observed by Parents during Peep Activities

	National Study			In-Depth Study		
	N	Mean	Std Dev	N	Mean	Std Dev
As we did the activities together, my child tried to guess what we might discover/what might happen next.	55	3.64	.557	18	3.17	.383
As we did the activities together, my child asked a lot of questions.	55	3.71	.533	18	3.33	.485
As we did the activities together, my child talked about the things s/he was seeing.	55	3.76	.543	18	3.61	.608
As we did the activities together, my child came up with ideas about why certain things were happening.	55	3.64	.589	18	3.50	.618

Parents reported:

- *I have noticed that my son has been using his imagination to find any little thing, like an investigator, since watching Peep.*
- *My son loved it all and learned new ways to play and new words.*
- *My daughter is always curious and after watching Peep, she wants to do things alone without help.*
- *Since watching Peep, my child is always asking to do more hands-on activities and is more creative with the things around the house we have.*
- *My child asks more questions and is more interested in science and much more interested in independent play now.*

Families suggested a few ways to enhance Peep resources for Spanish-speaking families or make them more widely available.

We asked parents for suggestions about how to enhance the Peep materials to make them even more appropriate for Spanish-speaking families. They wanted to see Peep in Spanish on television:

- *Please make Peep more widely available on TV.*

- *Please put this show on television in Spanish.*

Parents also thought Peep materials should be provided to more schools and libraries:

- *These should be provided to schools.*
- *Sometimes in the library there are complimentary bookmarks promoting public television shows. Maybe a bookmark promoting Peep in English & Spanish could help?*
- *Include some lessons or materials for English Language Learners for teachers who teach English as a Second Language.*
- *Maybe include information in the show about different cultures of Hispanic families.*

A couple of parents from Central America and Puerto Rico commented that some of the language used was unfamiliar to them. They suggested having the script reviewed by Spanish-speakers from a range of dialects.

- *There are some words in Spanish which was not very familiar, as the word "tap" which I imagine is the key to the water exiting the hose. The translation must be a little more "Latino." There is another scene where Duck runs into the root of a tree and says: "This left", that really makes no sense. He could say, "Wao the root of this tree is very big" and implied that it the root of the tree is out of the earth.*

PEEP provided its community engagement partners appropriate resources for the families, both English-and Spanish-speaking, that they serve (Impact III, Indicators a-e).

KLRN (San Antonio, TX)

The Texas station partner (KLRN) and its community partner, the San Antonio Public Library, reported on 3 family events held in October 2011, February 2012, and April 2012. These events reached over 1,000 families total, 90% of which were Spanish-speaking. KLRN used the following Peep resources at their family events:

- Character walkabout costume
- Peep logos/images

- PDFs of English and Spanish family handouts
- Activities from the Peep Event Kit
- Peep posters
- Peep tattoos
- Peep merchandise (books or DVDs)
- PEEP activity booklet (that KLRN created)

KLRN based each of the events on the PEEP resources (specifically, the handouts). They also used the resources to promote the airtime and the value of the Peep program to families. Their main objective was to make families aware that science can be fun and is easy for parents to engage with children. As reported in Appendix E (Table E-9), families were very engaged by the activities and the resources were perceived by KLRN as very appropriate for Spanish-speaking families.

According to KLRN, "…children and parents were very engaged in the activities and demonstrated to parents that science is fun. Children made predictions when mixing colors and planting their seeds. Children also came up with their own ideas as to how they were going to lace their beads, which beads should go first and why. Parents expressed how easy science can be. Parents talked about trying the same activities at home. They referenced in allowing the children help with the plants at how and how they could create a daily journal on how the plants grew and changed shape and size. Others talked about going on walks and looking for different leaves, shapes and sizes." The station plans to use the Peep resources again with families in the future.

KLRN also reported on 1 training event for pre-K educators held in November 2011 for 42 educators. The following resources were used in the training:

- Peep logos/images
- PDFs of English and Spanish family handouts
- 1-sheet promoting the Peep Explorer's Guide
- PowerPoint for use with teachers
- Peep merchandise (books or DVDs)

The training objective was to introduce teachers to the program and help them learn how to integrate Peep information into their curriculum. KLRN demonstrated that the topics are developmentally appropriate for children 3- 5 years old and explained how teachers can connect science themes/topics to children's everyday life experiences and situations.

Based on feedback the partner received from teachers, they found that teachers were interested in the materials and planned to use some of the activities in their

classrooms. Teachers reported that they liked that the information was available in English and Spanish. KLRN plans to continue using the Peep resources in training sessions with pre-K educators.

Starting in October 2011, KLRN has also distributed PDFs of the Spanish Peep family handouts during community events and parent workshops on a monthly basis to make families aware of the Peep program and how the program can help develop children's science and math skills. They estimate that they have reached over 300 families (80% of whom are Spanish-speaking) with these activities.

One community partner, the San Antonio Public Library, also reported using Peep resources at their library birthday celebration and during regular family story times. They have used the Peep character costume, the Peep logo/images, English and Spanish family handouts, and the Peep books. They reported that families were "very engaged" by the resources and that the resources were appropriate for Spanish-speaking families.

Challenges

One of the biggest challenges to working with Spanish-speaking families, according to the TX partners, is building a relationship with families that will create trust. They recommended making sure all the information is available in Spanish, that the trainer/presenter can speak Spanish, and most importantly building a relationship with the families. In addition, having interactive activities that engage the child, no matter what language they speak, will help to keep families interested. The KLRN Education team builds trust with its families by hosting weekly family activities (parent workshops, play and learn groups), following up with phone calls and taking an interest in the families' involvement in their children's education. The KLRN team also takes pictures at events and shares them with the families as a gift. According to the station, "KLRN is connected to families on a personal level."

KCTS (Yakima Valley, WA)

The Washington station (KCTS) reported on 4 family events and 2 pre-K educator training events. KCTS reaches out to Spanish speaking families on several levels. It broadcasts Vme, including its extensive children's block, 24/7 in the Seattle-Tacoma, Yakima and Tri-Cities areas. KCTS does not collect ratings for Vme, so it is hard to quantify reach via broadcast, but data from two years ago suggest that between 12% and 17% of Spanish speaking consumers in the area had seen Vme within 7 days. Since beginning the Vme service, KCTS has maintained a Spanish speaking educator on its Community Engagement &

Education team. Its on-going early learning workshops are fully available in English and Spanish.

KCTS has also added Peep to its website. Since Peep airs on its Vme service, but not on KCTS 9, the program was featured with its Vme schedule at KCTS9.org, and had a presence via social media. The "KCTS 9 Vme" Facebook page and "Vme Washington" on Twitter featured posts about the program and Dia de los Ninos. Peep's Facebook page is also a Favorite of the station's Facebook page. Peep will be rotated with other program highlights for Vme, but does not have a permanent page (Bilingual Facebook and Twitter accounts are in their early stages.)

Peep is also included in the station's member communication vehicles, including the Viewer Guide (distributed monthly) and Ezine (biweekly) to over 185,000 members (2% of whom are Spanish-speaking).

To date, the station estimates that they have reached about 270 families with Spanish Peep resources. About 200 families accessed Peep resources collateral at the 3 family events (Latino EXPOs) and close to 50 families benefitted from the "family science night" activity night in June. 85% of the families attending this event were Spanish-speaking.

The Peep resources used at these events included:

- Peep logos/images
- PDFs of English and Spanish family handouts
- Activities from the Peep Event Kit
- Activities from the Anywhere Science & Math area of Peep's website
- DVD of Peep episodes in English
- DVD of Peep episodes in Spanish
- Peep posters
- Peep tattoos
- Peep flashlights
- Peep merchandise (books or DVDs)
- Peep plush toys
- Peep T-shirts
- Powerpoint adapted from WGBH teacher in-service

Activities included modeling activities from hand-outs and Explorer's Guide, previews of program and extensions (i.e., sorting and classification of sounds, shapes, etc.) At some events (Latino EXPOs in Yakima and Tri-Cities),

interaction was a little "softer" and promotional in nature: distribution of tune-in information, coloring sheets and collateral.

The station plans on continuing to use Peep resources at its family and community events.

The two educator trainings were held in October 2011 and June 2012 and reached 56 pre-K educators. The station used the following Peep resources:

- Peep logos/images
- PDFs of English and Spanish family handouts
- Activities from the Peep Explorers Guide for classrooms
- 1-sheet promoting the Peep Explorer's Guide
- PowerPoint for use with teachers
- Activities from the Peep Event Kit
- Activities from the Anywhere Science & Math area of Peep's website
- DVD of Peep episodes in English
- DVD of Peep episodes in Spanish
- Peep merchandise (books or DVDs)

According to the station, “the objective for the first training was to encourage childcare providers to envision a comprehensive approach to science learning. It used Peep as an example of how to explore science concepts by connecting video content, classroom activities and home activities in a single process of themed inquiry with children. The audience included providers from centers and home-based childcare programs. The second training took place at the Washington State Migrant Council’s Headstart program in Toppenish, WA which serves about 70 Spanish speaking families. Ten early learning professionals participated in a hands-on demonstration of science activities inspired by the Peep Neighborhood Safari, including activities they could replicate with children that explored light and shadow, plants, colors and sound. They received class sets of seeds, bilingual activity handouts, Peep flashlights and about $600 worth of science manipulatives including plant matching games, magnifying glasses, color mixing tiles and sound games. All teachers also received activity guides, handouts, DVDs and Peep plush toys for their programs.

KCTS reported that the educators enjoyed the connectivity of online resources with television/video content. Several participants commented that the pacing of the video content seemed especially appropriate for ages 3-5 and very welcome in an era of "Sponge Bobification." The two trainings were designed specifically to equip educators with the content and materials necessary to explore multiple units from the Explorer's Guide.

Suggestions for the Future

"The integration of content in web, PDF and video formats helps educators design a seamless system of inquiry, whether it is on shapes, ramps, shadows, plants or colors. WGBH provided a rich array of resources, including unique elements like flashlights and garden seeds. One way the resources could be improved would be to include more branded reproducibles such as graphs to accompany activities that ask children to make measurements of time, length, etc."

"Some of the materials are a little text heavy (in either language). This is not an issue unique to Peep, but one pervasive to many of our PBS materials for parents of young children. Like English-speaking families, Spanish-speaking families have a range of comfort with literacy and a range of time and energy to devote to parenting materials. (Due to the fact that some parents have been working since they were children, some migrant families have generational literacy issues in both Spanish and English and can be extra discouraged by text heavy documents.) This is not to suggest that materials be 'dumbed down,' rather that use of graphic elements and concise language can go a long way. Additionally, it sometimes helps to work closely with a translator to translate the intent of a text rather than the literal structure of a text."

Challenges

KCTS reported: "One of the biggest challenges in encouraging families to immerse themselves in science is to build confidence in adult family members. Anecdotal observations confirmed that adult concerns about science and math can have an impact about when and how these subjects are explored with young children. One of the most positive aspects of the Peep materials is that they open up science and math in accessible ways that allow children and caregivers to discover concepts all around them - in the classroom, home and neighborhood walk. Whether in English or Spanish, the units offered basic terms and questions for families. In terms of the supporting materials, the flashlights have been a great tool to reinforce the shadows unit. The majority of units (shadow, color, ramps, etc) rely on easy-to-find materials that are readily available to families and providers.

"As with any audience, understanding Spanish speaking families' needs, interests and diversity is key. In our region, most Spanish dominant households include first generation immigrants of Mexican descent, but in Seattle also include sizable populations of Central Americans and South Americans, but fewer Caribbeans. In raw numbers, there are more Latinos concentrated in the

urban centers of western Washington but Latinos constitute a larger percentage of the rural communities of central and eastern Washington. Some migrant families may experience limited literacy if parents have been in the labor force since childhood. Varying policies and politics in school districts can also affect how and in what language Spanish dominant parents communicate with their children. All this is to say that Spanish speaking families are not a monolithic demographic. Many homes may be Spanish dominant conversationally and in terms of broadcast preferences, but may lean toward English on academics and in internet usage. Similarly, some households are split linguistically by generation. An effective approach is to focus on reaching Latino families with Spanish speaking materials as one component of a suite of compelling resources."

"Also, it is important to develop on-going partnerships and relationships. One of the challenges of the structure of this grant is that its limited scope would bias toward "one time" outreach, unless it is coupled with an on-going effort by a station to bolster community connections over time. Relationships are especially important in Latino circles, as borne out by recent research. Science and math outreach may fit best if part of a larger program of engagement with Latino (Eng/Span/bilingual) families. Events that are multi generational in nature can be a great fit. Bilingual presentation can be helpful. Full integration on the station's community advisory board can be an important way of building alliances."

KUED (Salt Lake City, UT)

The Utah station (KUED) reported on 17 family events that took place between November 2011 and February 2012. Pre-K educators were in attendance at many of these parent events. The events included a "Super Reader" party event as well as math and science parent workshops that the station holds annually at Title 1 and Head Start preschools. These events reached over 1,500 families and over 600 Head Start providers (about 1/3 of families are estimated to be Spanish-speaking). For 20 years, KUED has hosted the annual Super Reader party event that brings together close to 46 community, nonprofit, educational and diversity partners to celebrate children, reading and recently (added two years ago) STEM focused activities.

At these events, schools choose between 4-9 different themes they would like the educational outreach staff to cover. Any presentations scheduled in Spanish are hosted by a bilingual presenter, and hosted in English or Spanish depending on the ratio of attendees. Station staff reported that these events, which engaged families outside of the school day, are important because many parents in their Spanish-speaking community believe that all math and science teaching should happen at school and therefore parents don't see their role as teaching these subjects to their children. The events were designed to encourage parents

to see the home as the first place children learn. They provided simple tools and skills to support parents in teaching their children about STEM subjects at home. In addition to the family events in January, the station also participated at the State Fair with hands-on activities (Peep has been a character at that event three years in a row). The Peep resources used at all of the events listed above included:

- Character walkabout costume
- Peep logos/images
- PDFs of English and Spanish family handouts
- Activities from the Peep Event Kit
- Activities from the Anywhere Science & Math area of Peep's website
- DVD of Peep episodes in English
- Peep posters
- Peep tattoos
- Peep flashlights

KUED conducted evaluation surveys after the family events. Some of the feedback from participants included:

- *Keep my mind open to ideas, the world around me, asking more questions to help my children grow and learn.*
- *Good suggestions.*
- *Good to get parents thinking.*
- *This is very helpful and educational.*
- *I will use it to show my son that math is fun.*
- *I will share it with my other kids and also family.*
- *Thank you for helping us to do simple activities to be involved with our kids' education.*
- *I will get my son involved more in the daily stuff around the house. Great information.*
- *Thank you for your support and teachings that are very useful to us.*
- *I like the interactive science ideas, interesting presentation.*

KUED did not dedicate space on its website to Peep, but highlighted Peep in its blog to publicize upcoming events at which Peep was featured. The station has also included information about Peep in its member communication vehicles that reach over 28,000 members of the community (at least one-third of these individuals are Spanish-speaking).

The station found the Peep resources very easy to use. The content and the illustrations of the concepts were very well-received by families and educators.

Challenges

Besides the challenge of helping parents overcome the belief that learning only takes place at school, the other major challenge in reaching out to Spanish-speaking families has been encouraging people to attend events. To address this issue, KUED ensured that all event presenters were bilingual. In addition, the staff worked hard to help parents understand how this activity or program supports what they want to do for their kids. Getting an endorsement from a community partner (such as the Hispanic chamber, community group, or a teacher) or making the workshops a requirement for some programs also helped the station to increase attendance at events.

KAET-TV (Phoenix, AZ)

The Arizona station (KAET-TV) reported that Spanish Peep resources were used at 4 family events and 1 training event for pre-K educators. The family events included the Latino Institute Back to School Fair in July 2011, the Arizona Humanities Festival in November 2011, A "Sid the Science Kid" event (Water's Journey) in February 2012, and Día de los Niños in April 2012. Over 10,000 families (85% of whom were Spanish-speaking) attended these events and were exposed to the Peep resources. The following Peep resources were used at the events:

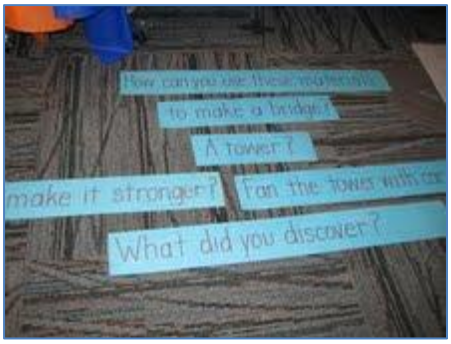
- Character walkabout costume
- Peep logos/images
- PDFs of English and Spanish family handouts
- Activities from the Peep Event Kit
- Activities from the Anywhere Science & Math area of Peep's website
- Peep posters
- Peep tattoos
- Peep flashlights

At one event, KAET-TV and its partners applied the Peep tattoos to all of the children at the event who wanted one. They also handed out the PEEP Exploring Science with Kids Tips hand-out in Spanish and English. Their objective was to promote the Peep program on the local TV station. At another event, the outreach partners had two tables where they conducted two water-related activities (Making Rivers and Making Things Sink and Float). The objective was to create parent awareness of preschooler inquiry and encourage everyday activities around science.

KAET-TV featured Chirp at another event, where they also conducted Shadow Box and Pattern activities. Participants were given Peep flashlights and

necklaces or bracelets. The objective was to promote the program and to let parents know that science is found in everyday activities.

At another event, KAET-TV featured an activity of making Peep characters out of fruit (an idea from a local blogger who is a Peep fan). They also featured Shadow activities for the participants.



The station reported that all of the Peep activities were facilitated and these facilitators helped to promote inquiry and to direct the activities as needed. The children attending the events were encouraged to ask questions and come up with ideas regarding each activity. Many of the children and their families were already very familiar with Peep. KAET-TV reported that families were very engaged by the Peep resources and that they were very appropriate for a Spanish-speaking audience (see Appendix E, Table E-9).

KAET-TV also reported on 1 training event for pre-K educators. Fifteen educators attended the event, held in April 2012 at the Children's Museum of Phoenix. Teachers, parents, and children attended the event together. The objective was to introduce Peep as a resource for pre-K educators and to show them how they can use these resources in their classrooms. The following Peep resources were used in the training session:

- Peep logos/images
- PDFs of English and Spanish family handouts
- Activities from the Peep Explorers Guide for classrooms
- 1-sheet promoting the Peep Explorer's Guide
- PowerPoint for use with teachers
- Activities from the Peep Event Kit
- Activities from the Anywhere Science & Math area of Peep's website

KAET-TV reported, "I cannot say that there was anything that we did not like about the resources. It is an amazingly in depth resource for teachers. And the fact that it is bilingual makes it even better for the educators in our state." As summarized in Appendix E (Table E-9), the partner reported that the resources were very engaging, very appropriate for the audience, and that they would use the resources again in future workshops like this.

KAET-TV also reported that, since July 2011, they have disseminated Peep materials (specifically, PDFs of the Spanish family handouts and public service announcements in Spanish) at conferences, trainings, workshops, and in emails to promote Peep on TV as well as to promote the events. These materials are disseminated on a monthly basis. The station estimates that the materials have

reached over 2,500 families, 75% of whom are Spanish-speaking. The station reported that the Peep materials are very appropriate for its audience and that it plans to continue disseminating the materials.

Beginning in July 2011, KAET-TV added Peep to its website to provide awareness of the program and to promote the events it was conducting that included Peep-related activities (the website averages about 7,500 hits per month). Peep resources available on the website include:

- Link to Peep's Facebook Fan Page Activities
- Link to Peep website
- Peep logos/images
- PDFs of English and Spanish family handouts
- Links to Peep episodes in English
- Links to Peep episodes in Spanish
- PSA in English
- PSA in Spanish

KAET-TV plans to keep Peep on its website after the project has ended.

The station has also included Peep in its member communication vehicles, specifically via the station's website, Facebook page, Twitter feed, and emails. KAET-TV estimates that these communications have reached over 73,000 educators and 55,000 families (65-75% of whom are Spanish-speaking). The station reported that it plans to continue including Peep in its member communication vehicles after the project has ended.

Challenges

KAET-TV reported that getting families to pre-register for events is a challenge when reaching out to Spanish-speaking families. However, they feel that the Peep events were successful since face-to-face support to families is an effective way to support and enhance Spanish-speaking family involvement in science and math activities.

UNC-TV (Raleigh-Durham, NC)

The NC partner station (UNC-TV) and its community outreach partners (including Parents As Teachers, NC Cooperative Extension, libraries, Partnerships for Children and family childcare providers and pre-K teachers) reported on 8 family events and 5 training events for pre-K educators held between August 2011 and April 2012.

Nearly 12,000 families attended the events at which UNC-TV used Peep, 8% of whom were Spanish-speaking. UNC-TV and its partners used the following Peep resources at the events:

- Character walkabout costume
- Peep logos/images
- PDFs of English and Spanish family handouts
- Activities from the Peep Event Kit
- Activities from the Anywhere Science & Math area of Peep's website
- DVD of Peep episodes in English
- DVD of Peep episodes in Spanish
- Peep posters
- Peep tattoos
- Peep merchandise (books or DVDs)
- Peep flashlights
- Peep parsley seeds

The station and its partners exposed the community to the Peep bilingual educational resources, website, facebook page, and TV program through these family events, which included screenings, workshops, distribution of PEEP science resources and discussion of STEM for early learners, families, teachers, administrators, and businesses. At the 2011 Countdown to Kindergarten in Durham and Kick Off to Kindergarten Events in Greensboro and Raleigh, Peep and Quack walkaround characters greeted rising kindergarteners and their families and community members. Children had fun exploring the museum's exhibits, practiced boarding a real school bus, sampled options for healthy snacks and lunches and took home goody bags filled with school supplies, PEEP resources, and other school related information, such as library cards.

Parents who attended the events reported:

- *My daughter enjoyed meeting the characters and making crafts.*
- *I enjoyed the activities and the UNC-TV characters. I also enjoyed learning about the resources available to my child in learning.*
- *I would like to attend various workshops with kindergarten concepts.*
- *We really enjoyed the variety of centers and activities.*
- *This was great! My daughter was able to fellowship with other kids her age. This made her super excited to start kindergarten!*
- *Fun activities and kids learn a lot!*
- *The mascot is so fun, and my kids also loved to share the fun atmosphere with other kids, especially the drawings (art activities)!*

- *Enjoyed the readings and art activities!*
- *All of the activities were great! Thank you sincerely!*
- *We really appreciated the hands-on activities and the receipt of a book to read at home! I want to learn more about kindergarten from UNC-TV.*
- *Three positives about today's event: reading books, characters, and craft tables. Peep is a great program to teach science. My grandkids love it. I like the bilingual materials. My grandchild especially loved the flashlights and creating shadow boxes or stages for puppet play.*

UNC-TV plans to continue using the Peep resources at future family and community events.

UNC-TV and its partners also reported on 5 educator trainings that reached 85 educators. The following Peep resources were used at the trainings:

- Peep logos/images
- PDFs of English and Spanish family handouts
- Activities from the Peep Explorers Guide for classrooms
- 1-sheet promoting the Peep Explorer's Guide
- PowerPoint for use with teachers
- Activities from the Peep Event Kit
- Activities from the Anywhere Science & Math area of Peep's website
- DVD of Peep episodes in English
- DVD of Peep episodes in Spanish
- HTML postcard sharing results of Peep Explorer's Guide evaluation
- Q&A with advisor, Karen Worth (PDF)
- Peep merchandise (books or DVDs)
- Info on new Peep blog, In the Classroom with Peep
- Peep flashlights
- Peep parsley seeds

At the trainings, UNC-TV staff demonstrated the strategies of asking questions and encouraging the children to make predictions, and came up with other ideas to show science inquiry. The station directed participants to the PEEP website to show them where they could access all resources for future use. They downloaded the lesson plans from the website to give to each teacher, along with the bilingual Family Science resources that they could share with their parents. They also provided a toolkit containing the props needed for each of the lesson plans. According to the station, teachers were highly engaged and amazed at the simplicity of the lesson plans and toolkit. Staff found that the parsley seeds and flashlights in the toolkit were a great reinforcement of the lessons and a way to continue to use PEEP daily.

Peep walkaround characters provided a Meet and Greet opportunity for the teachers and they enjoyed taking pictures with Chirp and PEEP. In addition, UNC-TV received approval from NC Division of Child Development-Early Education (DCD-EE) to offer 2.0 childcare contact hour credits (CHCs) to teachers.

At one such training, UNC-TV conducted a Train the Trainer workshop for the PAT Parent Educators on January 6, 2012 and then on January 9, 2012, PAT educators in turn conducted playgroups for parents and children. A "Parents As Teachers" leader who used the PEEP resources in one of her playgroups for families commented that the children were engaged, parents were engaged and could help their children with science projects, and the learning was fun.

Evaluations were conducted at each pre-K educator training. On a scale from 1 to 5, overall ratings were a 5 (very satisfied). Comments included:

- *Great experiments.*
- *Good activities that were simple to do.*
- *I learned more things that I can do in my classroom about science and more about STEM.*
- *I learned you can use everyday objects (ex. cardboard, ice cube makers, etc in the classroom) to teach science; it's important to go through all the steps for children and incorporating new vocabulary with science inquiry.*
- *I learned how to use these activities with all ages.*
- *I learned great ideas to extend scientific learning-ramps, shadows, colors, plants, etc).*
- *I learned to ask children open-ended questions-Great training!*
- *This workshop sparked my creative juices again, I am motivated to teach science concepts with the use of affordable free props. There was lots of great information.*
- *I learned different creative ideas for teaching science concepts to kids. Very resourceful materials and so easy to use.*

UNC-TV plans to continue using Peep resources to train pre-K educators.

Since August 2011, the station has also added Peep resources to its website (which receives 43,000 unique visitors per month) in order to directly link the community to the PEEP website and resources for easy access. The website includes:

- Link to Peep's Facebook Fan Page Activities
- Link to Peep website

- Peep logos/images
- PDFs of English and Spanish family handouts
- Links to Peep episodes in English
- Links to Peep episodes in Spanish
- Q&A with advisor, Karen Worth (PDF)
- Info on new Peep blog, In the Classroom with Peep
- Promotions of UNC-TV's Community Events and Calendar of Events Workshops

UNC-TV plans to continue offering Peep resources on its website.

The station has also included Peep in its member communication vehicles since August 2011. These vehicles include the station's e-guide and Centerpiece monthly guide – which are distributed to over 65,000 homes in NC (8% of which are Spanish-speaking).

The Peep resources were helpful to UNC-TV because they offered "free, easy to use materials and handouts for families and free materials for teachers to distribute to their parents. The website with the bilingual resources is superb-so viewers can see the episodes in Spanish and English. The support from WGBH-- Powerpoints, blog info, Headstart standards, etc. was great. The easy to use website was a great addition. It was great to offer a resource to our community partners such as Parents As Teachers, NC Cooperative Extension, libraries, Partnerships for Children and family childcare providers and pre-K teachers, who could then offer the materials to their families and integrate the materials in their classrooms. The race has just begun for us!"

The station plans to offer the materials to other Hispanic groups such as El Pueblo, other PAT trainers, and other non-English speaking groups. Partnership with the museums provides exposures to other ethnic groups.

Challenges

One of the greatest challenges UNC-TV faces in reaching out to Spanish-speaking families is being able to air more programs in Spanish and ensure they can collaborate with more partners who can reach more Spanish speaking families. The station is always looking for additional funding to support these efforts.

Suggestions for the Future

In closing, UNC-TV offered the following advice for reaching out to Spanish-speaking families:

- Collaborate with community organizations to integrate Peep resources in their existing programs, to obtain a greater reach.
- Offer workshops for parents and pre-K teachers that are free or at a minimal cost of $5.00.
- Offer Meet and Greet opportunities with costume characters and include mini-workshops for families and hands-on activities.
- Promote the Peep website in Spanish and English.
- Collaborate with libraries to offer screening sessions of Peep and promote STEM.

Summary

We were able to bond and, through our interaction, we both learned! -Parent

Since watching Peep, my child is always asking to do more hands-on activities and is more creative with the things around the house we have. -Parent

In 2012, Concord Evaluation Group (CEG) conducted an evaluation of the impact of Peep and the Big Wide World (Peep) resources on Spanish-speaking families with preschool-aged children. The three-pronged evaluation included a **National Family Study** in which 112 Spanish-speaking families who used the Peep resources were compared to Spanish-speaking families who did not use the Peep resources. It also included an **In-Depth Family Study** -- an experiment conducted in the metro Boston area in which 36 Spanish-speaking families who used the Peep resources were compared to Spanish-speaking families who did not use the Peep resources through in-person interviews and observations of playtime. The evaluation also included an **Outreach Partner Study**, with a survey of five public television stations (demonstration sites for engaging Latino families in informal science learning) and their community partners. The evaluation findings are summarized below:

Parents who used the Peep resources were better equipped to facilitate science and math exploration with their preschoolers, and thus were more confident, than parents who did not use PEEP (Impact I, Indicator a). Moreover, Peep provided an opportunity for positive family interactions.

- Parents who used Peep resources reported that Peep gave them new ideas about exploring STEM and, therefore, gave them greater confidence to explore STEM activities.
- Most parents in the National and In-Depth Treatment Groups (96% of the National sample and 88% of the In-Depth sample) reported using the Peep "Tips for Parents" sheet designed to help parents learn how to facilitate science and math exploration with their children. Of the parents who used the Tips sheet, 100% reported that it helped them learn how to facilitate science and math exploration.
- Parents reported that the Peep resources were easy to understand and fun to use. They also reported that the Peep resources encouraged interaction between parents and children, and that the interaction helped them both learn.
- We observed that parents in the Treatment Group were significantly more likely than parents in the Control Group to engage in proactive, parent-initiated behaviors and encouraging or supportive behaviors with their children. Treatment Group parents were 12% more likely to engage in proactive behaviors than parents in the Control Group.
- Parents in the Treatment Group were also significantly less likely than parents in the Control Group to remain only passive or neutral during playtime.

- Parents in the In-Depth Family Study Treatment Group (after using Peep resources) were more likely than parents in the Control Group to report that they felt capable of helping their children explore specific topics like shadows, ramps, and patterns (We did not observe this same difference in the National sample).

Parents who used the Peep resources reported feeling more inclined to do math and science activities with their preschoolers than parents who were not exposed to the PEEP resources (Impact I, Indicator b).

- Parents who used Peep resources reported that Peep motivated them to do more STEM activities in the future with their children.
- Among the families in the National Family Study, families in the Treatment Group were more likely than families in the Control Group to report intentions to visit science museums and aquaria in the coming year despite the fact that families from both groups reported visiting these places with equal frequency during the previous year.
- Among the families in our In-Depth Family Study, after using the Peep resources, families in the Treatment Group were significantly more likely to report that they planned to visit zoos and nature centers in the coming year than were families from the Control Group, despite the fact that Control Group families reported visiting them more frequently than Treatment Group families the prior year.
- Also in the In-Depth Family Study, after using Peep, Control Group families were no longer statistically more likely to visit aquaria than Treatment Group families (based on frequency of prior visits). So, using Peep helped to close that gap between the groups.

Children and parents reported that children were engaged by the Peep episodes and activities (Impact II, Indicator a).

- Nearly all children in the National Family Study reported that they enjoyed the animated episodes (95%), the live action videos (100%), and the activities (100%) and that they would like to do more Peep activities in the future (78%).
- Likewise, nearly all children in the In-Depth Family Study reported that they enjoyed the animated episodes (100%), the live action videos (89%) and the activities (100%) and that they would like to do more Peep activities in the future (100%).
- In both the National Study and the In-Depth Study, nearly all parents who used Peep reported that they would recommend Peep to other Spanish-speaking families (98% of the National sample and 95% of the In-Depth sample) and that they would recommend Peep to their child's teacher (100% of parents in both studies).

Children who used the Peep resources applied science process skills (including observation, prediction, and problem-solving) in the hands-on explorations of their environments (Impact II, Indicator b).

- While playing with ramps, we observed that children in the Treatment Group were significantly more likely than children in the Control Group to apply science process skills (11% more likely).
- We did not observe significant differences in children's science process skills when the families were playing with shadows and patterns. Children in both groups demonstrated an equal amount of science process skills during those activities and the percent of science process-related behaviors was high in both groups.
- In the National and In-Depth Family Studies, parents who used Peep resources reported that they observed their children applying science process skills while doing the activities.

PEEP provided its community engagement partners appropriate resources for the families, both English-and Spanish-speaking, that they serve (Impact III, Indicators a-e).

Through our survey of 5 public television station partners across the country, it appears that WGBH was able to provide engaging and appropriate resources for families and educators. Over the past 9 months, outreach partners in 5 communities have been able to reach thousands of families and pre-K educators with Peep resources at community events, family playgroups, cultural fairs, state fairs, parent workshops and teacher training sessions. All the stations and their community outreach partners reported that the translated Peep resources were appropriate and engaging for their respective audiences and that they plan to continue using them in their In-Depth outreach efforts. Station partners reported that the Peep resources were well-designed, comprehensive, and met their needs.

Lessons Learned: Best Practices for Reaching Out to Spanish-Speaking Families

Finally, we asked study participants (primarily the community outreach partners, but others, too) about the challenges inherent in reaching out to Spanish-speaking families and sought their advice about best practices. Participants offered the following suggestions:

1. **Build trust** with families by hosting regular family activities (parent workshops, play and learn groups), following up with phone calls and taking an interest in the families' involvement in their children's education.

For example, the KLRN team takes pictures at events and shares them with the families as a gift. According to the station, “KLRN is connected to families on a personal level.”

2. Related to building trust, outreach partners stressed the importance of **developing ongoing partnerships and relationships**. As one partner reported: “Science and math outreach may fit best if part of a larger program of engagement with Latino (Eng/Span/bilingual) families. Events that are multi generational in nature can be a great fit. Full integration on the station's community advisory board can be an important way of building alliances.”

3. **Collaborating** with other community groups, such as libraries, to offer programming can further cement trust within the community, build awareness, and add credibility to an outreach effort. Getting an endorsement from a community partner (such as the Hispanic chamber, community group, or a teacher) has helped some stations to increase attendance at events. Some parents in the study also recommended partnering with libraries and schools.

4. Partners also stressed the importance of taking the time to **learn about any audience and its needs**. If a program doesn’t meet the needs of its target audience, it is likely to fail.

5. Partners also recommended finding out what the **barriers are to accessing programs** and addressing those. In some communities, we learned that there were beliefs that all math and science teaching should happen at school and therefore Spanish-speaking parents didn’t see it as their role to teach these subjects to their children. Another barrier could be cost. One community addresses this by offering workshops for free or at a low cost ($5).

6. Outreach efforts may be more successful if they offer **multiple or flexible options**. As one partner noted, “Many homes may be Spanish dominant conversationally and in terms of broadcast preferences, but may lean toward English on academics and in internet usage. Similarly, some households are split linguistically by generation. An effective approach is to focus on reaching Latino families with Spanish speaking materials as one component of a **suite** of compelling resources (e.g., English and Spanish).”

7. Related to literacy and language, we were reminded by a number of partners and participants that “like English-speaking families, Spanish-speaking families have a range of comfort with literacy and a range of

time and energy to devote to parenting materials." Resources developed for parents in *any* language should always be accessible at a **fifth grade reading level or less**.

8. Of course, all partners recommended providing **resources and facilitators who were bilingual**. Recognizing that there are many different Spanish dialects in the world, several study participants remarked on wording choices used in Peep materials and cautioned that "it sometimes helps to work closely with a translator to **translate the intent of a text** rather than the literal structure of a text."

Appendix A: Peep Episodes and Activities

Content	Title in Spanish	Description in Spanish	Title in English	Description in English
Shadows	Luz Nocturna	Quack y Peep encuentran una linterna y se divierten haciendo sombras grandes y pequeñas.	Night Light (animation)	Quack and Peep find a flashlight and have fun making big and little shadows.
Shadows	Trayendo la Primavera	Es febrero, hace frío y todo está gris. Pero las cosas empiezan a animarse cuando las aves ayudan a una jóven marmota a encontrar su sombra.	Bringing Spring (animation)	It's February, cold and grey. But things start to cheer up when the birds help a young groundhog find her shadow.
Shadows	Jugando con sombras	Peep, Quack, y Chirp descubren sus sombras.	Shadow Play (animation)	Peep, Quack, and Chirp discover their shadows.
Shadows	Creando sombras	Adentro, los niños juegan con sombras. Luego salen al aire libre y trazan con tiza su sombra en la acera(gis).	Making Shadows (live-action)	Kids play with shadows indoors. Then they go outdoors and trace their shadows with chalk.
Shadows	Cómo cambian las sombras	Los niños trazan sus sombras afuera. Luego, más tarde en el día, observan cómo se han movido las sombras.	Watching Shadows Change (live-action)	Kids trace shadows outside. Later in the day they notice how the shadows have moved.
Shadows	Juguemos con títeres hechos con sombras	Los niños hacen títeres con sombras y un teatro para presentarlos. Más adelante presentan una función para sus amigos.	Playing with Shadow Puppets (live-action)	Kids make shadow puppets and a shadow theater; then they put on a show for friends.
Ramps	¿Qué es eso?	Peep, Chirp y Quack descubren las emociones de bajar a gran velocidad por un deslizadero , completamente por accidente!	The Whatchamacallit (animation)	Peep, Chirp, and Quack discover the thrill of zipping down a slide-quite accidentally!

Content	Title in Spanish	Description in Spanish	Title in English	Description in English
Ramps	A Rodar Canicas	Peep necesita ayudar para rodar una canica sobre una colina.	Marble Mover (animation)	Peep needs help rolling a marble up a hill.
Ramps	ConstruyamosRampas	Los niños construyen rampas con objetos de uso cotidiano e inventan un juego de bolos.	Building ramps (live-action)	Kids build ramps with everyday objects and invent a bowling game
Ramps	Cuesta Abajo	Los niños hacen rodar cuesta abajo toda clase de cosas. Al hacerlo, descubren algunas cosas interesantes.	Rolling down a hill (live-action)	Kids roll things down a hill and make some interesting discoveries.
Patterns	El Baile del Pato Mágico	Quack cree que su nuevo baile del pato tiene un poder mágico. El decide enseñárselo a todos sus amigos.	Magic Duck Dancing (animation)	Quack thinks his new Duck Dance has magical power. He decides to teach it to all his friends.
Patterns	Chirp, Chirp, Tweet, Tweet, Chirp	Chirp es realmente buena reconociendo el canto de otras aves, pero ¿puede encontrar su propio canto?	Chirp, Chirp, Tweet, Tweet, Chirp (animation)	Chirp is really good at recognizing other birds' songs, but can she find one of her own?
Patterns	Hagamos cadenas estampadas	Los niños hacen cadenas estampadas utilizando diferentes materiales.	Making patterned chains (live-action)	Kids make patterned chains using different materials.
Patterns	Hagamos collares de cuentas	Los niños haces collares de cuentas	Stringing bead necklaces	Kids make beaded necklaces.
Patterns	Hagamos un baile	Los niños utilizan instrumentos y sus cuerpos para crear un baile.	Making a dance (live-action)	Kids use instruments and their bodies to make a dance.

Appendix B: Family Survey Questions

Spanish Version	English Version	Treatment Group (Local & National)	Control Group (Local & National)
Díganos qué tanto está de acuerdo con la siguientes afirmaciones (Totalmente en desacuerdo a Totalmente de acuerdo). **Yo sé cómo…** …enseñarle a mi hijo(a) a usar una luz para hacer sombras. ...jugar con mi hijo(a) a ver lo que sucede cuando se ponen objetos diferentes en rampas y toboganes. ...ayudarle a mi hijo(a) a crear patrones utilizando bloques, canicas de colores, botones u otros objetos. ...ayudarle a mi hijo(a) a explorar nuestro hogar o la comunidad en busca de nuevos lugares o cosas. …trabajar con mi hijo(a) para resolver problemas sencillos. …mostrarle a mi hijo(a) cómo funcionan las cosas. …alentar a mi hijo a hacer preguntas. …alentar a mi hijo(a) a adivinar o hacer predicciones acerca de cómo funciona algo y luego proba las ideas.	Please tell us how much you agree with the following statements (Strongly Disagree to Strongly Agree). I know how to... …teach my child to use light to make shadows. …play with my child to see what happens when you put different objects on ramps and slides. …help my child make patterns using blocks or colored beads or buttons or other objects. …help my child explore our home or community for new places or things. …work with my child to solve simple problems. …show my child how things work. …encourage my child to ask questions.	Yes	Yes
¿Qué tan probable es que usted visite estos lugares con sus hijos en los próximos años? (No es probable a Muy probable)	**How likely are you to visit these places with your kid(s) in the coming year? (Not Likely at All to Very Likely)**	Yes	Yes

Spanish Version	English Version	Treatment Group (Local & National)	Control Group (Local & National)
Museo de ciencias Museo de los niños Museo de arte Biblioteca Acuario Zoológico Centro de naturaleza Parque local Parque infantil	Science museum Children's museum Art museum Library Aquarium Zoo Nature center Local park Playground		
Niños solamente: ¿Le gustaron las caricaturas de Peep? Me fascinaron Me gustaron No me gustaron mucho No me gustaron nada Yo no verlos	**Kids only: Did you like watching the Peep cartoons?** I loved them I liked them I didn't like them that much I didn't like them at all I didn't watch them	Yes	No
Niños solamente: ¿Le gustaron los videos de Peep que mostraban niños y adultos reales?	**Kids only: Did you like watching the Peep videos that showed real kids and adults?**	Yes	No

Spanish Version	English Version	Treatment Group (Local & National)	Control Group (Local & National)
○ Me fascinaron ○ Me gustaron ○ No me gustaron mucho ○ No me gustaron nada ○ Yo no verlos	○ I loved them ○ I liked them ○ I didn't like them that much ○ I didn't like them at all ○ I didn't watch them		
Niños solamente: ¿Le gustó realizar actividades de Peep con su familia? ○ Me fascinaron ○ Me gustaron ○ No me gustaron mucho ○ No me gustaron nada ○ Yo no lo hacen	**Kids only: Did you like doing Peep activities with your family?** ○ I loved them ○ I liked them ○ I didn't like them that much ○ I didn't like them at all ○ I didn't do them	Yes	No
Niños solamente: ¿Le gustaría realizar más actividades de Peep con su familia? ○ Sí	**Kids only: Would you like to do more Peep activities with your family?** ○ Yes	Yes	No

Spanish Version	English Version	Treatment Group (Local & National)	Control Group (Local & National)
Quizás No	Maybe No		
Niños solamente: ¿Aprendió algo nuevo al ver a Peep y realizar las actividades? [Por favor díganos en las propias palabras de su hijo(a)]	**Kids only: Did you discover anything new from watching Peep and doing the activities? (Please tell us in your child's own words)**	Yes	No
¿Cuál de los siguientes episodios de dibujos animados (caricaturas) de Peep vieron usted y su hijo(a)? (Seleccione todo lo que aplique)	**Which of the following animated (cartoon) Peep episodes did you and your child watch? (Choose all that apply)**	Yes	No
Por favor díganos qué tanto está de acuerdo con la siguiente afirmación acerca de Peep: Mi hijo estaba emocionado de ver los vídeos de dibujos animados (caricaturas).	**Please tell us how much you agree with the following statement about Peep:** My child was excited by the animated (cartoon) videos.	Yes	No
¿Cuál de los siguientes segmentos de acción en vivo (aquellos con personas reales) vieron usted y su hijo(a)? (Seleccione todo lo que aplique)	**Which of the following live action segments (those with real people) did you and your child watch? (Choose all that apply)**	Yes	No
Por favor díganos qué tanto está de acuerdo con la siguiente afirmación acerca de Peep: Mi hijo estaba emocionado de ver los segmentos de acción en vivo (con personas reales).	**Please tell us how much you agree with the following statement about Peep:** My child was excited by the live action segments (with real people).	Yes	No
¿Cuáles de las siguientes actividades realizó con su	**Which of the following activities did you do with your**	Yes	No

Spanish Version	English Version	Treatment Group (Local & National)	Control Group (Local & National)
hijo(a)? (Seleccione todo lo que aplique)	**child? (Choose all that apply)**		
Por favor díganos qué tanto está de acuerdo con la siguiente afirmación acerca de Peep: Mi hijo estaba emocionado de realizar las actividades.	**Please tell us how much you agree with the following statement about Peep:** My child was excited about the Peep activities.	Yes	No
¿Leyó y utilizó la hoja Consejos para los padres de una sola página? Si fue así, ¿fue útil? ○ Fue muy útil ○ Fue útil ○ Fue un poco útil ○ No fue muy útil ○ No la leí ni la utilicé	**Did you read and use the one-page Tips for Parents sheet? If so, was it helpful?** ○ It was very helpful ○ It was helpful ○ It was a little helpful ○ It was not helpful ○ I did not read or use it	Yes	No
Díganos qué tanto está de acuerdo con las siguientes afirmaciones acerca del material de Peep: • A medida que realizábamos las actividades juntos, mi hijo(a) trató de adivinar qué podríamos descubrir o anticipar lo que iba a suceder. • A medida que realizábamos las actividades juntos, mi hijo(a) hizo muchas preguntas.	**Please tell us how much you agree with the following statements about the Peep materials:** • As we did the activities together, my child tried to guess what we might discover/what might happen next. • As we did the activities together, my child asked a lot of questions.	Yes	No

Spanish Version	English Version	Treatment Group (Local & National)	Control Group (Local & National)
• A medida que realizábamos las actividades juntos, mi hijo(a) hablaba acerca de las cosas que estaba viendo. • A medida que realizábamos las actividades juntos, mi hijo(a) tuvo ideas acerca de por qué ocurrían ciertas cosas. • Los materiales de Peep me dieron ideas acerca de cómo estudiar temas de matemáticas y ciencias con mis hijos. • Los materiales de Peep me hicieron sentir más seguro de que puedo ayudar a mis hijos a aprender matemáticas y ciencias. • Ahora es más probable que realice actividades de matemáticas y ciencias con mis hijos que antes de saber acerca de Peep.	• As we did the activities together, my child talked about the things s/he was seeing. • As we did the activities together, my child came up with ideas about why certain things were happening. • The Peep materials gave me ideas about how to explore math and science topics with my kid(s). • The Peep materials made me feel more confident that I can help my kid(s) learn about math and science. • I am more likely now to do math and science activities with my kid(s) than before I knew about Peep.		
¿Ha notado alguna diferencia en los niños de edad preescolar después de ver a Peep y hacer actividades de Peep? Describa.	**Have you noticed any differences in your preschooler after his or her watching Peep and doing Peep activities? Please describe.**	Yes	No
¿Qué tan probable es que usted intente hacer otras actividades de Peep (disponibles en el sitio web) con sus hijos? ○ Muy probable	**How likely are you to try other Peep activities with your child (available on the website)?** ○ Very likely ○ Likely	Yes	No

Spanish Version	English Version	Treatment Group (Local & National)	Control Group (Local & National)
○ Probable ○ No muy probable ○ No es probable	○ Not very likely ○ Not likely at all		
¿Recomendaría usted que otros padres que hablan español y tienen hijos de edad preescolar utilicen los materiales de Peep? ○ Sí ○ Quizás ○ No	**Would you recommend that other Spanish-speaking parents use the Peep materials with their preschoolers?** ○ Yes ○ Maybe ○ No	Yes	No
¿Les recomendaría Peep a los maestros de su hijo(a)? ○ Sí ○ Quizás ○ No ○ N/A	**Would you recommend Peep to your child's teacher?** ○ Yes ○ Maybe ○ No ○ N/A	Yes	No
¿Qué fue lo que más les gustó a usted y su hijo(a) de	**What did you and your child like best about the Peep**	Yes	No

Spanish Version	English Version	Treatment Group (Local & National)	Control Group (Local & National)
los vídeos de Peep?	**videos?**		
¿Qué fue lo que más les gustó a usted y su hijo(a) de las actividades de Peep?	**What did you and your child like best about the Peep activities?**	Yes	No
¿Cómo podemos mejorar los videos y/o las actividades de Peep para las familias de habla hispana?	**How can we make the Peep videos and/or activities better for Spanish-speaking families?**	Yes	No

Appendix C: Playtime Observation Protocol

Study Protocol

I. Set-up

Each session will require the following instruments and materials:

- Study Protocol
- Check made payable to participant
- Consent form
- Acknowledgement of Receipt of Incentive form
- Videocamera and tripod
- Digital recorder
- Extra batteries
- Box of toys for Shadow Activity
- Box of toys for Ramp Activity
- Box of toys for Pattern Activity

II. Observation Protocol

Introduction

Have makers, crayons or pencils and paper set-up as the child arrives so that they can immediately relax and play while you explain the study procedures.

Welcome! Thank you for coming today. My name is _____. I have some things over here for you to play with while I explain what we're going to do.

Today, we have some play activities for you to do. We are interested in studying how kids use different objects from around their homes to play. So, I have bags of objects for you to play with. I will ask you some questions and take some notes as you play. I will be videotaping our discussion today so I can make sure my notes are correct. Is that OK? Do you have any questions for me before we get started?

Let the child play for another couple of minutes while you start and check the videocamera and audio recording device.

Shadow Activity

Remove the items from the table and let the child know what is happening.

Did you have fun with these? Great! Now, [child], we're now going to play with some different things. So, I'm going to pick these toys up and give you some others.

Place the following objects on the table: Flashlight, small shadow box, toy shapes. Place the shadow box on its back so the open side is facing the ceiling.

Here are some things I brought with me today. These are things that are sometimes found in people's houses and I was wondering if you might be able to find some ways to have fun with these things. There is no right way or wrong way to play with these things. We just want to see how kids play with different types of objects from around the house.

Your [caregiver] is welcome to play with you, too. I'm going to put the objects on the table and you can play with them in any way that you like.

Give the kids some space to explore. Let the child hold the objects and come up with some ideas without your intervention for a couple minutes. The goal is to see if they will create a shadow box or do any kind of shadow play at all without prompting.

If child is having difficulty and the child seems like she/he can't figure out how to start, you may ask the following:

- **What would you like to do with these things?**
- **What do you think you can do with these things?**
- **Do you have any ideas about what you might do?**

*If the child is still stuck, try using **non-verbal cues**, such as standing the shadow box up on one side and placing some of the objects in the shadow box.*

If all else fails and the child can't begin, you may ask:

- **Do you know what a shadow is?**
    - **[If Yes] I wonder what could you do to make a shadow?**
    - **[If No, demonstrate how to make a shadow.]**

If the child asks a question about what to do (ex: How much do I use? Do I use this one? Will it work if I do this?), say something like:

- **I'm not sure how I would do it. What do *you* think you should do?**
- **All kids do it differently. You can do it any way that you like.**

Observe what the family does, whether they ask any questions, make any observations, or demonstrate any problem-solving skills. Also, observe how they interact and what roles they each take on. We also want to see if kids are asking questions about how things work in the world, make references to the physical world (e.g., water, light, sound) when playing, and show curiosity for their surroundings. Record notes on the following:

How interested in the activity does child appear?
What information/knowledge from child's own experience does child refer to?
What observations does the child make on his/her own? When prompted?
How do the child's observations lead him/her to new questions or approaches to the activity?
What predictions does the child make on his/her own? When prompted?
What is the context for the predictions?

Prompts during play may include:

- **So, what you are doing now?**
- **How did you do that?**
- **I wonder how that happened? Can you do that again?**
- **Did that surprise you?**
- **What do you think will happen next?**
- **What else might you do?**
- **I wonder what you are thinking about now?**

Follow the child's lead about when it is time to stop the activity. If they are still going strong after about 10 minutes, let them know that they have about 2 more minutes to play with the materials. After the 2 minutes have passed, ask the following only if the child made shadows and this question was not addressed:

- **I saw that you made some shadows. I wonder how you can make the shadows bigger or smaller?**
- **Do you ever notice shadows at home or outside? Tell me about them.**

Ask the child to help you place the objects in the box.

Ramp Activity

Place the following objects on the table: Two, small, but different-sized balls/marbles; piece of flat cardboard; building blocks; ramps; crumpled tin foil; and toy car.

I have some new objects in another box that you may now play with. I'm going to put them on the table and you can play with them in any way that you like.

Let the child hold the objects and come up with some ideas without your intervention for a couple minutes. The goal is to see if they will explore the ramps with different objects (ex. To see if one objects rolls faster down the ramp than another object) without prompting.

If child is having difficulty and the child seems like she/he can't figure out how to start, you may ask the following:

- **What would you like to do with these things?**
- **What do you think you can do with these things?**
- **Do you have any ideas about what you might do?**

*If the child is still stuck, try using **non-verbal cues**, such as standing the ramp up and rolling an object down the ramp.*

If all else fails and the child can't begin, you may ask:

- **I wonder if there is a way to see which one of these balls can roll faster?**

If the child asks a question about what to do (ex: How much do I use? Do I use this one? Will it work if I do this?), say something like:

- **I'm not sure how I would do it. What do *you* think you should do?**
- **All kids do it differently. You can do it any way that you like.**

Observe what the family does, whether they ask any questions, make any observations, or demonstrate any problem-solving skills. Also, observe how they interact and what roles they each take on. We also want to see if kids are asking questions about how things work in the world, make references to the physical world (e.g., water, light, sound) when playing, and show curiosity for their surroundings. Record notes on the following:

How interested in the activity does child appear?
What information/knowledge from child's own experience does child refer to?
What observations does the child make on his/her own? When prompted?
How do the child's observations lead him/her to new questions or approaches to the activity?
What predictions does the child make on his/her own? When prompted?
What is the context for the predictions?

Prompts during play may include:

- **So, what you are doing now?**
- **How did you do that?**
- **I wonder how that happened? Can you do that again?**
- **Did that surprise you?**
- **What do you think will happen next?**
- **What else might you do?**
- **I wonder what you are thinking about now?**

Follow the child's lead about when it is time to stop the activity. If they are still going strong after about 10 minutes, let them know that they have about 2 more minutes to play with the materials. After the 2 minutes have passed, ask the following only if the child made shadows and this question was not addressed:

- **I noticed that some of the balls/marbles rolled faster than the others. Why do you think that happened?**
- **Do these ramps remind you of anything at home or outside? Tell me about that.**

Ask the child to help you place the objects in the box.

Pattern Activity

Place the following objects on the table: coins, beads of various colors, shapes and sizes, paper clips.

I have some new objects in another box that you may now play with. I'm going to put them on the table and you can play with them in any way that you like.

Let the child hold the objects and come up with some ideas without your intervention for a couple minutes. The goal is to see if they will create groupings or patterns with different objects (ex. Grouping all the objects of the same color together) without prompting.

If child is having difficulty and the child seems like she/he can't figure out how to start, you may ask the following:

- **What would you like to do with these things?**
- **What do you think you can do with these things?**
- **Do you have any ideas about what you might do?**

*If the child is stuck or too shy to do anything, try using **non-verbal cues**, such as starting to string the beads.*
If all else fails and the child can't begin, you may ask:

- **I wonder if there is a way to make a pattern with these objects?**

If the child asks a question about what to do (ex: How much do I use? Do I use this one? Will it work if I do this?), say something like:

- **I'm not sure how I would do it. What do *you* think you should do?**
- **All kids do it differently. You can do it any way that you like.**

Observe what the family does, whether they ask any questions, make any observations, or demonstrate any problem-solving skills. Also, observe how they interact and what roles they each take on. We also want to see if kids are asking questions about how things work in the world, make references to the physical world (e.g., water, light, sound) when playing, and show curiosity for their surroundings. Record notes on the following:

How interested in the activity does child appear?

What information/knowledge from child's own experience does child refer to?
What observations does the child make on his/her own? When prompted?
How do the child's observations lead him/her to new questions or approaches to the activity?
What predictions does the child make on his/her own? When prompted?
What is the context for the predictions?

Prompts during play may include:

- **So, what you are doing now?**
- **How did you do that?**
- **What else might you do?**
- **I wonder what you are thinking about now?**

Follow the child's lead about when it is time to stop the activity. If they are still going strong after about 10 minutes, let them know that they have about 2 more minutes to play with the materials. After the 2 minutes have passed, ask the following only if the child made shadows and this question was not addressed:

- **I noticed that you put some of these objects together in a group. What made you put those together?**
- **What are some other ways you could put together groups of things that are alike?**

OK, you did a great job! Now, I just have a few more questions and then we will be done.

III. Interview Questions

<u>Control Group Only</u>

1. [To child] Do you watch TV?

2. [To child] If so, what shows do you like to watch?

3. [To parent] Do you watch kids' shows in Spanish with your child? What do you think of the shows that exist?

<u>Treatment Group Only</u>

1. [To child] How much did you like watching the Peep cartoons? Please tell me more about what you liked or didn't like.

2. [To child] How much did you like watching the Peep videos that showed real kids and adults? Please tell me more about what you liked or didn't like.

3. [To child] How much did you like doing Peep activities with your family? Please tell me more about what you liked or didn't like.

4. [To child] Would you like to do more Peep activities with your family? Why or why not?

5. [To child] Did you discover anything new from watching Peep and doing the activities? Please tell me more about what you learned.

6. [To parent] Would you recommend that other Spanish-speaking parents use the Peep materials with their preschoolers? Why or why not?

7. [To parent] How can we make the Peep videos and/or activities better for Spanish-speaking families?

Those are all of the questions I have for you today. Is there anything else you would like to tell us about your experience with Peep?

Thank you. Your feedback has been very helpful to us and will be used to make educational materials better for Spanish-speaking families!

[End and pay]

IV. Coding Sheet

For each activity, record whether you observed a behavior and (when relevant) the number of instances you observe the following behaviors (these can be verbal or non-verbal behaviors). Use the videotape to code these behaviors.

Science Process Skills

- Child plays and explores the objects independently without being prompted by anyone
- Child notices and describes similarities and differences between objects
- Child tries out multiple objects during play (and may ask "What will happen if I…?")
- Child recalls past experiences and applies them in a new situation (including Peep videos or activities)
- Child predicts what might happen if/next
- Child brainstorms solutions, trying them out and learning from mistakes
- Child draws conclusions and/or "makes theories" about why something happened
- Child shares ideas and discoveries with others
- Child makes connections with past experiences and tells a story
- Parent and child play together in child-initiated role

In addition to other non-science process behaviors:

Support Seeking Behaviors

- Child looks for reassurance from parent
- Child asks for instructions from parent or researcher (wants to know what to do)

- Child asks for a definition or what something means

Reactive Behaviors

- Child answers parent's question
- Child plays with shadows, ramps or patterns with prompting from researcher
- Child plays with shadows, ramps or patterns after parent suggests it

Proactive or Parent-Initiated Behaviors

- Parent and child play together in parent initiated role
- Parent asks child a question
- Parent explains a concept to child
- Parent gives verbal instructions to child (tells them what to do)
- Parent physically manipulates objects to cue the child to next step
- Parent sets up or modifies environment
- Parent models for the child how to accomplish a task or do an activity
- Parent asks child for help to accomplish a task or to figure something out
- Parent talks to researcher about what child is doing (ex: “He loves this part, she always does it that way, he has trouble sharing, he likes to think up new ways of doing things.”)

Encouraging or Supportive Behaviors

- Parent gives praise or encouragement
- Parent monitors and controls child’s frustration
- Parent smiles at child or nods to reinforce that he or she is using the objects in appropriate ways
- Parent uses hand gestures to encourage child to persist and keep going
- Parent moves physically closer to the child

Passive or Neutral Behaviors

- Parent plays independently
- Parent and child play together in child initiated role
- Parent answers child's question
- Parent observes child at play

Appendix D: Outreach Partner Survey

Peep Outreach Partner Survey

Thank you for taking the time to respond to our survey. Concord Evaluation Group is conducting an independent evaluation of Peep resources for Spanish-speaking families. We have invited all outreach partners to complete this survey.

We estimate that the survey will take 15-30 minutes to complete, depending on the number of Peep resources with which you have experience.

Your input will be used to help us make judgments about the effectiveness of Peep resources. Your input will also help WGBH and other organizations to develop useful and engaging math and science resources for Spanish-speaking families.

Your responses will be kept confidential. We will never attach your name or organization to your comments in our report. All data that we share with our project team, sponsors, or other researchers will have all identifying information removed (names, organizations, contact information) so that no one can identify your individual responses.

This survey is voluntary, so there is no penalty if you refuse to respond. You may also skip any questions that you like, but we hope that you won't so that we can get a complete picture of how the Peep resources worked for you.

Thank you for your time!

*What organization do you represent?

*What city/area do you serve?

- ◯ Salt Lake City, UT
- ◯ Yakima Valley, WA
- ◯ San Antonio, TX
- ◯ Phoenix, AZ
- ◯ Raleigh-Durham, NC

Briefly, please describe your organization's mission:

Peep Outreach Partner Survey

*Please help us understand the populations you serve (ballpark estimates are fine):

% Latino/a	
% African-American	
% White	
% Asian	
% Other	
% High income	
% Middle income	
% Low income	

*Do you work for the public television station?

- ◯ Yes
- ◯ No

We'd like to learn more about the Peep resources you have used and how you have used them.

*How many family events have you had?

When were they held? (Month and year)

Event 1	
Event 2	
Event 3	
Event 4	

*Please give us your best guess as to how many families (total) attended the event(s).

*What percentage of the families were Spanish-speaking?

Peep Outreach Partner Survey

Which of the following Peep resources did you use to support the family event(s)? (Choose all that apply)

- [ ] Character walkabout costume
- [ ] Peep logos/images
- [ ] PDFs of English and Spanish family handouts
- [ ] Activities from the Peep Event Kit
- [ ] Activities from the Anywhere Science & Math area of Peep's website
- [ ] DVD of Peep episodes in English
- [ ] DVD of Peep episodes in Spanish
- [ ] Peep posters
- [ ] Peep tattoos
- [ ] Peep merchandise (books or DVDs)
- [ ] Other (please specify)

Briefly, please describe how you used these resources at your family event(s), including a summary of your objectives.

How engaged were young children and their parents by the Peep resources at your event (s)?

- ◯ Very engaged
- ◯ Engaged
- ◯ Somewhat engaged
- ◯ Not engaged

Peep Outreach Partner Survey

How appropriate were the Peep resources for Spanish-speaking families?

- ◯ Very appropriate
- ◯ Appropriate
- ◯ Somewhat appropriate
- ◯ Not appropriate

At events where families were involved, did you observe kids modeling science inquiry behaviors (like asking questions, making predictions, coming up with ideas, etc.?) If so, please describe.

Peep Outreach Partner Survey

Do you have any evidence (even anecdotal) that the Peep resources got families interested in learning about science and math? Please describe.

Do you plan to continue using these Peep resources at family events?

- ◯ Yes
- ◯ No or I don't know (please explain)

***How many training events for pre-K educators have you held?**

When were they held? (Month and year)

Event 1	
Event 2	
Event 3	
Event 4	

***Please give us your best guess as to how many educators (total) attended the event(s).**

Peep Outreach Partner Survey

Which of the following Peep resources did you use in support of the pre-K training event (s)? (Choose all that apply)

- [ ] Peep logos/images
- [ ] PDFs of English and Spanish family handouts
- [ ] Activities from the Peep Explorers Guide for classrooms
- [ ] 1-sheet promoting the Peep Explorer's Guide
- [ ] PowerPoint for use with teachers
- [ ] Activities from the Peep Event Kit
- [ ] Activities from the Anywhere Science & Math area of Peep's website
- [ ] DVD of Peep episodes in English
- [ ] DVD of Peep episodes in Spanish
- [ ] HTML postcard sharing results of Peep Explorer's Guide evaluation
- [ ] Q&A with advisor, Karen Worth (PDF)
- [ ] Peep merchandise (books or DVDs)
- [ ] Info on new Peep blog, In the Classroom with Peep
- [ ] Other (please specify)

Briefly, please summarize how you used these resources at the training event(s), including your objectives.

How engaged were the educators by the Peep resources at your event(s)?

- ◯ Very engaged
- ◯ Engaged
- ◯ Somewhat engaged
- ◯ Not engaged

Peep Outreach Partner Survey

How appropriate were the Peep resources for pre-K educators?

- ◯ Very appropriate
- ◯ Appropriate
- ◯ Somewhat appropriate
- ◯ Not appropriate

Do you have any evidence (even anecdotal) that the Peep resources helped educators feel better equipped to support children's learning? Please describe.

Briefly, please explain what you liked and didn't like about using Peep's educator resources with pre-K teachers.

Do you plan to continue using these Peep resources at trainings and workshops?

- ◯ Yes
- ◯ No or I don't know (please explain)

Peep Outreach Partner Survey

Do you know what educators did with the information after they were trained? Do you know if they went back to their school/day care center and trained others, added PEEP curriculum to their day etc.?

***Where have you disseminated translated Peep materials?**

Briefly, what were your objectives in doing so?

When did you first disseminate the materials? (Month and year)

Peep Outreach Partner Survey

How regularly have you/will you disseminate them?

- ◯ One time only
- ◯ Weekly
- ◯ Monthly
- ◯ Annually
- ◯ Other (please specify)

***Please give us your best guess as to how many total households/organizations have received the materials you disseminated (please don't try to count individuals, just households or groups).**

Please estimate the proportion of the recipients who are Spanish-speaking, if possible:

Which of the following Peep resources have you disseminated? (Choose all that apply)

- ☐ PDFs of Spanish family handouts
- ☐ DVD of Peep episodes in Spanish
- ☐ PSA in Spanish
- ☐ Other (please specify)

How appropriate were the translated Peep resources for your audience?

- ◯ Very appropriate
- ◯ Appropriate
- ◯ Somewhat appropriate
- ◯ Not appropriate

Do you plan to continue disseminating translated Peep materials?

- ◯ Yes
- ◯ No or I don't know (please explain)

Peep Outreach Partner Survey

Have you added Peep to your website and/or linked to Peep's Facebook Fan Page, Activities, or Suggestions?

- ◯ Yes
- ◯ No

Briefly, what were your objectives for adding Peep or Peep links to your website?

When did you first add Peep to your website? (Month and year)

If available, how many visitors has your website received since Peep was added?

If available, how many of those were unique visitors?

Which of the following Peep resources have you added to your website? (Choose all that apply)

- ☐ Link to Peep's Facebook Fan Page Activities
- ☐ Link to Peep website
- ☐ Peep logos/images
- ☐ PDFs of English and Spanish family handouts
- ☐ Links to Peep episodes in English
- ☐ Links to Peep episodes in Spanish
- ☐ PSA in English
- ☐ PSA in Spanish
- ☐ Q&A with advisor, Karen Worth (PDF)
- ☐ Info on new Peep blog, In the Classroom with Peep
- ☐ Other (please specify)

Peep Outreach Partner Survey

Do you plan to keep Peep on your website?

- ◯ Yes
- ◯ No or I don't know (please explain)

Have you included Peep in your member communication vehicles?

- ◯ Yes
- ◯ No

In what types of communication vehicles have you included Peep?

When did you first include Peep in your communications? (Month and year)

How regularly have you/will you disseminate them?

- ◯ One time only
- ◯ Weekly
- ◯ Monthly
- ◯ Annually
- ◯ Other (please specify)

***How many (total) recipients are on your contact lists for these communication vehicles?**

If possible, please estimate the percentage of the families that were Spanish-speaking:

Do you plan to continue including Peep in your communication vehicles?

- ◯ Yes
- ◯ No or I don't know (please explain)

Peep Outreach Partner Survey

Beyond including them on your website, have you identified additional use(s) for the English and Spanish Peep PSAs, which are playing on local radio stations?

- ◯ Yes
- ◯ No

Which PSA did you use? (Choose all that apply)

- ☐ English
- ☐ Spanish

How else are you using the Peep PSAs?

When did you first use the Peep PSAs? (Month and year)

How regularly have you/will you use them?

- ◯ One time only
- ◯ Weekly
- ◯ Monthly
- ◯ Annually
- ◯ Other (please specify)

If possible, please estimate the total number of households that are reached with the PSAs?

If possible, please estimate the percentage of recipients that are Spanish-speaking:

How appropriate were the Peep PSAs for your audience?

- ◯ Very appropriate
- ◯ Appropriate
- ◯ Somewhat appropriate
- ◯ Not appropriate

Peep Outreach Partner Survey

Do you plan to continue using the Peep PSAs?

- ◯ Yes
- ◯ No or I don't know (please explain)

*What type of organization do you represent (e.g., preschool, library, museum, etc.)?

We'd like to learn more about the Peep resources you have used and how you have used them.

Did you use the character costume?

- ◯ Yes
- ◯ No

At what type of event(s) or in what context did you use the Peep character costume?

How engaged were young children and their parents by the Peep character costume at your event(s)?

- ◯ Very engaged
- ◯ Engaged
- ◯ Somewhat engaged
- ◯ Not engaged

Did you use Peep logos/images?

- ◯ Yes
- ◯ No

Did you use the English and/or Spanish family handouts (activities)? (Choose all that apply)

- ☐ English
- ☐ Spanish
- ☐ None

At what type of event or in what context did you use the Peep family handouts?

Peep Outreach Partner Survey

How appropriate were the Peep family handouts for Spanish-speaking families?

- ◯ Very appropriate
- ◯ Appropriate
- ◯ Somewhat appropriate
- ◯ Not appropriate

Do you plan to continue using the Peep family handouts at your events?

- ◯ Yes
- ◯ I don't know
- ◯ No (please explain)

Did you use Peep episodes in English and/or Spanish? (Choose all that apply)

- ☐ English
- ☐ Spanish
- ☐ None

At what type of event or in what context did you use the Peep episodes?

How engaged were young children and their parents by the Peep episodes?

- ◯ Very engaged
- ◯ Engaged
- ◯ Somewhat engaged
- ◯ Not engaged

Do you plan to continue using the Peep episodes at your events?

- ◯ Yes
- ◯ I don't know
- ◯ No (please explain)

Peep Outreach Partner Survey

Did you use Peep posters or tattoos?

- [ ] Posters
- [ ] Tattoos
- [ ] Neither of these

Did you use the Peep books?

- ◯ Yes
- ◯ No

At what type of event or in what context did you use the Peep books?

How engaged were young children and their parents by the Peep books?

- ◯ Very engaged
- ◯ Engaged
- ◯ Somewhat engaged
- ◯ Not engaged

How appropriate were the Peep books for Spanish-speaking families?

- ◯ Very appropriate
- ◯ Appropriate
- ◯ Somewhat appropriate
- ◯ Not appropriate

Do you plan to continue using the Peep books at your events?

- ◯ Yes
- ◯ I don't know
- ◯ No (please explain)

Peep Outreach Partner Survey

At events where families were involved, did you observe kids modeling science inquiry behaviors (like asking questions, making predictions, coming up with ideas, etc.?) If so, please describe.

Please describe any other uses of Peep we haven't asked about. Did you use English or Spanish resources? What kind of impact did these resources have?

Peep Outreach Partner Survey

In what ways did the Peep resources best help you engage Spanish-speaking families in science and math activities?

In what ways were the Peep resources NOT HELPFUL in reaching out to Spanish-speaking families?

Peep Outreach Partner Survey

Please tell us how much you agree with the following statements:

	Strongly Agree	Agree	Disagree	Strongly Disagree	I Don't Know
The Peep resources helped us achieve our mission.	◯	◯	◯	◯	◯
I would recommend that other organizations use the Peep resources to engage Spanish-speaking families in science exploration.	◯	◯	◯	◯	◯
I would recommend that other organizations use the Peep resources to engage Spanish-speaking families in math exploration.	◯	◯	◯	◯	◯

Does your organization regularly reach out to Spanish-speaking families? If yes, can you quantify that reach?

What are some of the challenges you have encountered in reaching out to Spanish-speaking families?

Peep Outreach Partner Survey

In your experience, what are the most effective ways to support and enhance Spanish-speaking family involvement in science and math activities? What advice would you give to other organizations trying to do the same?

Appendix E: Additional Data Tables

Additional Parent Tables

Table E-1:
Parental Behaviors Observed – All Activities

Group	Proactive or Parent-Initiated	Encouraging or Supportive	Passive or Neutral	Total Behaviors
Treatment	277 (66.3%)	85 (20.3%)	56 (13.4%)	418 (100%)
Control	205 (59.4%)	61 (17.7%)	79 (22.9%)	345 (100%)

Note: Chi-square (df = 2) = 11.742, p = .003.

Table E-2:
Parental Behaviors Observed – Shadow Play

Group	Proactive or Parent-Initiated	Encouraging or Supportive	Passive or Neutral	Total Parental Behaviors
Treatment	66 (67.3%)	15 (15.3%)	17 (17.3%)	98 (100%)
Control	54 (53.5%)	17 (16.8%)	30 (29.7%)	101 (100%)

Note: Chi-square (df = 2) = 4.877, p = .087.

Table E-3:
Parental Behaviors Observed – Ramp Play

Group	Proactive or Parent-Initiated	Encouraging or Supportive	Passive or Neutral	Total Parental Behaviors
Treatment	91 (60.3%)	40 (26.5%)	20 (13.2%)	151 (100%)
Control	71 (61.7%)	17 (14.8%)	27 (23.5%)	115 (100%)

Note: Chi-square (df = 2) = 8.068, p = .018.

Table E-4:
Parental Behaviors Observed – Ramp Play

Group	Proactive or Parent-Initiated	Encouraging or Supportive	Passive or Neutral	Total Parental Behaviors
Treatment	120 (71.0%)	30 (17.8%)	19 (11.2%)	169 (100%)
Control	80 (62.0%)	27 (20.9%)	22 (17.1%)	129 (100%)

Note: Chi-square (df = 2) = 3.063, p = .216.

Additional Children's Tables

Table E-5:
Children's Behaviors Observed – All Activities

Group	Discovery-Based	Support Seeking	Reactive	Total Behaviors
Treatment	653 (79.3%)	28 (3.4%)	142 (17.3%)	823 (100%)
Control	504 (75.6%)	31 (4.6%)	132 (19.8%)	667 (100%)

Note: Chi-square (df = 2) = 3.41, p = .182.

Table E-6:
Children's Behaviors Observed – Shadow Play

Group	Discovery-Based	Support Seeking	Reactive	Total Behaviors
Treatment	105 (69.5%)	9 (6.0%)	37 (24.5%)	151 (100%)
Control	129 (75.4%)	6 (3.5%)	36 (21.1%)	171 (100%)

Note: Chi-square (df = 2) = 1.84, p = .398.

Table E-7:
Children's Behaviors Observed – Ramp Play

Group	Discovery-Based	Support Seeking	Reactive	Total Behaviors
Treatment	387 (83.8%)	11 (2.4%)	64 (13.9%)	462 (100%)
Control	219 (75.3%)	14 (4.8%)	58 (19.9%)	291 (100%)

Note: Chi-square (df = 2) = 8.853, p = .012.

Table E-8:
Children's Behaviors Observed – Pattern Play

Group	Discovery-Based	Support Seeking	Reactive	Total Behaviors
Treatment	161 (76.7%)	8 (3.8%)	41 (19.5%)	210 (100%)
Control	156 (76.1%)	11 (5.4%)	38 (18.5%)	205 (100%)

Note: Chi-square (df = 2) = 0.61, p = .739.

Table E-9:
Station Feedback on Peep Resources in Spanish

Resource	AZ	TX	UT	WA	NC
How engaged were young children and their parents by the Peep resources at your event(s)?	Very engaged	Very engaged	Engaged	Engaged	Very engaged
How appropriate were the Peep resources for Spanish-speaking families?	Very appropriate	Very appropriate	Appropriate	Somewhat Appropriate	Very appropriate
Do you plan to continue using these Peep resources at family events?	Yes	Yes	Yes	Yes	Yes
How engaged were the educators by the Peep resources at your event(s)?	Very engaged	Engaged	N/A	Engaged	Very engaged
How appropriate were the Peep resources for pre-K educators?	Very appropriate	Appropriate	N/A	Appropriate	Very appropriate
Do you plan to continue using these Peep resources at trainings and workshops?	Yes	Yes	Yes	Yes	Yes
The Peep resources helped us achieve our mission.	Strongly agree	Agree	Agree	Agree	Strongly agree
I would recommend that other organizations use the Peep resources to engage Spanish-speaking families in science exploration.	Strongly agree	Agree	Agree	Strongly agree	Strongly agree
I would recommend	Strongly	Agree	Agree	Agree	Strongly

Resource	AZ	TX	UT	WA	NC
that other organizations use the Peep resources to engage Spanish-speaking families in math exploration.	agree				agree