

Concord Evaluation Group

Evaluation of PEEP and the Big Wide World Resources for Families

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Executive Summary

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. WGBH recently completed a total redesign of the PEEP website that was intended make the site more accessible to Spanish-speakers, more supportive of extended informal science and math exploration, and more functional for users of tablets and mobile devices. This work included:

- The **transformation of PEEP into a fully dual language website** via the translation of all games and website text into Spanish and the debut of a new Spanish-language title (*El Mundo Divertido de Peep*) and accompanying logo;
- **A significant expansion of available PEEP assets**, including six new games for kids, new videos for parents, and new professional development materials for preschool educators, as well as an expansion of the number of previously-produced PEEP animated videos from 7 to more than 50;
- **The reorganization of media assets for children**, in which the site no longer focuses on discrete “types” of assets like games and videos, but rather invites children to explore science and math topics—like “sound,” and “numbers and measuring”— that feature integrated collections of animated stories, live-action videos, and online games;
- **The reorganization of materials for parents**, in which WGBH reworked the Parent section to make it easier for parents to explore hands-on activities (they are now searchable by location and theme) and find suggestions for related videos and games; and
- **A shift to responsive design**, meaning that the site now automatically adjusts to different window sizes on a variety of tablets, mobile devices and browsers.

Evaluation

WGBH hired Concord Evaluation Group (CEG) to evaluate the impact of the new assets and redesigned site on children and their families, including English- and Spanish-speaking families. Specifically, the evaluation was designed to assess the extent to which PEEP achieved its stated impacts.

The evaluation consisted of a national, home-based experiment in which 200 families who used the PEEP website were compared to 200 families who did not use the PEEP website (post-test only control group design). Half the families in each group were English-speaking and half were Spanish-speaking. Families that were assigned to the treatment group were provided with access to PEEP animated episodes, live action videos, games, and hands-on activities, while families in the control group were not provided with access to PEEP until after the study was completed. We encouraged treatment group families to use the resources as many times, and in any manner, desired over a period of 2-3 weeks; however we did ask them to focus on resources from two content areas: **(1) light and color (science), and (2) numbers and measuring (math).**

High-Level Findings

Below, we summarize the main evaluation findings, organized by impacts.

Parents who used PEEP resources were significantly more likely to find **enjoyment** exploring science with their children, improve their **knowledge** of how to help their children learn science concepts, and believe that it is their **role** to help their children learn science and math. (Results were consistent across English- and Spanish-speaking parents.) In addition, 100% of parents reported that they would let their child watch/play with PEEP again.

Children who used PEEP resources were more likely to improve their **knowledge** of math and science content, increase their **interest** in math and science, and show **curiosity** about math and science. (Results were consistent across English- and Spanish-speaking children.) In addition, 99% of children said they would watch/play with PEEP again.

Impact 1: English- and Spanish-speaking parents will feel more equipped (self-efficacy), and thus more confident facilitating math and science exploration with their preschoolers as a result of using PEEP.

We found that English- and Spanish-speaking parents who used PEEP resources were significantly more comfortable exploring math and science with their children and were significantly more knowledgeable about how to help their children learn specific math concepts, such as numbers, measuring, and other math topics than parents who did not use PEEP resources.

Among English- and Spanish-speaking families, PEEP resources helped increase parents' comfort levels with respect to exploring math and science with their children.

Parents who used PEEP resources were significantly more likely than parents who did not use PEEP to agree with the following statements:

- I am comfortable exploring science with my child(ren).
- I am comfortable exploring math with my child(ren).

PEEP resources improved parents' confidence and self-efficacy around how to help their children learn about specific math and science concepts.

English-speaking parents who used PEEP resources were statistically more likely than parents who did not use PEEP to agree with the following statements:

- I know how to help my child(ren) learn about light, color, and other science topics.
- I know how to help my child(ren) learn about numbers, measuring, and other math topics.

Spanish-speaking parents who used PEEP resources were significantly more likely than parents who did not use PEEP to agree with the following statements:

- I know how to explain most basic math concepts to my child(ren).
- I know how to help my child(ren) learn about numbers, measuring, and other math topics.

Spanish-speaking parents who used PEEP resources were more likely to report that math and science were difficult subjects to explain than parents who did not use PEEP.

Spanish-speaking parents who used PEEP resources were significantly more likely than parents who did not use PEEP resources to agree with the following statements:

- Science is harder to explain than most subjects.
- Math is harder to explain than most subjects.

Impact 2: English- and Spanish-speaking parents will feel more inclined to facilitate math and science exploration with their preschoolers as a result of using PEEP resources.

English- and Spanish-speaking parents who used PEEP resources were significantly more likely to report that they enjoyed exploring math and science with their children and that they believed it was their job to help their children understand science than parents who did not use PEEP, thus making them more inclined to explore these topics with their children.

English- and Spanish-speaking parents who used PEEP resources were statistically more likely than parents who did not use PEEP resources to agree with the following statements:

- I enjoy exploring science with my child(ren).
- I enjoy exploring math with my child(ren).

Spanish-speaking parents who used PEEP resources were statistically more likely than parents who did not use PEEP resources to agree with the following statements:

- It is my job to help my child(ren) understand science.
- It is my job to help my child(ren) understand math.

English-speaking parents who used PEEP were significantly more likely than parents who did not use PEEP to agree that it was their job to help their children to understand science, but there was no difference between the groups with respect to math.

Impact 3: Preschoolers will more effectively apply inquiry process skills, including prediction, observation, problem-solving, and exploration as a result of using PEEP.

Spanish-speaking parents whose children used PEEP resources reported that their children were significantly more likely to ask interesting questions about how things work, enjoy exploring and sharing ideas about what they find, enjoy solving problems, and show a willingness to listen to other people's ideas than children who did not use PEEP.

We found no differences in inquiry skills between English-speaking children who used PEEP versus those who did not use PEEP, but this is possibly due to a "ceiling effect" – children in the English-speaking control group had higher scores than children in the Spanish-speaking control group, so there may have been less room for growth.

Impact 4: Preschoolers will demonstrate more curiosity and interest in math and science as a result of using PEEP.

English- and Spanish-speaking parents whose children used PEEP resources reported that their children were significantly more likely to be interested in math and science and were more curious than children who did not use PEEP.

In addition, among Spanish-speaking parents who used PEEP,

- 100% of parents who used PEEP resources reported that “PEEP made my child more interested in learning science,”
- 81% agreed that “PEEP sparked my child’s curiosity,” and
- 72% of parents reported that “PEEP made my child more interested in learning about math.”

Among English-speaking parents who used PEEP,

- 90% agreed that “PEEP sparked my child’s curiosity,”
- 61% reported that “PEEP made my child more interested in learning science,” and
- 61% also reported that “PEEP made my child more interested in learning about math.”

Impact 5: Preschoolers will learn math and science content as a result of using PEEP.

We found that English- and Spanish-speaking children who used the PEEP resources scored significantly higher on objective measures of science and math knowledge (including numbers, measuring, light, and color) than children who did not use PEEP.

Spanish-speaking children who used PEEP scored, on average, 29% better than the children who did not use PEEP. English-speaking children who used PEEP scored an average of 18% better than children who did not use PEEP.

We found that 100% of Spanish-speaking parents who used PEEP reported that “My child learned something new about science from PEEP” and 75% of these parents reported that “My child learned something new about math from PEEP.”

We found that 92% of English-speaking parents who used PEEP reported that “My child learned something new about science from PEEP” and 75% of parents reported that “My child learned something new about math from PEEP.”

Feedback on PEEP

All parents (100%) reported that they would let their child watch or play with PEEP again. All but one child (99%) reported they planned to visit PEEP again.

Several parents reported that they enjoyed PEEP because it taught their children something new within the context of having fun. Other parents reported that they

liked PEEP because it kept their children engaged. Parents also reported that they enjoyed the slower pace and simplicity of PEEP as well as its “easy to access” content. A couple parents reported that they appreciated the gender neutrality of PEEP.

Suggestions for Future Study

Due to the small proportion of low income families in the study, it is unclear what role socioeconomic status (SES) may have played in some of the findings. We suggest that future evaluations try to include more low income families. For example, it would be informative to conduct an evaluation with 100% lower income samples to explore the impacts that can be made on a population with fewer economic and educational resources than middle or upper income families.

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

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- **A shift to responsive design**, meaning that the site now automatically adjusts to different window sizes on a variety of tablets, mobile devices and browsers.

¹ From the PEEP website <http://www.PEEPandthebigwideworld.com/about/show.html>

WGBH hired Concord Evaluation Group (CEG) to evaluate the impact of the new assets and redesigned site on children and their families, including English- and Spanish-speaking families. Specifically, the evaluation was designed to assess the extent to which PEEP achieved its stated impacts:

1. English- and Spanish-speaking parents will feel more equipped (self-efficacy), and thus more confident facilitating math and science exploration with their preschoolers as a result of using PEEP.
2. English- and Spanish-speaking parents will feel more inclined to facilitate math and science exploration with their preschoolers as a result of using PEEP.
3. Preschoolers will more effectively apply inquiry process skills, including prediction, observation, problem-solving, and exploration as a result of using PEEP.

In addition to the stated impacts, the evaluation also assessed the extent to which PEEP achieved two additional impacts:

4. Preschoolers will demonstrate more curiosity and interest in math and science as a result of using PEEP.
5. Preschoolers will learn math and science content as a result of using PEEP.

Methods and Procedures

Study Design

The evaluation consisted of a national, home-based experiment in which families who used the PEEP website were compared to families who did not use the PEEP website (post-test only control group design).

CEG recruited study participants 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 across the country. 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 4-5 year old child living at home,
- Speak English and/or Spanish, and
- Have the ability to watch videos streaming from a computer (at home or anywhere they preferred).

We offered families an incentive of \$50 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). Families randomly assigned to the control group who indicated previous exposure to PEEP were reassigned to the treatment group so the control group would only contain families who have never been exposed to PEEP before. 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 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.

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

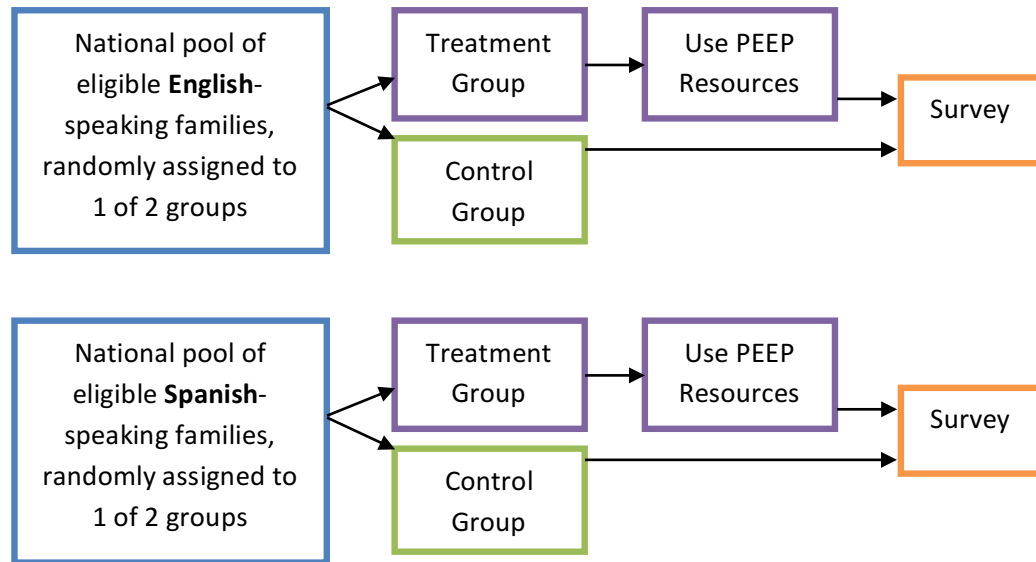


Figure 1. Experimental design of the National Family Study.

As illustrated in Figure 1, families that were assigned to the treatment group were provided with access to PEEP animated episodes, live action videos, games, and hands-on activities, while families in the control group were not provided with access to PEEP until after the study was completed.³ We encouraged treatment group families to use the resources as many times, and in any manner, desired over a period of 2-3 weeks; however we did ask them to focus on resources from two content areas: **(1) light and color (science), and (2) numbers and measuring (math)**. The specific episodes, videos, games, and activities are listed in Appendices A and B.

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 observations and predictions, problem-solving, and an overall

³ The website was publicly available at the time of the study. To ensure that the control group families were “uncontaminated” by exposure to the website, we asked families after the study whether they had visited the website during the study period. Those who responded affirmatively were removed from the sample and a replacement family was included.

discovery-based orientation in the hands-on explorations of their environments after using PEEP.

- Parents observed that their preschoolers demonstrated curiosity and interest in math and science after using PEEP.
- Preschoolers demonstrated knowledge of math and science content as a result of 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 next.

Study Instruments

We developed two survey instruments and translated them both into Spanish, one survey for the treatment group (Appendix C) and one for the control group (Appendix D). The 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. We provided written instructions for survey administration to the parents, plus email follow-up and, when necessary, telephone support.

The survey questions were pilot tested by 8 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.

Participants

Children

The total sample size was 400 families (200 English-speaking and 200 Spanish-speaking). The children sample was split evenly between boys and girls. The study included more 4 year olds than 5 year olds, at a ratio of 3:1. Most of the children in the English-speaking population were white (80%), while most of the children in the Spanish-speaking population were Latino(a) (92%). The English-speaking control group contained significantly more African-American families than the treatment group (21% versus 3%), despite random assignment.⁴ Nearly all of the children attended preschool/daycare at a center or attended Kindergarten.

**Table 1:
Children’s Demographic and Background Characteristics**

	Control Group (n = 100)	Treatment Group (n = 100)	TOTAL (N = 200)
Gender – English-speaking			
Boy	52 (52.0%)	50 (50.0%)	102 (51.0%)
Girl	48 (48.0%)	50 (50.0%)	98 (51.1%)
Gender – Spanish-speaking			
Boy	50 (50.0%)	51 (51.0%)	101 (50.5%)
Girl	50 (50.0%)	49 (49.0%)	99 (49.5%)
Age – English-speaking			
4	70 (70.0%)	74 (74.0%)	144 (72.0%)
5	30 (30.0%)	26 (26.0%)	56 (28.0%)
Age – Spanish-speaking			
4	79 (79.0%)	73 (73.0%)	152 (76.0%)
5	21 (21.0%)	27 (27.0%)	48 (24.0%)
Race/ethnicity – English-speaking			
White or Caucasian	76 (76.0%)	83 (83.0%)	159 (79.5%)
Hispanic, Latino(a), or Spanish	7 (7.0%)	8 (8.0%)	15 (7.5%)
Black or African-American ^a	21 (21.0%)	3 (3.0%)	24 (12.0%)
Asian	6 (6.0%)	10 (10.0%)	16 (8.0%)
Other	1 (1.0%)	0 (0.0%)	1 (0.5%)
Race/ethnicity – Spanish-speaking			
White or Caucasian	50 (50.0%)	42 (42.0%)	92 (46.0%)

⁴ While random assignment usually results in samples that are equivalent on most variables, there are times when the two groups lack equivalence. We have analyzed the data, controlling for differences in variables, when appropriate.

	Control Group (n = 100)	Treatment Group (n = 100)	TOTAL (N = 200)
Hispanic, Latino(a), or Spanish	92 (92.0%)	92 (92.0%)	184 (92.0%)
Black or African-American	6 (6.0%)	9 (9.0%)	15 (7.5%)
Asian	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other	1 (1.0%)	0 (0.0%)	1 (0.5%)
Preschool type – English-speaking			
Preschool/daycare at a center	80 (80.0%)	73 (73.0%)	153 (76.5%)
Kindergarten	19 (19.0%)	18 (18.0%)	37 (18.5%)
Preschool/daycare at a home provider	0 (0.0%)	3 (3.0%)	3 (1.5%)
Not in school yet	0 (0.0%)	2 (2.0%)	2 (1.0%)
Not answered	1 (1.0%)	4 (4.0%)	5 (2.5%)
Preschool type – Spanish-speaking^b			
Preschool/daycare at a center	93 (93.0%)	69 (69.0%)	162 (81.0%)
Kindergarten	7 (7.0%)	27 (27.0%)	34 (17.0%)
Preschool/daycare at a home provider	0 (0.0%)	0 (0.0%)	0 (0.0%)
Not in school yet	0 (0.0%)	0 (0.0%)	0 (0.0%)
Not answered	0 (0.0%)	4 (4.0%)	4 (2.0%)

^a The difference between the two groups was statistically significant (Chi-square $(df = 1) = 13.684$, $p = .000$).

^b The difference between the groups was statistically significant (Chi-square $(df = 1) = 15.245$, $p = .0001$).

Parents

The majority of the parents involved in the study were mothers (93% and 90%, respectively), followed by fathers (6% and 11%, respectively). Most of the parents in the English-speaking population were white (78%), while most of the parents in the Spanish-speaking population were Latino(a) (87%). The English-speaking control group contained more African-American parents than the treatment group (21% versus 3%).

**Table 2:
Parents' Demographic and Background Characteristics**

	Control Group (n = 100)	Treatment Group (n = 100)	TOTAL (N = 200)
Role – English-speaking			
Mother	93 (93.0%)	92 (92.0%)	185 (92.5%)
Father	4 (4.0%)	7 (7.0%)	11 (5.5%)
Other Relative or Guardian	3 (3.0%)	1 (1.0%)	4 (2.0%)
Role – Spanish-speaking			
Mother	94 (94.0%)	85 (85.0%)	179 (89.5%)
Father	6 (6.0%)	15 (15.0%)	21 (10.5%)
Other Relative or Guardian	0 (0.0%)	0 (0.0%)	0 (0.0%)
Race/ethnicity – English-speaking			
White or Caucasian	74 (74.0%)	82 (82.0%)	156 (78.0%)
Hispanic, Latino(a), or Spanish	1 (1.0%)	4 (4.0%)	5 (2.5%)
Black or African-American ^a	19 (19.0%)	3 (3.0%)	22 (11.0%)
Asian	5 (5.0%)	9 (9.0%)	14 (7.0%)
Other	2 (2.0%)	2 (2.0%)	4 (2.0%)
Race/ethnicity – Spanish-speaking			
White or Caucasian ^b	38 (38.0%)	24 (24.0%)	62 (31.0%)
Hispanic, Latino(a), or Spanish	87 (87.0%)	87 (87.0%)	174 (87.0%)
Black or African-American	0 (0.0%)	0 (0.0%)	0 (0.0%)
Asian	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)
Household Income – English-speaking^c			
Under \$25K per year	9 (9.0%)	13 (13.0%)	22 (11.0%)
\$25,000 - \$49,999 per year	14 (14.0%)	3 (3.0%)	17 (8.5%)
\$50,000 - \$99,999 per year	36 (36.0%)	53 (53.0%)	89 (44.5%)
\$100,000 or more per year	40 (40.0%)	28 (28.0%)	68 (34.0%)
Not answered	1 (1.0%)	3 (3.0%)	4 (2.0%)
Household Income – Spanish-speaking^d			
Under \$25K per year	9 (9.0%)	9 (9.0%)	18 (9.0%)
\$25,000 - \$49,999 per year	21 (21.0%)	15 (15.0%)	36 (18.0%)
\$50,000 - \$99,999 per year	56 (56.0%)	27 (27.0%)	83 (41.5%)
\$100,000 or more per year	14 (14.0%)	45 (45.0%)	59 (29.5%)

	Control Group (n = 100)	Treatment Group (n = 100)	TOTAL (N = 200)
Not answered	0 (0.0%)	4 (4.0%)	4 (2.0%)
Location – English-speaking^e			
Urban	36 (36.0%)	18 (18.0%)	54 (27.0%)
Suburban	56 (56.0%)	64 (64.0%)	120 (60.0%)
Rural	8 (8.0%)	18 (18.0%)	26 (13.0%)
Location – Spanish-speaking			
Urban	60 (60.0%)	61 (61.0%)	121 (60.5%)
Suburban	34 (34.0%)	36 (36.0%)	70 (35.0%)
Rural	6 (6.0%)	3 (3.0%)	9 (4.5%)

^a The difference between the groups was statistically significant (Chi-square $(df = 1) = 11.491, p = .001$).

^b The difference between the groups was statistically significant (Chi-square $(df = 1) = 3.950, p = .047$).

^c The difference between the groups was statistically significant (Chi-square $(df = 4) = 14.210, p = .007$).

^d The difference between the groups was statistically significant (Chi-square $(df = 4) = 31.421, p = .000$).

^e The difference between the groups was statistically significant (Chi-square $(df = 2) = 10.379, p = .006$).

Treatment Group Activities

Most families in the treatment group reported that they primarily used laptop computers to access PEEP resources (60%), followed by desktop computers (19%). Tablets and smartphones were used less frequently, although English-speaking families were almost four times more likely to report using tablets than Spanish-speaking families.

**Table 3:
Devices Used by Treatment Group Families**

Device	English-speaking Families (N = 100)	Spanish-speaking Families (N = 100)	Totals
Laptop computer	50 (50.0%)	69 (69.0%)	119 (59.5%)
Desktop computer	25 (25.0%)	12 (12.0%)	37 (18.6%)
Tablet	21 (21.0%)	6 (6.0%)	27 (13.6%)
Smartphone	4 (4.0%)	9 (9.0%)	13 (6.6%)
Not answered	0 (0.0%)	4 (4.0%)	4 (2.0%)

We provided access to PEEP resources in both Spanish and English. Interestingly, among the Spanish-speaking families, 66% reported that they preferred to use websites written in English with their children, while only 17% reported that they preferred to use websites written in Spanish; 16% reported that they had no preference.

The animations and the number of families who viewed each of them are summarized in the table below.

**Table 4:
Animations Used by Treatment Group Families**

Animations	English-speaking Families (N = 100)	Spanish-speaking Families (N = 100)	Totals
A PEEP of a Different Color	97 (97.0%)	96 (96.0%)	193 (96.5%)
Shadow Play	90 (90.0%)	87 (87.0%)	177 (88.5%)
PEEP's Color Quest	79 (79.0%)	87 (87.0%)	166 (83.0%)
Night Light	85 (85.0%)	63 (63.0%)	148 (74.0%)
PEEP Feet	59 (59.0%)	81 (81.0%)	140 (70.0%)
There's No Place Like Home	66 (66.0%)	72 (72.0%)	138 (69.0%)
Count Them Out	65 (65.0%)	57 (57.0%)	122 (61.0%)
Bringing Spring	67 (67.0%)	54 (54.0%)	121 (60.5%)
Meeting Halfway	54 (54.0%)	63 (63.0%)	117 (58.5%)

Animations	English-speaking Families (N = 100)	Spanish-speaking Families (N = 100)	Totals
Go West Young PEEP	65 (65.0%)	48 (48.0%)	113 (56.5%)
Two's a Crowd, Part I	54 (54.0%)	39 (39.0%)	93 (46.5%)
Two's a Crowd, Part II	51 (51.0%)	39 (39.0%)	90 (45.0%)

The live action videos and their viewing frequency are summarized in the table below.

**Table 5:
Live Action Videos Used by Treatment Group Families**

Videos	English-speaking Families (N = 100)	Spanish-speaking Families (N = 100)	Totals
Mixing Paint	87 (87.0%)	87 (87.0%)	174 (87.0%)
Outdoor Shadows	61 (61.0%)	81 (81.0%)	142 (71.0%)
Shadow Puppets	72 (72.0%)	54 (54.0%)	126 (63.0%)
Measuring Me	62 (62.0%)	63 (63.0%)	125 (62.5%)
Shadow Tracing	59 (59.0%)	63 (63.0%)	122 (61.0%)
Sharing Snacks	57 (57.0%)	48 (48.0%)	105 (52.5%)
Juicy Light	61 (61.0%)	39 (39.0%)	100 (50.0%)
Recycled Reflections	45 (45.0%)	48 (48.0%)	93 (46.5%)
Measuring with Footsteps	38 (38.0%)	51 (51.0%)	89 (44.5%)
Using a Measuring Stick	43 (43.0%)	30 (30.0%)	73 (36.5%)
Shifting Shadows	51 (51.0%)	18 (18.0%)	69 (34.5%)
Lemonade Lessons	38 (38.0%)	27 (27.0%)	65 (32.5%)
Half Court	33 (33.0%)	24 (24.0%)	57 (28.5%)

The hands-on activities and their frequency of use are summarized in the table below. Notably, although we invited families to try only two hands-on activities, clearly most families chose to do many more than just two.

**Table 6:
Hands-on Activities Used by Treatment Group Families**

Activities	English-speaking Families (N = 100)	Spanish-speaking Families (N = 100)	Totals
Making Hand Shadows	62 (62.0%)	90 (90.0%)	152 (76.0%)
Pouring Water	48 (48.0%)	63 (63.0%)	111 (55.5%)
Mixing Colors	50 (50.0%)	45 (45.0%)	95 (47.5%)
Me and My Shadow	40 (40.0%)	48 (48.0%)	88 (44.0%)
Big Steps Little Steps	19 (19.0%)	63 (63.0%)	82 (41.0%)
Measuring with Steps	30 (30.0%)	51 (51.0%)	81 (40.5%)

Activities	English-speaking Families (N = 100)	Spanish-speaking Families (N = 100)	Totals
Playing with Mirrors	45 (45.0%)	30 (30.0%)	75 (37.5%)
Exploring Colored Shadows	24 (24.0%)	45 (45.0%)	69 (34.5%)
Sharing Snacks	29 (29.0%)	36 (36.0%)	65 (32.5%)
Tracing Shadows	32 (32.0%)	24 (24.0%)	56 (28.0%)
Making Shadow Puppets	29 (29.0%)	27 (27.0%)	56 (28.0%)
Tall, Taller, Tallest. Wide, Wider, Widest.	11 (11.0%)	36 (36.0%)	47 (23.5%)
Measuring Time	22 (22.0%)	21 (21.0%)	43 (21.5%)
Perfect Portions	17 (17.0%)	21 (21.0%)	38 (19.0%)
Playing with Reflections	23 (23.0%)	9 (9.0%)	32 (16.0%)
Keep the Change	19 (19.0%)	12 (12.0%)	31 (15.5%)
Measuring Your Journey	6 (6.0%)	15 (15.0%)	21 (10.5%)
Weight Watchers	5 (5.0%)	15 (15.0%)	20 (10.0%)

The games and the number of families who tried them are summarized in the table below.

**Table 7:
Games Used by Treatment Group Families**

Games	English-speaking Families (N = 100)	Spanish-speaking Families (N = 100)	Totals
Shadow Shapes	82 (82.0%)	81 (81.0%)	163 (81.5%)
Paint Splat	77 (77.0%)	69 (69.0%)	146 (73.0%)
Night Light	80 (80.0%)	48 (48.0%)	128 (64.0%)
Fish Swish	65 (65.0%)	45 (45.0%)	110 (55.0%)
Flower Power	54 (54.0%)	51 (51.0%)	105 (52.5%)
Hop to It!	51 (51.0%)	48 (48.0%)	99 (49.5%)

Findings

Parents

Impact 1: English- and Spanish-speaking parents will feel more equipped (self-efficacy) and more confident facilitating math and science exploration with their preschoolers as a result of using PEEP.

We asked parents to rate their agreement with the statements in Tables 8 and 9 on a scale of 1 (Strongly disagree) to 5 (Strongly agree). The statements were designed to gauge their self-efficacy and confidence related to facilitating math and science activities with their children.

We found that English- and Spanish-speaking parents who used PEEP resources were significantly more comfortable exploring math and science with their children and were significantly more knowledgeable about how to help their children learn specific math concepts, such as numbers, measuring, and other math topics than parents who did not use PEEP resources.

English-speaking parents who used PEEP resources were also significantly more knowledgeable about how to help their children learn about light, color, and other science topics than parents who did not use PEEP resources. We did not observe this difference with the Spanish-speaking sample.

In addition, Spanish-speaking parents who used PEEP resources were significantly more likely to report that they knew how to explain most basic math concepts to their children than parents who did not use PEEP resources. This is notable since they were also significantly more likely to report that math and science are harder to explain than most subjects. Neither of these effects were observed with the English-speaking sample.

Due to differences in the background characteristics of participants in each group, we performed the analyses multiple times, each time controlling for a different background variable, including African-American status (African-American or not), household income, and urbanicity (urban, rural, suburban). The differences reported above remained significant when controlling for these background factors. Thus, we are confident that exposure to Peep is likely driving the observed differences rather than differences in the groups' backgrounds.

**Table 8:
English-speaking Parents' Self-Efficacy and Confidence**

	Group	N	Mean	Std Dev	p Value	Effect Size
I know how to help my child(ren) learn about light, color, and other science topics.	Treatment	98	4.15	.78	.02	.34
	Control	99	3.87	.94		
I know how to explain most basic science concepts to my child(ren).	Treatment	98	4.06	.66	.57	--
	Control	99	4.00	.86		
I am comfortable exploring science with my child(ren).	Treatment	98	4.49	.78	.05	.29
	Control	99	4.26	.80		
Science is harder to explain than most subjects.	Treatment	98	2.97	1.07	.90	--
	Control	99	2.95	1.17		
I know how to help my child(ren) learn about numbers, measuring, and other math topics.	Treatment	98	4.28	.67	.01	.40
	Control	99	3.99	.40		
I know how to explain most basic math concepts to my child(ren).	Treatment	98	4.28	.67	.17	--
	Control	99	4.12	.90		
I am comfortable exploring math with my child(ren).	Treatment	98	4.43	.61	.00	.52
	Control	99	3.98	1.05		
Math is harder to explain than most subjects.	Treatment	98	2.87	1.15	.16	--
	Control	95	3.11	1.30		

**Table 9:
Spanish-speaking Parents' Self-Efficacy and Confidence**

	Group	N	Mean	Std Dev	p Value	Effect Size
I know how to help my child(ren) learn about light, color, and other science topics.	Treatment	96	3.88	1.00	.54	--
	Control	100	3.97	1.18		
I know how to explain most basic science concepts to my child(ren).	Treatment	96	3.75	1.07	.48	--
	Control	100	3.63	1.29		
I am comfortable exploring science with my child(ren).	Treatment	96	4.47	.50	.00	.50
	Control	100	3.96	1.33		

	Group	N	Mean	Std Dev	p Value	Effect Size
Science is harder to explain than most subjects.	Treatment	96	2.88	.90	.02	.48
	Control	100	2.53	1.18		
I know how to help my child(ren) learn about numbers, measuring, and other math topics.	Treatment	96	4.06	.90	.00	.61
	Control	88	3.31	1.41		
I know how to explain most basic math concepts to my child(ren).	Treatment	96	4.47	.50	.00	1.07
	Control	100	3.41	1.30		
I am comfortable exploring math with my child(ren).	Treatment	96	4.34	.89	.00	.62
	Control	100	3.71	1.13		
Math is harder to explain than most subjects.	Treatment	96	2.59	1.37	.02	.33
	Control	100	2.19	1.00		

Impact 2: English- and Spanish-speaking parents will feel more inclined to facilitate math and science exploration with their preschoolers as a result of using PEEP resources.

We asked parents to rate their agreement with the statements in Tables 10 and 11 on a scale of 1 (Strongly disagree) to 5 (Strongly agree). The statements were designed to gauge their inclination to facilitate math and science activities with their children.

English- and Spanish-speaking parents who used PEEP resources were significantly more likely to report that they enjoyed exploring math and science with their children and that they believed it was their job to help their children understand science than parents who did not use PEEP.

Spanish-speaking parents who used PEEP were also significantly more likely to believe that it was their job to help their children understand math than parents who did not use PEEP. We did not observe this difference in the English-speaking sample.

Again, we performed the analyses multiple times, each time controlling for African-American status (African-American or not), household income, and urbanicity (urban, rural, suburban). The differences reported above remained significant when controlling for these background factors. Once again, we can be confident that exposure to Peep is likely driving the observed differences.

**Table 10:
English-speaking Parents' Inclinations**

	Group	N	Mean	Std Dev	p Value	Effect Size
I enjoy exploring science with my child(ren).	Treatment	98	4.76	.43	.00	.61
	Control	99	4.39	.73		
It is my job to help my child(ren) understand science.	Treatment	96	4.45	.66	.03	.32
	Control	99	4.19	.89		
I enjoy exploring math with my child(ren).	Treatment	98	4.52	.65	.00	.83
	Control	99	3.69	1.26		
It is my job to help my child(ren) understand math.	Treatment	98	4.47	.68	.24	--
	Control	99	4.34	.82		

**Table 11:
Spanish-speaking Parents' Inclinations**

	Group	N	Mean	Std Dev	p Value	Effect Size
I enjoy exploring science with my child(ren).	Treatment	96	4.81	.39	.00	.81
	Control	98	4.04	1.27		
It is my job to help my child(ren) understand science.	Treatment	96	4.19	.73	.00	.48
	Control	100	3.70	1.24		
I enjoy exploring math with my child(ren).	Treatment	96	4.56	.66	.00	1.03
	Control	100	3.59	1.15		
It is my job to help my child(ren) understand math.	Treatment	96	4.09	1.02	.05	.27
	Control	100	3.76	1.37		

Children

Impact 3: Preschoolers will more effectively apply inquiry process skills, including prediction, observation, problem-solving, and exploration as a result of using PEEP.

We asked parents to rate their agreement with the statements in Tables 12 and 13 on a scale of 1 (Strongly disagree) to 5 (Strongly agree). The statements were designed to gauge their children's inquiry process skills.

Parents of Spanish-speaking children who used PEEP were significantly more likely to report that their children asked interesting questions about how things work, enjoyed exploring and sharing ideas about what they find, enjoyed solving problems, and showed a willingness to listen to other people's ideas than children who did not use PEEP.

We found no differences in inquiry skills between English-speaking children who used PEEP versus those who did not use PEEP. Given that the children in the English-speaking control group had higher scores on these skills when compared to children in the Spanish-speaking control group, it is possible that we observed a "ceiling effect" with little room for growth.

We performed the Spanish-speaking children's analyses again, this time controlling for type of school attended. The differences reported above remained significant when controlling for school attended. So, once again, we are confident that exposure to PEEP is likely driving the observed differences.

We asked additional follow-up question of families who used PEEP. We found:

Among Spanish-speaking parents who used PEEP,

- 81% agreed that "PEEP taught my child to share with others what s/he learned."
- 63% agreed that "PEEP taught my child how to come up with ideas or explanations for why things happen."
- 56% agreed that "PEEP taught my child how to use words and numbers to describe what s/he is thinking or doing."
- 53% agreed that "PEEP taught my child how to ask questions about things that interest or puzzle him/her, and how to try and find the answers."
- 53% agreed that "PEEP taught my child how to predict (using what s/he already knows to think about what might happen next)."

Among English-speaking parents who used PEEP,

- 64% agreed that “PEEP taught my child how to come up with ideas or explanations for why things happen.”
- 59% agreed that “PEEP taught my child how to predict (using what s/he already knows to think about what might happen next).”
- 54% agreed that “PEEP taught my child how to use words and numbers to describe what s/he is thinking or doing.”
- 52% agreed that “PEEP taught my child to share with others what s/he learned.”
- 51% agreed that “PEEP taught my child how to ask questions about things that interest or puzzle him/her, and how to try and find the answers.”

**Table 12:
English-speaking Children’s Inquiry Skills**

My child...	Group	N	Mean	Std Dev	p Value	Effect Size
...asks interesting questions about how things work.	Treatment	98	4.42	.80	.96	--
	Control	99	4.42	.86		
...likes to explore and share ideas about what he or she finds.	Treatment	98	4.44	.76	.93	--
	Control	98	4.43	.95		
...doesn’t like to learn new things.	Treatment	94	1.78	1.11	.67	--
	Control	99	1.85	1.22		
...likes to solve problems.	Treatment	98	4.26	.78	.75	--
	Control	99	4.29	.88		
...is willing to listen to other people’s ideas.	Treatment	96	3.81	.74	.38	--
	Control	99	3.92	.92		

**Table 13:
Spanish-speaking Children’s Inquiry Skills**

My child...	Group	N	Mean	Std Dev	p Value	Effect Size
...asks interesting questions about how things work.	Treatment	96	4.63	.49	.00	.72
	Control	88	3.73	1.58		
...doesn’t like to learn new things.	Treatment	87	2.86	1.84	.00	.86
	Control	100	1.59	.70		
...likes to explore and share ideas about what he or she finds.	Treatment	96	4.81	.39	.00	1.03
	Control	100	3.50	1.76		
...likes to solve problems.	Treatment	96	4.44	.79	.00	.81
	Control	100	3.48	1.45		
...is willing to listen to other people’s ideas.	Treatment	96	4.25	.75	.00	.76
	Control	100	3.40	1.38		

Impact 4: Preschoolers will demonstrate more curiosity and interest in math and science as a result of using PEEP.

We asked parents to rate their agreement with the following statements on a scale of 1 (Strongly disagree) to 5 (Strongly agree). The statements were designed to gauge their children’s curiosity and interest in math and science.

We found that English- and Spanish-speaking parents reported that children who used PEEP resources were significantly more likely to be more interested in math and science and were more curious than children who did not use PEEP. This was true, even when controlling for type of school attended.

We asked additional follow-up questions of families that used PEEP. We found:

Among Spanish-speaking parents who used PEEP,

- 100% of parents who used PEEP resources reported that “PEEP made my child more interested in learning science,”
- 81% agreed that “PEEP sparked my child’s curiosity,” and
- 72% of parents reported that “PEEP made my child more interested in learning about math.”

Among English-speaking parents who used PEEP,

- 90% agreed that “PEEP sparked my child’s curiosity,”
- 61% reported that “PEEP made my child more interested in learning science,” and
- 61% also reported that “PEEP made my child more interested in learning about math.”

**Table 14:
English-speaking Children’s Inquiry Skills and Interest**

My child...	Group	N	Mean	Std Dev	p Value	Effect Size
...is interested in science.	Treatment	98	4.55	.52	.00	.42
	Control	99	4.24	.88		
...is interested in math.	Treatment	96	4.27	.76	.02	.33
	Control	98	3.96	1.05		
...is generally curious.	Treatment	96	4.72	.52	.02	.34
	Control	96	4.50	.73		

**Table 15:
Spanish-speaking Children's Inquiry Skills and Interest**

My child...	Group	N	Mean	Std Dev	p Value	Effect Size
...is interested in science.	Treatment	87	4.41	.50	.00	.88
	Control	100	3.44	1.47		
...is interested in math.	Treatment	87	4.21	.61	.00	.82
	Control	100	3.40	1.23		
...is generally curious.	Treatment	78	4.65	.48	.00	.65
	Control	88	3.84	1.59		

Impact 5: Preschoolers will learn math and science content as a result of using PEEP.

We created a set of questions to test children’s knowledge of the science and math concepts covered in the PEEP resources. Specifically, the measure assessed children’s understanding of light, color, numbers, and measuring. Children were able to earn a total of 15 points on the measure.

We found that English- and Spanish-speaking children who used the PEEP resources scored significantly higher on the knowledge measure than children who did not use PEEP. Spanish-speaking children who used PEEP scored, on average, 29% better than the children who did not use PEEP. English-speaking children who used PEEP scored an average of 18% better than children who did not use PEEP. These differences remained significant, even when controlling for school type.

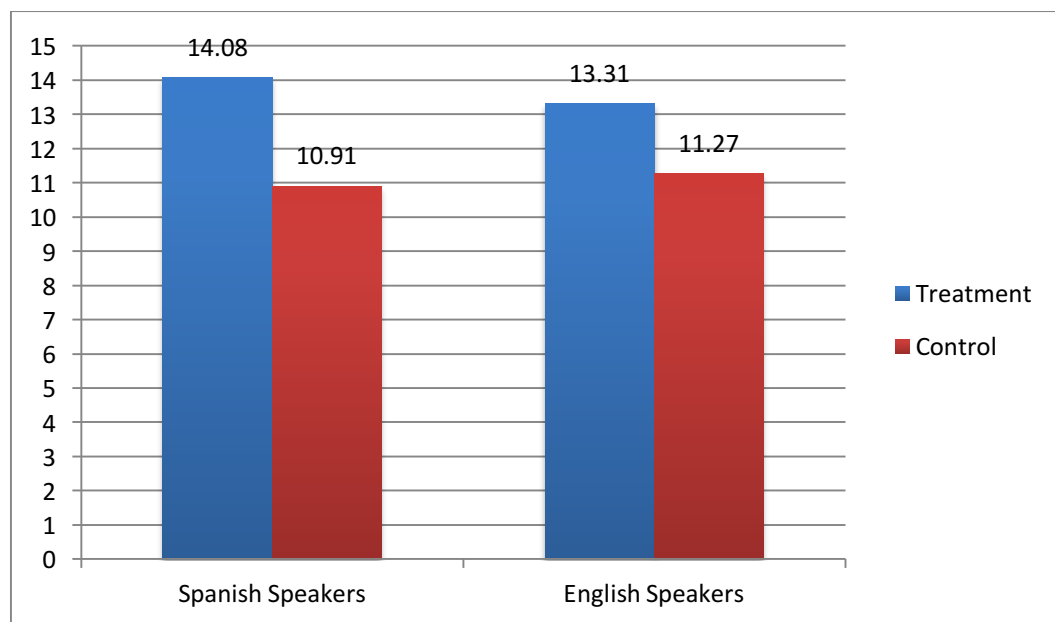


Figure 2. Average math and science knowledge scores.

The average score for Spanish-speaking children in the treatment group was 14.08 (sd = 1.71) while the average score for their peers in the control group was 10.91 (sd = 2.52).⁵

The average score for English-speaking children in the treatment group was 13.31 (sd = 1.69) while the average score for their peers in the control group was 11.27 (sd = 2.05).⁶

⁵ $t_{(174.084)} = 10.401, p = .00, \text{effect size} = 1.47.$

⁶ $t_{(198)} = 7.688, p = .00, \text{effect size} = 1.09.$

We found that 100% of Spanish-speaking parents who used PEEP reported that “My child learned something new about science from PEEP” and 75% of these parents reported that “My child learned something new about math from PEEP.”

We found that 92% of English-speaking parents who used PEEP reported that “My child learned something new about science from PEEP” and 75% of parents reported that “My child learned something new about math from PEEP.”

Feedback on PEEP

We asked treatment group families to provide feedback on their experiences using PEEP. All parents (100%) reported that they would let their child watch or play with PEEP again. All but one child (99%) reported they planned to visit PEEP again.

We asked children to tell us what they learned from PEEP. Some illustrative quotes are listed below:

- *You can use lots of things to measure. I learned about shadows and colors and how tall PEEP is.*
- *You can do shadows on stuff.*
- *To explore and do science projects.*
- *The shadow one, I learned, they got scared of their shadows...but I didn't get scared. When I run and its sunny I don't look behind me. But when they run they look behind them and get scared.*
- *Shadows, colors, and how to measure.*
- *It's fun and they talk about colors, and shapes, and numbers (I like numbers a lot!) and PEEP and Quack and all the characters are friends.*
- *I learned to play with PEEP is more interesting than TV. He taught me that you can experiment and have fun a lot.*

Finally, we asked parents what they liked about PEEP. Several parents reported that they enjoyed PEEP because it taught their children something new within the context of having fun:

- *They like to watch because it's funny, but don't realize they're learning at the same time.*

- *I liked that the games were very creative and taught kids science and math without them knowing it. There was just the right amount of humor mixed into each video with PEEP.*
- *I like that the characters learn through exploration and experimentation. I especially like that they occasionally make mistakes and learn from them. I think overall the characters, plots, and dialogue come together really well.*
- *We enjoyed the short and easy to understand videos and games. I was glad that the materials were educational.*
- *The videos/games were fun, colorful and easy to digest for my four year old.*
- *This presentation makes learning fun for my son.*
- *Real life lessons, Creatures in nature, simple illustrations, friendly characters, the games didn't include phrases like "Oops!" Try again!"... they were very positive and there was never frustration in my child.*

Other parents reported that they liked PEEP because it kept their children engaged:

- *We liked the live action videos because it seemed to get her really interested and showed her she could do these experiments too.*
- *The shows were a good length to keep my son's attention. They were fun to watch!*
- *The characters are intriguing/engaging, the topics we learn from, and have fun along the way. Also, the games are Fantastic! Plus the live children learning are always interesting ideas for me as a parent.*
- *Personalities of the characters are engaging to adults and kids, and I like how science is integrated smoothly.*
- *It engaged my child and I didn't mind him spending time on a device given it was teaching him.*
- *I love that it is an interactive show that keeps kids' attention while also teaching them about topics that may be difficult to teach otherwise.*

Parents also reported that they enjoyed the slower pace and simplicity of PEEP as well as its “easy to access” content:

- *[I liked the] use of complex ideas within a simple framework. I also appreciate the simplicity of the characters and the setting in which the stories take place.*
- *The characters are simply drawn but keep my child's interest and make him laugh.*
- *Slower pace, quirky characters, narration makes things clearer for children.*
- *Pace, humor are right on! Concepts explored in an age-appropriate way.*
- *It's simple, colorful, and hilarious for the kids.*

A couple parents reported that they appreciated the gender neutrality of PEEP:

- *[I liked] the mixture of interesting cartoon characters with the presence of real children. Also that there were not super gendered topics or characters like we see in so much children's entertainment and toys at the moment. Finally we LOVE the learning element of this.*
- *[I liked] that the genders of the characters aren't obvious. [I also liked the] depiction of friendships and the live action segments--diversity of children and the kinds of activities they do.*

Summary

Parents who used PEEP resources were significantly more likely to find **enjoyment** exploring science with their children, improve their **knowledge** of how to help their children learn science concepts, and believe that it is their **role** to help their children learn science and math. (Results were consistent across English- and Spanish-speaking parents.) In addition, 100% of parents reported that they would let their child watch/play with PEEP again.

Children who used PEEP resources were more likely to improve their **knowledge** of math and science content, increase their **interest** in math and science, and show **curiosity** about math and science. (Results were consistent across English- and Spanish-speaking children.) In addition, 99% of children said they would watch/play with PEEP again.

Below, we summarize the main evaluation findings, organized by impacts.

Impact 1: English- and Spanish-speaking parents will feel more equipped (self-efficacy), and thus more confident facilitating math and science exploration with their preschoolers as a result of using PEEP.

We found that English- and Spanish-speaking parents who used PEEP resources were significantly more comfortable exploring math and science with their children and were significantly more knowledgeable about how to help their children learn specific math concepts, such as numbers, measuring, and other math topics than parents who did not use PEEP resources.

Among English- and Spanish-speaking families, PEEP resources helped increase parents' comfort levels with respect to exploring math and science with their children.

Parents who used PEEP resources were significantly more likely than parents who did not use PEEP to agree with the following statements:

- I am comfortable exploring science with my child(ren).
- I am comfortable exploring math with my child(ren).

PEEP resources improved parents' confidence and self-efficacy around how to help their children learn about specific math and science concepts.

English-speaking parents who used PEEP resources were statistically more likely than parents who did not use PEEP to agree with the following statements:

- I know how to help my child(ren) learn about light, color, and other science topics.
- I know how to help my child(ren) learn about numbers, measuring, and other math topics.

Spanish-speaking parents who used PEEP resources were significantly more likely than parents who did not use PEEP to agree with the following statements:

- I know how to explain most basic math concepts to my child(ren).
- I know how to help my child(ren) learn about numbers, measuring, and other math topics.

Spanish-speaking parents who used PEEP resources were more likely to report that math and science were difficult subjects to explain than parents who did not use PEEP.

Spanish-speaking parents who used PEEP resources were significantly more likely than parents who did not use PEEP resources to agree with the following statements:

- Science is harder to explain than most subjects.
- Math is harder to explain than most subjects.

Impact 2: English- and Spanish-speaking parents will feel more inclined to facilitate math and science exploration with their preschoolers as a result of using PEEP resources.

English- and Spanish-speaking parents who used PEEP resources were significantly more likely to report that they enjoyed exploring math and science with their children and that they believed it was their job to help their children understand science than parents who did not use PEEP, thus making them more inclined to explore these topics with their children.

English- and Spanish-speaking parents who used PEEP resources were statistically more likely than parents who did not use PEEP resources to agree with the following statements:

- I enjoy exploring science with my child(ren).
- I enjoy exploring math with my child(ren).

Spanish-speaking parents who used PEEP resources were statistically more likely than parents who did not use PEEP resources to agree with the following statements:

- It is my job to help my child(ren) understand science.

- It is my job to help my child(ren) understand math.

English-speaking parents who used PEEP were significantly more likely than parents who did not use PEEP to agree that it was their job to help their children to understand science, but there was no difference between the groups with respect to math.

Impact 3: Preschoolers will more effectively apply inquiry process skills, including prediction, observation, problem-solving, and exploration as a result of using PEEP.

Spanish-speaking parents whose children used PEEP resources reported that their children were significantly more likely to ask interesting questions about how things work, enjoy exploring and sharing ideas about what they find, enjoy solving problems, and show a willingness to listen to other people's ideas than children who did not use PEEP.

We found no differences in inquiry skills between English-speaking children who used PEEP versus those who did not use PEEP, but this is possibly due to a "ceiling effect" – children in the English-speaking control group had higher scores than children in the Spanish-speaking control group, so there may have been less room for growth.

Impact 4: Preschoolers will demonstrate more curiosity and interest in math and science as a result of using PEEP.

English- and Spanish-speaking parents whose children used PEEP resources reported that their children were significantly more likely to be interested in math and science and were more curious than children who did not use PEEP.

In addition, among Spanish-speaking parents who used PEEP,

- 100% of parents who used PEEP resources reported that "PEEP made my child more interested in learning science,"
- 81% agreed that "PEEP sparked my child's curiosity," and
- 72% of parents reported that "PEEP made my child more interested in learning about math."

Among English-speaking parents who used PEEP,

- 90% agreed that "PEEP sparked my child's curiosity,"
- 61% reported that "PEEP made my child more interested in learning science," and

- 61% also reported that “PEEP made my child more interested in learning about math.”

Impact 5: Preschoolers will learn math and science content as a result of using PEEP.

We found that English- and Spanish-speaking children who used the PEEP resources scored significantly higher on objective measures of science and math knowledge (including numbers, measuring, light, and color) than children who did not use PEEP.

Spanish-speaking children who used PEEP scored, on average, 29% better than the children who did not use PEEP. English-speaking children who used PEEP scored an average of 18% better than children who did not use PEEP.

We found that 100% of Spanish-speaking parents who used PEEP reported that “My child learned something new about science from PEEP” and 75% of these parents reported that “My child learned something new about math from PEEP.”

We found that 92% of English-speaking parents who used PEEP reported that “My child learned something new about science from PEEP” and 75% of parents reported that “My child learned something new about math from PEEP.”

Feedback on PEEP

All parents (100%) reported that they would let their child watch or play with PEEP again. All but one child (99%) reported they planned to visit PEEP again.

Several parents reported that they enjoyed PEEP because it taught their children something new within the context of having fun. Other parents reported that they liked PEEP because it kept their children engaged. Parents also reported that they enjoyed the slower pace and simplicity of PEEP as well as its “easy to access” content. A couple parents reported that they appreciated the gender neutrality of PEEP.

Suggestions for Future Study

Due to the small proportion of low income families in the study, it is unclear what role socioeconomic status (SES) may have played in some of the findings. We suggest that future evaluations try to include more low income families. For example, it would be informative to conduct an evaluation with 100% lower

income samples to explore the impacts that can be made on a population with fewer economic and educational resources than middle or upper income families.

Appendix A: Treatment Group Episodes, Games, and Activities (English)

Step 1: Online Activities

To complete the study, please review as many of the following cartoons, games, and live action videos as you can:

- Cartoons (Each cartoon is between 1 and 5 minutes):
 - **A PEEP of a Different Color:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/32/a-PEEP-of-a-different-color/>
 - **PEEP's Color Quest:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/14/PEEPs-color-quest/>
 - **Shadow Play:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/17/shadow-play/>
 - **Night Light:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/15/night-light/>
 - **Bringing Spring:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/18/bringing-spring/>
 - **Go West Young PEEP:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/16/go-west-young-PEEP/>
 - **PEEP Feet:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/69/PEEP-feet/>
 - **Meeting Halfway:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/131/meeting-half-way/>
 - **Count Them Out:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/178/count-them-out/>
 - **There's No Place Like Home:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/124/theres-no-place-like-home/>
 - **Two's a Crowd, Part I:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/39/twos-a-crowd-part-1/>

- **Two's a Crowd, Part II:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/41/twos-a-crowd-part-2/>
- Games:
 - **Shadow Shapes:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/games/html5/2/shadow-shapes/>
 - **Paint Splat:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/games/10/paint-splat/>
 - **Night Light:**
<http://PEEPandthebigwideworld.com/en/kids/games/html5/1/night-light/>
 - **Fish Swish:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/games/4/fish-swish/>
 - **Flower Power:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/games/5/flower-power/>
 - **Hop to It!:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/games/7/hop-to-it/>
- Live Action Videos (Each of these videos with real families is less than 5 minutes):
 - **Mixing Paint:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/33/mixing-paint/>
 - **Juicy Light:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/20/juicy-light/>
 - **Shadow Puppets:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/61/shadow-puppets/>
 - **Shadow Tracing:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/66/shadow-tracing/>

- **Outdoor Shadows:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/21/outdoor-shadows/>
- **Recycled Reflections:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/150/recycled-reflections/>
- **Shifting Shadows:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/85/shifting-shadows/>
- **Measuring Me:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/70/measuring-me/>
- **Half Court:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/252/half-court/>
- **Sharing Snacks:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/179/sharing-snacks/>
- **Lemonade Lessons:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/248/lemonade-lessons/>
- **Measuring with Footsteps:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/40/measuring-with-footsteps/>
- **Using a Measuring Stick:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/43/using-a-measuring-stick/>

Step 2: Do 2 Family Hands-on Activities

Please do **one** of any of the following activities together:

<http://PEEPandthebigwideworld.com/en/parents/activities/by-theme/#act-4>

Then, please do **one** of any of the following activities together:

<http://PEEPandthebigwideworld.com/en/parents/activities/by-theme/#act-5>

Each activity will take anywhere from a few minutes to an hour and may require some everyday household materials.

Appendix B: Treatment Group Episodes, Games, and Activities (Spanish)

Paso 1: Actividades en Internet

Para completar el estudio, favor de repasar la mayor cantidad posible de las siguientes caricaturas, juegos y videos de acción en vivo:

- Caricaturas (Cada caricatura dura de entre 1 a 5 minutos):
 - **A PEEP of a Different Color / Diferentes colores:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/32/a-PEEP-of-a-different-color/>
 - **PEEP's Color Quest / PEEP sale a buscar colores:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/14/PEEPs-color-quest/>
 - **Shadow Play / Jugando con la sombra:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/17/shadow-play/>
 - **Night Light / Se hizo la luz:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/15/night-light/>
 - **Bringing Spring / Trayendo la primavera:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/18/bringing-spring/>
 - **Go West Young PEEP / Siguiendo el Sol:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/16/go-west-young-PEEP/>
 - **PEEP Feet / Paso a paso:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/69/PEEP-feet/>
 - **Meeting Halfway / Veámonos en la mitad:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/131/meeting-half-way/>
 - **Count Them Out / Contemos uno por uno:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/178/count-them-out/>

- **There's No Place Like Home / No hay nada como el hogar:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/124/theres-no-place-like-home/>
- **Two's a Crowd, Part I / Dos son multitud, parte 1:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/39/twos-a-crowd-part-1/>
- **Two's a Crowd, Part II / Dos son multitud, parte 2:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/41/twos-a-crowd-part-2/>
- **Juegos:**
 - **Shadow Shapes / Figuras de la Sombra:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/games/html5/2/shadow-shapes/>
 - **Paint Splat / Pintura Plas:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/games/10/paint-splat/>
 - **Night Light / Luz Nocturna:**
<http://PEEPandthebigwideworld.com/en/kids/games/html5/1/night-light/>
 - **Fish Swish / Pez Saltarín:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/games/4/fish-swish/>
 - **Flower Power / Flor Poderosa:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/games/5/flower-power/>
 - **Hop to It! / ¡Salta Encima!:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/games/7/hop-to-it/>
- **Videos de Acción en Vivo (Cada uno de estos videos, con familias reales, dura menos de 5 minutos):**
 - **Mixing Paint / Como mezclar pinturas:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/33/mixing-paint/>

- **Juicy Light / Luz jugosa:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/20/juicy-light/>
- **Shadow Puppets / Juguemos con títeres de sombras:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/61/shadow-puppets/>
- **Shadow Tracing / Creando sombras:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/66/shadow-tracing/>
- **Outdoor Shadows / Sombras al aire libre:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/21/outdoor-shadows/>
- **Recycled Reflections / Reflejos reciclados:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/150/recycled-reflections/>
- **Shifting Shadows / Como cambias las sombras:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/4/light-and-color/videos/85/shifting-shadows/>
- **Measuring Me / Midamos las alturas:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/70/measuring-me/>
- **Half Court / Media cancha:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/252/half-court/>
- **Sharing Snacks / Comidas compartidas:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/179/sharing-snacks/>
- **Lemonade Lessons / Las lecciones de la limonada:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/248/lemonade-lessons/>
- **Measuring with Footsteps / Medir con los pasos:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/40/measuring-with-footsteps/>

- **Using a Measuring Stick / Medir con una regla:**
<http://PEEPandthebigwideworld.com/en/kids/pathways/5/numbers-and-measuring/videos/43/using-a-measuring-stick/>

Paso 2: Hacer 2 Actividades practicas familiares

Favor de hacer **una** de las siguientes actividades junto a su familia:

<http://PEEPandthebigwideworld.com/en/parents/activities/by-theme/#act-4>

Después, favor de hacer **una** de las siguientes actividades junto a su familia:

<http://PEEPandthebigwideworld.com/en/parents/activities/by-theme/#act-5>

Cada actividad tomará desde un par de minutos hasta una hora y necesitará algunos materiales caseros de uso diario.

Appendix C: Treatment Group Post-test Survey (English and Spanish)

Appendix D: Control Group Post-test Survey (English and Spanish)