

Peep and the Big Wide World
**Season One Evaluation:
Television Series Final Report**

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TABLE OF CONTENTS

INTRODUCTION	1
EVALUATION GOALS	1
METHOD	2
OVERVIEW OF DESIGN	2
SELECTION OF THE PEEP EPISODES	3
ACTIVITY PROTOCOL AND RECORD	3
VIEWING DIARY	4
PARENT SURVEY	5
RESULTS	5
SAMPLE DEMOGRAPHICS	5
CHILDREN'S FLOATING AND SINKING EXPLORATIONS	6
AMOUNT OF TIME SPENT EXPLORING AND NUMBER OF INTERACTIONS	6
OVERALL USE OF MATERIALS	7
MAKING PREDICTIONS AND OBSERVING	8
PROBLEM-SOLVING	8
DISCOVERY ATTITUDE AND METHODOLOGICAL APPROACH	9
PARENTS' OPINIONS ABOUT PEEP AND OTHER CHILDREN'S TELEVISION PROGRAMS	10
BACKGROUND ABOUT CHILDREN'S TELEVISION VIEWING BEHAVIORS	12
LIMITATIONS OF THE STUDY	13
CONCLUSIONS	14

INTRODUCTION

Goodman Research Group, Inc. (GRG), an evaluation research firm specializing in the evaluation of educational programs, services, and materials, is conducting an evaluation of *PEEP and the Big Wide World* (PEEP). The primary focus of the evaluation is to assess PEEP's appeal and the extent to which the various components of PEEP (e.g., television series, Web site, and educators' print guide) contribute to encouraging children ages 3-5 years to engage in hands-on science explorations of their everyday environments.

GRG employed several data collection methods to assess PEEP, including a children's focus group, assessments of children's hands-on science explorations after viewing PEEP, and surveys about educators' use of the print guide.

The first data collection activity in this evaluation was a focus group with ten preschoolers in Cambridge, MA. The group discussion focused on children's reactions to a PEEP episode in terms of overall appeal, story comprehension, and understanding of the science objectives. The findings from this focus group were presented in a report submitted to WGBH in May 2004.

The second data collection activity, which comprises this report, consisted of a quasi-experimental study of children's hands-on science explorations and parents' opinions of PEEP compared to other children's television programs.

This report summarizes the findings from the quasi-experimental study. The findings are intended to provide WGBH with information about children's and parent's reactions to PEEP, and the influence of watching PEEP on children's hands-on science explorations.

EVALUATION GOALS

The primary objective of the quasi-experimental study was to examine the extent to which repeated exposure to PEEP would influence children's hands-on science explorations of their everyday environments. The aim of PEEP is to encourage and model science inquiry skills including asking questions, making predictions, observing, and problem solving.

The quasi-experimental design included two conditions: a treatment group of children who watched a minimum of three PEEP episodes in a one week period and a control group of children who did not watch PEEP.

The main research question assessed in this study was whether children exposed to PEEP would approach the science explorations differently than children who had not watched PEEP. More specifically, the study documented whether the two groups (treatment and control) differed in the extent to which they demonstrated science inquiry skills, including making predictions, observing, and problem solving.

METHOD

OVERVIEW OF DESIGN

GRG recruited 38 children in two U.S. geographic regions for in-home assessments that evaluated the extent to which children engage in the type of hands-on science explorations modeled in the PEEP television series.

Participating children were recruited using a variety of methods, including mailing flyers directly to a group of families that had participated in a previous evaluation by GRG, and posting flyers at libraries, restaurants, playgrounds, and grocery stores.

When a parent called to join the study, they and their child were randomly assigned to either the treatment or control group. In total, 20 children were assigned to the treatment group and 18 children were assigned to the control group. In return for their participation, parents and their children received a \$100 stipend and a PEEP poster.

Participants in the treatment group received one video with three episodes of PEEP on it and viewing instructions for the following week. Every PEEP episode consists of two animated stories, each followed by a live action segment with real children. Parents in the treatment group were instructed to have their child watch each of the three episodes at least once during the next seven days. Parents were provided with a viewing diary and asked to document the child's viewing schedule.

Seven days after receiving the PEEP episodes, a field researcher visited the homes to conduct two exploration activities with the child. The treatment group assessments began with the child watching the *Night Light* and *Fish Museum* episode. The field researcher then provided the child with the materials shown in each of the two live action segments in the *Night Light* and *Fish Museum* episode, and invited the child to engage in an open-ended exploration of the materials.

The two activities presented in the live action segments of the *Night Light* and *Fish Museum* episode were a floating and sinking exploration and shadow-making exploration. The materials included objects to sink and float (e.g., plastic bowls, rocks, rubber balls) in a shallow tub of water for the floating and sinking exploration, and a flashlight, paper cut outs, drawing paper, and crayons for the shadow exploration.

The order of the two activities was counterbalanced and the materials were presented one at a time in different rooms of the home so that a child would only be presented with one set of materials at a time. All explorations were conducted with one child at a time. Before the field researcher left the home, she collected the viewing diary from the parent and provided the parent with a survey to complete over the next few days.

Participants in the control group did not receive any videos to watch beforehand, however a field researcher visited their homes to conduct the identical exploration activities that were administered to the treatment group. Similar to the treatment group, parents in the control group were asked to complete a survey in the days following the assessment. Children in both groups were audio taped during the activities.

SELECTION OF THE PEEP EPISODES

The following criteria guided the selection of the animated stories and accompanying interstitials for the treatment group:

- The selected episodes were well suited to provide the children with an introduction to PEEP.
- The selected episodes included a balanced representation of the three main characters.
- The selected episodes included live action explorations that could feasibly be replicated in participants' homes.

Based on these guiding criteria, the following three PEEP episodes were selected for viewing in the week prior to the researcher's visit: *Save It For Later* and *The Red Ballmoon*, *Night Light* and *Fish Museum*, and *Under Duck* and *All Fall Down*. Participants received one videotape with all three episodes on it and were not asked to watch the episodes in any particular order.

The live action interstitials from the *Night Light* and *Fish Museum* episode were selected to be the stimulus for the in-home assessments. The *Night Light* interstitial showed several children tracing shadows under a light and making shadows outdoors with their bodies. The *Fish Museum* interstitial showed children exploring the concepts of floating and sinking with several different objects in a shallow pool of water.

ACTIVITY PROTOCOL AND RECORD

GRG developed parallel versions of the treatment and control activity protocols. Both versions are included in the Appendix. The protocols consisted of the following topics and guidelines:

- Purpose of visit
- Instructions for setting up each of the two explorations
- Exploration prompts
- Guidelines for concluding the explorations
- Frequently Asked Questions

Within two hours of the assessments, the researchers completed an activity record for each participating child. A copy of the activity record is included in the Appendix. Using a transcript, if needed, or by listening to the audiotape, the

researchers segmented each child's science explorations into discrete "interactions." An interaction was defined as a child's manipulation and use of a set of materials for some directed purpose. For example, the child may have selected and manipulated several of the materials for a period of time such as creating a particular kind of shadow or attempting to sink a particular object.

Rather than focus on how many times a child picked up one particular material, the field researcher focused her observations on each "interaction" that the child engaged in. Each time the child redirected his or her attention to a different exploration, problem, or goal, the researcher noted that the child was engaged in the next discrete interaction.

The following data were documented for each science exploration interaction:

- Presence or absence of specific terminology and vocabulary
- Description of the materials used
- Whether the interactions were initiated by the child or researcher
- Whether the child explicitly mentioned prior knowledge or experiences
- Predictions made and who initiated
- Observation made and who initiated
- Whether the interstitial concepts were mirrored in the interactions
- Whether the child initiated a question to explore
- Whether the child demonstrated problem-solving strategies, if applicable

The researchers were also asked to rate the child's approach and orientation to each exploration (*Fish Museum* and *Night Light*) on several dimensions. The dimensions were:

The child was...

- At ease with the researcher
- Talkative/Verbal
- Distracted
- Interested in the activity
- Engaged in the activity with a "discovery" attitude
- Methodical in his/her approach to the activity

VIEWING DIARY

Parents assigned to the treatment group were instructed to have their children watch each of the three episodes at least once in the seven days prior to the researcher's visit, and to complete a viewing diary. The viewing diary gathered information about how many times the children watched each episode, as well as when, where, and with whom the children watched the episodes.

PARENT SURVEY

At the conclusion of the home visits, parents were given a survey to complete within one to two days and to return to GRG using a postage-paid return envelope. Parents in both the treatment and control groups were given parallel forms of the survey. The difference between the surveys was that the treatment group surveys asked for parents' opinions as they related specifically to PEEP, whereas the control group surveys asked parents to consider their child's typical television programming in making their judgments. This distinction was necessary because the control group had not watched PEEP. The parent surveys (see Appendix) asked the following types of questions:

- Child and parent demographics
- Child behaviors that result from TV viewing
- The perceived educational value of children's TV programs

RESULTS

SAMPLE DEMOGRAPHICS

GRG recruited 38 participants (children ages 3-5 and their parents) from two U.S. geographic areas: Boston, MA and Minneapolis, MN. See Appendix for a sample of the recruiting letter. Table 1 displays the number of children grouped by location and condition.

Table 1
Participants by Condition and Location

	Treatment	Control	TOTAL
Boston, MA	10	8	18
Minneapolis, MN	10	10	20
TOTAL	20	18	38

Children's Demographics

The participants (N= 38) were an approximately an equal mix of boys and girls (51% girls and 49% boys), and were between three and five years old. It was determined in the pilot stage that the range of communication skills for three to five year olds varied widely, and the decision was made to include more four and five year olds than three years olds in the study. In this sample, 19% of the participants were three years old, 27% were four years old, and 54% were five years old.

The composition of the sample consisted of 87% White, 11% African-American, 8% Asian, and 5% Filipino. These percentages total more than 100% because some parents indicated multiple ethnicities for their children.

Sixty-nine percent of the children attended preschool or kindergarten, and 28% attended daycare at the time of the assessments.

Parents' Demographics

Eighty-nine percent of the parents who completed a survey were mothers of the children. Seventy-six percent of the parents reported an annual household income of \$75,000 or more, 16% of the households earn between \$50,000 and \$74,999, and 8% of participating households earned between \$20,000 and \$49,999.

The participating parents ranged in age from 25 to 54 years old, with 78% between the ages of 35 and 44. For the majority of parents (49%), the highest level of education completed was college. Five percent of parents indicated their highest degree was a High School diploma or GED, 3% had completed some college courses, 8% had completed some graduate courses, 16% had a Master's Degree, 14% had earned a Doctorate, and 5% had completed some other type of education.

CHILDREN'S FLOATING AND SINKING EXPLORATIONS

The findings reported here are drawn exclusively from the Fish Museum (floating and sinking) activity. For several reasons, the Fish Museum activity was a more viable test for the hypotheses. First, the Fish Museum activity produced a richer explorations and a greater range of behaviors in the children. In the absence of a variety of behaviors to examine, many hypotheses could not be tested with the Night Light activity. Second, there was consistent difficulty finding locations in the homes where it was dark enough to create the shadows necessary for the Night Light activity. The decision to include only the Fish Museum activity in the analyses was determined following an analysis of the Night Light activity records which included the researchers' ratings, the total number of interactions the children had within this activity, and the length of time they engaged in the activity.

AMOUNT OF TIME SPENT EXPLORING AND NUMBER OF INTERACTIONS

On average, children explored the Fish Museum materials for 12 minutes, with a range of 5-22 minutes. The treatment and control groups interacted with the materials for equal amounts of time.

As described earlier, each child's exploration of the Fish Museum materials was categorized in terms of discrete interactions. The number of interactions that children engaged in varied from three to fourteen interactions. On average, children engaged in seven interactions during the Fish Museum activity, and the mode was four. Children in the treatment and control groups did not differ in the number of interactions they had while exploring the Fish Museum materials.

After the child's interactions were entered into the activity record, the field researcher rank ordered each child's interaction with one representing the interaction with which the child was most engaged. The rationale behind the rankings was that since the children engaged in multiple interactions (average of seven) in a short amount of time (average of 12 minutes), it would be meaningful to have a sense for the relative engagement in the various interactions.

For each child, we isolated the interaction ranked number one (child most engaged with this interaction) and assigned the child a value between one and three. The number one was assigned if the first ranked interaction occurred at the start of the activity, a two was assigned if the interaction occurred in the middle of the activity, and three was assigned if the interaction occurred towards the end of the activity.

The treatment and control groups did not differ on this variable and the result is presented for the whole group. Forty-two percent of the children engaged in their first ranked interaction in the middle of the activity period, 37% of the children engaged in the first ranked interaction at the end of the activity period, and 21% of the children engaged in the first ranked interaction at the start of the activity.

As might be expected, this finding indicates that for most children, the start of the activity period was marked by a less engaged, more random manipulation of the Fish Museum materials, with the children's engagement with the materials peaking in the middle of the activity period before tailing off again towards the end.

OVERALL USE OF MATERIALS

For those children who were exposed to PEEP (treatment group), 64% of their interactions explored the materials in a way that was identical to what was shown in the live action interstitial (compared to 14% of the control group's interactions).

Further, 71% of the control group's interactions were marked by explorations that did not, in any way, resemble the explorations presented in the live action interstitial (compared to 13% of the treatment group's interactions).

Table 2
Overall use of materials

In what percent of interactions did children...	Treatment Group	Control Group
explore the materials exactly as shown in PEEP?	64%	14%*
explore materials in no way that resembled what was shown in PEEP?	13%	71%*

N = 38; * The mean ratings significantly differ at the level of $p < .01$

As presented in Table 2, this finding suggests that children in the treatment group were explicitly referencing what they had seen in PEEP during their science explorations and that the children not exposed to PEEP did not. As will be evident in the next section, this referencing was not simply a copying of the task, but rather involved a transfer of process skills.

MAKING PREDICTIONS AND OBSERVING

The central tenet of the study was to determine whether the two groups of children would demonstrate similar or different science inquiry skills when given identical materials to explore. In pursuit of this question, the researcher documented whether a prediction and/or observation was made at least once during an interaction, and if so, whether the child initiated it, as opposed to being initiated by the researcher. We then calculated the percentage of each child’s interactions that included child initiated predictions and observations.

As presented in Table 3, children in the treatment group initiated a prediction in 33% of their interactions whereas children in the control group initiated a prediction in 7% of their interactions. This difference is statistically significant.

With regard to making observations, children in the treatment group initiated one or more observations in 47% of their interactions, and control group children initiated observations in 16% of their interactions. As with the previous finding, this difference was statistically significant.

Table 3
Predictions and observations

In what percent of interactions did children...	Treatment Group	Control Group
initiate a prediction?	33%	7%*
initiate an observation?	47%	16%*

N = 38; * The mean ratings significantly differ at the level of $p < .01$

PROBLEM-SOLVING

In addition to influencing children’s initiation of predictions and observations, it was hypothesized that PEEP would model problem solving approaches to hands-on science explorations. As hypothesized, children who were exposed to PEEP (treatment group) initiated a problem to be solved in 71% of their interactions. As a comparison, the control group initiated a problem to be solved in 22% of their interactions, a difference that is statistically significant.

Further, children exposed to PEEP applied problem-solving strategies in 76% of their interactions and solved the problems 74% of the time. Children not exposed to PEEP applied problem-solving strategies in 34% of their interactions and solved the problems 31% of the time.

As summarized in Table 4, these findings suggest that the children exposed to PEEP during the prior week were significantly more likely to initiate a problem to be solved during their interactions, to apply problem-solving strategies in their interactions, and ultimately to solve the problems that were initiated.

Table 4
Problem-solving

In what percent of interactions did children...	Treatment Group	Control Group
initiate a problem?	71%	22%*
apply problem-solving strategies?	76%	34%*
solve the problem?	74%	31%*

N = 38; * The mean ratings significantly differ at the level of $p < .01$

DISCOVERY ATTITUDE AND METHODOICAL APPROACH

As an additional measure of whether the children in the two groups explored the identical materials in unique ways, the researchers rated the children's overall approach to the science explorations in terms of the extent to which the children engaged in the explorations with a "discovery" attitude. The researchers assigned each child a rating between 1 and 5 with 1 equal to *not at all* engaged with a discovery attitude and 5 equal to *extremely* engaged with a discovery attitude.

On average, children in the treatment group received a rating of 4.0, indicating that the researchers rated the children in the treatment group as being *very* engaged in the activity with a discovery attitude. Children in the control group received an average rating of 2.6, indicating that the researchers observed that these children were *somewhat* engaged in the activity with a discovery attitude.

Another dimension of interest was how methodical the child was during each interaction. For each individual interaction, the researchers assigned a rating between 1 and 5 to indicate how methodical the child was in that particular interaction. The individual ratings were then averaged for each child, resulting in an overall methodical rating for each participant.

On average, children in the treatment group were *somewhat* methodical in their approach to the interactions (Mean = 3.2) whereas children in the control group were *a little* methodical (Mean = 2.3). Table 5 presents both sets of average ratings.

Table 5
Discovery attitudes and methodical approaches

To what extent did the child engage in the activity with a...	Treatment Group	Control Group
discovery attitude?	4.0	2.6*
methodical approach?	3.2	2.3*

N = 38; * The mean ratings significantly differ at the level of $p < .01$

PARENTS' OPINIONS ABOUT PEEP AND OTHER CHILDREN'S TELEVISION PROGRAMS

Parents were asked their opinions about different facets of their child's television viewing. Parents in the treatment and control groups were asked similar questions except that control parents were asked to share their opinions about typical children's TV programs, while the treatment group parents were asked specifically about PEEP. For example,

- How effective is **the typical children's TV program** at providing children with ideas for hands-on activities? (Control Group)
- How effective is **PEEP** at providing children with ideas for hands-on activities? (Treatment Group)

Parents were instructed to rate their opinions using a 1-5 Likert scale, with 1 equal to *not at all*; 2 equal to *a little*; 3 equal to *somewhat/moderately*; 4 equal to *very*; and 5 equal to *extremely*.

As shown in Table 6, compared to the typical children's television programs, parents are significantly more likely to encourage their children to watch PEEP as well as make a recommendation to other parents that their children watch PEEP.

Table 6
Parents' Opinions

How likely are you to do the following?	Treatment Average	Control Average
Encourage your child to watch [PEEP / children's programs]	3.9	3.1*
Recommend [PEEP / children's programs] to other parents	4.2	3.2*
Watch [PEEP / children's TV programs] with your child	3.0	3.4
Visit [the PEEP / a children's] Web site with your child	3.3	3.1

N ranged from 35-38; * The mean ratings significantly differ at the level of $p < .01$

Seventy-two percent of treatment group parents said that they were *very* or *extremely* likely to encourage their child to watch PEEP again, and 75% of the

parents said that they were *very* or *extremely* likely to recommend PEEP to other parents.

The treatment and control group parents did not significantly differ in their likelihood of watching TV programs (typical programs and PEEP) *with* their children or visiting Web sites (the PEEP Web site or others) with their children.

Using a 1-5 scale with 1 equal to *not at all* effective and 5 equal to *extremely* effective, parents' ratings indicated that PEEP, compared to typical TV programs for children, is significantly more effective at providing children with ideas for hands-on activities, introducing science concepts to children, encouraging children to explore their surroundings, and using humor to keep children interested. Parents in the treatment and control groups did not significantly differ in their opinions about the effectiveness of PEEP and typical children's TV programs in including interesting characters.

Table 7
Parents' Opinions

How effective is the typical program / PEEP at doing the following?	Treatment Average	Control Average
Providing children with ideas for hands-on activities	3.9	2.4*
Introducing science concepts to children	4.1	2.7*
Encouraging children to explore their surroundings	4.1	2.8*
Using humor to keep children interested	4.5	3.9*
Including interesting characters	4.1	3.8

N = 38; * The mean ratings significantly differ at the level of $p < .01$

The following parallel sets of questions were asked of the treatment and control group parents. Treatment group parents were asked to rate the influences of PEEP on their children if their children watched PEEP on a regular basis, whereas parents in the control group were asked to rate the influences of their children's typical TV programs. All participants made ratings using a scale with 1 equal to *not influential*; 2 equal to *a little influential*; 3 equal to *somewhat influential*; 4 equal to *very influential*; and 5 equal to *extremely influential*.

As shown in Table 8, parents believe that PEEP, compared to typical children's TV programs, has a greater likelihood of influencing children 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 his/her surroundings.

Table 8
Parents' Opinions

How much would the program [PEEP vs. typical] influence the likelihood of your child:	Treatment Average	Control Average
Asking questions about how things work in the world	3.7	2.7*
Referring to the physical world (e.g., water light, sounds) when playing	3.8	2.8*
Showing curiosity for his/her surroundings	4.0	2.7*

N = 36; * The mean ratings significantly differ at the level of $p < .01$

Parents in the treatment group further communicated the value of PEEP with their response to the question: How does PEEP compare to other children's television programs that your child watches? Seventy percent of respondents (14 of 20) said that PEEP is much more educational for their child and an additional 30% (6 of 20) said that PEEP is equally educational for their child. No one reported that PEEP was less educational. Sixty percent of parents (12 of 20) also indicated that PEEP is equally entertaining and an additional 40% (8 of 20) said that PEEP is much more entertaining. No one said PEEP was less entertaining.

When asked to rate their overall opinions about PEEP and the typically available children's TV programs using the scale of 1 equal to *poor*; 2 equal to *fair*; 3 equal to *good*; 4 equal to *very good*; and 5 equal to *excellent*, the average rating for PEEP was 4.1 (*very good*), and the average rating for the typical children's TV program was 2.9 (*good*). The difference between these two ratings was significant at the level of $p < .01$.

BACKGROUND ABOUT CHILDREN'S TELEVISION VIEWING BEHAVIORS

Parents were asked to describe various aspects of their children's television viewing behaviors. Because the children's TV viewing behaviors were similar across the treatment and control groups, the findings are reported here for the two groups combined.

Fifty-eight percent of the children watched at least some TV seven days a week. Only one child did not watch any TV in a typical week, and the remaining children watched TV two to six days per week.

On a typical weekday, children watched TV for a range of time from not at all to four hours. Twenty-nine percent of the children watched between 0-30 minutes of TV per day, 33% watched one hour of TV, 25% of the children watched two hours of TV, and 11% watched 3-4 hours of TV on a typical weekday. A similar pattern was reported for the amount of time children spent watching TV on a typical weekend day.

For the next set of behaviors, parents were asked to indicate whether or not (yes/no) their child did the following:

Table 9
Children's TV Viewing Behaviors

	% Children Who Do
Asks for a particular TV show or channel	89%
Selects which DVD or video to watch him/herself	81%
Turns on the TV by his/herself	74%
Puts in a DVD or Video by him/herself	61%
Chooses which TV programs to watch him/herself	57%
Changes channels by him/herself	43%

As evidenced in Table 9, the children in this sample were familiar with television and video media and demonstrated a significant amount of independence in selecting TV and video programs for themselves. Parents indicated that their children were likely to request particular TV programs and videos, and to initiate watching TV programs and videos themselves. Parents also indicated that 62% of participants have access to The Learning Channel on cable television and 36% have access to Discovery Kids on digital cable television.

LIMITATIONS OF THE STUDY

As evidenced throughout this report, the findings from this study were very positive and the hypotheses were supported by statistically significant margins. In order to accurately interpret these findings, it is important to identify the presence of study limitations. There are three limitations to this study.

First, the researchers were not blind to the hypotheses. The following actions were taken to mitigate this limitation: (1) three researchers rather than one conducted the assessments to minimize researcher bias, (2) each researcher conducted both treatment group and control group assessments, (3) children's explorations were divided into individual interactions, thus providing more detailed data, and (4) the activity records were structured in such a way as to minimize subjective biases.

The second limitation is that the study did not have complete control over the intervention. The children in the treatment group were instructed to watch each of the three episodes at least once in a seven day period. Data from the viewing diaries suggest that all of the children watched each episode at least once in the week long period, with very few children watching any episode multiple times. This leads us to conclude that the intervention was generally consistent across the participants in the treatment group, however the study did not control for variables including whether the children watched the program alone or with others, the time of day that the program was watched, and the presence or absence of external distracting factors.

The third limitation is that the findings were drawn from one activity. The second activity, Night Light, proved to be an inappropriate exploration for this study (see earlier discussion). As a result, the extent to which the findings can be generalized is somewhat limited by this fact.

CONCLUSIONS

The overall conclusion from this study was that the PEEP television series provides children with a program that is educationally sound, and one that effectively models science process skills, including making predictions and observations, and problem-solving. When presented with identical materials to explore, children who had been exposed to PEEP demonstrated science inquiry skills not observed with children who were not exposed to PEEP.

The main conclusions of this quasi-experimental study were:

- Children who watched a minimum of three PEEP episodes in the week prior to the assessments were significantly more likely to initiate predictions and observations during their science explorations than were children who had not watched PEEP.
- Children exposed to PEEP during the prior week were also significantly more likely to initiate a problem to be solved during their interactions, to apply problem-solving strategies in their interactions, and ultimately to solve the problems that were initiated than were children who were not exposed to PEEP.
- Compared to the typical children's television programs, parents were significantly more likely to encourage their children to watch PEEP as well as make a recommendation to other parents that their children watch PEEP.
- Parents' ratings also indicated that PEEP, compared to typical TV programs for children, is significantly more effective at providing children with ideas for hands-on activities, introducing science concepts to children, encouraging children to explore their surroundings, and using humor to keep children interested.
- Parents also believed that PEEP, compared to typical children's TV programs, has a greater likelihood of influencing children 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.