IMPACT PLANNING • EVALUATION • AUDIENCE RESEARCH

SUMMATIVE EVALUATION:

SCIENCE IN PRE-K II

Prepared for
The National Air & Space Museum
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SUMMARY AND DISCUSSION

Findings from the study of the Science in Pre-K professional development program show that teachers had a positive experience and found the program useful to their teaching. However, findings also show that teachers may need continuing help integrating inquiry science lessons into their teaching.

SUCCESSES

Several areas of success are revealed in this study. First, respondents highly rated the program's usefulness to their teaching. Specifically, post-ratings were consistently higher than pre-ratings when respondents indicated the ways in which they had integrated Science in Pre-K concepts and strategies into their classroom set-up and lessons. For instance, ratings show that more respondents integrated open-ended science materials into their classroom after attending the program than before attending the program. Additionally, respondents indicated that students were more engaged post-program. For instance, post-responses suggest that students are engaged in a wider variety of inquiry science activities and are learning more about physical science post-program. And, while respondents' interest in learning and teaching about physical science was fairly high pre-program, this interest increased post-program.

Also encouraging is that two-thirds of respondents have shared their Science in Pre-K experience with others, mostly other teachers. One-third also recommended the program to others. This act of sharing is another indication of how they value the program and find it useful as Pre-K teachers.

AREAS FOR GROWTH

Teachers still need assistance integrating inquiry science into their classroom pedagogy. While all respondents integrated inquiry science lessons since participating in the program, the majority do so on very infrequently (once or less than once per month). The majority also indicated that they have not sought out additional inquiry science resources since participating in the program (including visiting the Science in Pre-K web site). Findings do not suggest any program-specific barriers that would result in this low level of integration, as respondents rated their enjoyment of the science lessons high. They also seem comfortable teaching existing Science in Pre-K lessons, modifying those lessons, or designing new ones. And, they seem comfortable teaching a variety of inquiry lesson types, including open-ended and focused explorations. What may be more likely is that their barriers are outside of NASM's control (such as other professional priorities). However, it may be worth exploring specific barriers so that NASM can consider strategies for addressing them during or after programming.

STUDY BACKGROUND

The National Air & Space Museum (NASM) contracted Randi Korn & Associates, Inc. (RK&A) to conduct a summative evaluation of its Science in Pre-K program, a PNC Bank-funded onsite and online teacher professional development program that supports District of Columbia Public Charter Schools' (DCPS) preschool teachers in teaching science through exploration and problem solving. This evaluation is a continuation of a planning and evaluation project initiated in 2013. In 2013, RK&A helped NASM determine realistic strategies and next steps for scaling up its *Science in Pre-K* program, which included two literature reviews, an evaluation plan, and an assessment of DCPS teachers' experiences with an initial phase of the program.

The objectives of the evaluation are to explore the following before/after participation:

- participants' attitudes about teaching science (and physics in particular);
- participants' classroom environment and set-up;
- participants' strategies and methods for teaching physical science; in addition to
- participants' professional characteristics (years in the teaching profession, past experiences with professional development, age of students, etc.).

METHODOLOGY

Surveys were completed by program participants before and after participating in Science in Pre-K (see Appendix for the survey). NASM sent an e-mail to program participants with a link to complete the survey online through SurveyMonkey©. Participants who consented to participate on the first page of the survey were invited to complete the survey in its entirety.

DATA ANALYSIS AND REPORTING

Survey data are quantitative, generated from multiple choice and rating scales. Quantitative data are analyzed statistically using SPSS 20 for Windows. Quantitative analyses conducted include:

- Frequency distributions (e.g., percent of respondents who teach three-year-olds).
- Summary statistics (e.g., ratings).

Inferential statistics (used to examine the relationship among variables) were not calculated as the respondent sample is too small to draw meaningful relationships. However, we note positive differences in respondents' ratings from the pre-/post-sample.

PROGRAM PARTICIPANT SURVEYS

RK&A collected a total of 12 pre- and 15 post-program surveys from participants in Science in Pre-K. NASM facilitated the program, consisting of five professional development sessions and two in-classroom mentoring sessions, at the participants' school between August 2015 and April 2016. The total number of participants was 60 (30 teachers and 30 assistant teachers), so the sample represents approximately 20 to 25 percent of the population.

PARTICIPANT TEACHING CONTEXT

Respondents primarily use the Scholastic Big Day curriculum (67 and 73 percent respectively). Respondents also have been teaching for 10 years or less (91 and 86 percent respectively), and the majority of students they teach are three years of age (75 and 67 percent respectively).

TABLE 1

Curriculum	% of Pre-respondents	% of Post-respondents
Scholastic Big Day	67	73
Houghton Mifflin	25	13
Creative Curriculum	8	0
Journeys	8	7
Teaching Experience (years)	**% of Pre-respondents**	**% of Post-respondents**
0 – 5	55	43
6 – 10	36	43
11 – 15	9	7
16 – 20	0	0
21+	0	7
Age of Students	**% of Pre-respondents**	**% of Post-respondents**
Three-year olds	75	67
Four-year olds	25	53
Five-year olds	25	27

AFFECT OF SCIENCE IN PRE-K (PRE-/POST-DIFFERENCES)

Pre- and post-respondents completed the same set of questions before and after participating in Science in Pre-K. Differences between the two samples are presented after each table.

AFFECT ON TEACHING CONTEXT AND APPROACH

Respondents were asked to rate nine statements about their classroom context and teaching approach before and after participating in Science in Pre-K on a scale from 1, "Strongly disagree," to 7, "Strongly agree."

TABLE 2

Scale: 1 = Strongly disagree to 7 = Strongly agree

Rating of Classroom Context and Teaching Approach	Pre-respondent Mean Rating	Post-respondent Mean Rating
I provide a variety of open-ended science materials at choice times	4.2	6.1
I provide building and/or sensory and/or nature exploration materials in choice areas	4.8	5.8
I facilitate discussions with students that have them reflect about science ideas and activities (e.g., Science Talks)	4.7	5.5
My classroom set-up includes inquiry science centers	4.9	5.3
My classroom set-up includes inquiry science opportunities in non-science centers (literacy, math, etc.)	5.0	5.3
My classroom displays students' science work for them and others to see	4.8	5.1
My curriculum includes science activities focused on many different topics (water, air, etc.)	4.7	5.0
I post photographs for inspiration at block centers and water tables	4.4	4.8
I post science questions, wonderings, and/or challenges around the classroom	4.3	4.8

PRE-/POST-SAMPLE DIFFERENCES

All the mean ratings increased from the pre- to post-respondent sample. The mean rating with the biggest increase is respondents' ratings of the statement, "I provide a variety of open-ended science materials at choice times." Post-respondents rated this much higher than Pre-respondents (mean = 6.1 versus 4.2).

PERCEIVED AFFECT ON STUDENTS

Respondents were asked to rate five statements about students' engagement and interest in science activities before and after participating in Science in Pre-K on a scale from 1, "Strongly disagree," to 7, "Strongly agree."

TABLE 3

Scale: 1 = Strongly disagree to 7 = Strongly agree

Rating of Affect on Students	Pre-respondent Mean Rating	Post-respondent Mean Rating
My students engage in a variety of different science activities on a weekly basis	4.0	5.4
My students are learning a lot about physical science	4.3	5.4
My students engage in a variety of different science activities on their own (i.e., child-directed)	4.0	5.2
My students reflect on their science ideas and activities through drawing or collage	4.6	5.2
My students are very interested in physical science	4.5	5.2

PRE-/POST-SAMPLE DIFFERENCES

All the mean ratings increased from the pre- to post-respondent sample. The mean ratings with the biggest increase are respondents' ratings of the statements:

- **My students engage in a variety of different science activities on a weekly basis.** Post-respondents rated this much higher than Pre-respondents (mean = 5.4 versus 4.0).
- **My students are learning a lot about physical science.** Post-respondents rated this higher than Pre-respondents (mean = 5.4 versus 4.3).
- **My students engage in a variety of different science activities on their own.** Post-respondents rated this higher than Pre-respondents (mean = 5.2 versus 4.0).

AFFECT ON INTEREST IN PHYSICAL SCIENCE

Respondents were asked to rate two statements about their interest in learning about and teaching physical science before and after participating in Science in Pre-K on a scale from 1, "Strongly disagree," to 7, "Strongly agree."

TABLE 4

Scale: 1 = Strongly disagree to 7 = Strongly agree

Rating of Affect on Science Interest	Pre-respondent Mean Rating	Post-respondent Mean Rating
I am very interested in learning about physical science	5.8	6.5
I am very interested in teaching my students about physical science	5.8	6.5

PRE-/POST-SAMPLE DIFFERENCES

Both sets of mean ratings increased from the pre- to post-respondent sample (mean = 6.5 versus 5.8).

POST-RESPONDENT RATINGS AND TEACHING BEHAVIORS

Post-respondents completed several questions about their experience with Science in Pre-K, the types of inquiry science lessons they teach, and their interest in inquiry-based teaching overall. Their responses are presented below.

OVERALL EXPERIENCES WITH SCIENCE IN PRE-K

Respondents were asked to rate one statement about their overall experience in Science in Pre-K on a scale from 1, "Not at all useful to my teaching," to 7, "Very useful to my teaching." Overall, respondents indicated that their Science in Pre-K experience was useful to their teaching (mean = 6.2).

TABLE 5

Scale: 1 = Not at all useful to my teaching to 7 = Very useful to my teaching

Rating of Experience	Mean Rating
My overall experience with Science in Pre-K was …	6.2

COMMUNICATION WITH OTHERS ABOUT SCIENCE IN PRE-K

Of respondents, 69 percent communicated with others about Science in Pre-K since participating. All of these respondents communicated with other teachers, and one-half communicated with parents.

TABLE 6

Communication with Others	% of Respondents
Yes	69
Who with?	**% of "Yes" Respondents**
Other teachers	100
Parent(s)	56
Administrator(s)	22

Of respondents, 31 percent recommended Science in Pre-K to others since participating. All of these respondents recommended the program, and one-half recommended the web site.

TABLE 7

Recommended to Others	% of Respondents
Yes	31

Which did you recommend?	% of "Yes" Respondents
Science in Pre-K program	100
Science in Pre-K web site	50

VISITATION TO SCIENCE IN PRE-K WEBSITE

Of respondents, 15 percent visited the Science in Pre-K web site since participating. None of these respondents downloaded any materials to use in their classroom.

TABLE 8

Visited the Web Site	% of Respondents
Yes	15

FACILITATION OF INQUIRY SCIENCE LESSONS

Post-respondents completed several questions about their experience facilitating inquiry science lessons, including frequency and type. Their responses are presented below.

FACILITATION FREQUENCY

Since participating in Science in Pre-K, all respondents have facilitated inquiry science lessons in their classrooms. About one-third of these respondents facilitate lessons less than once a month, and another one-third facilitate lessons once a month.

TABLE 9

Facilitated Inquiry Science Lessons	% of Respondents
Yes	100
About How Often?	**% of Respondents**
Less than 1 time/month	42
1 time/month	33
1 time/week	17
More than 1 time/week	17

FACILITATION TYPE

Of respondents, about one-half facilitated existing Science in Pre-K lessons, another one-half facilitated new inquiry science lessons, and about one-third modified and facilitated an existing Science in Pre-K lesson.

TABLE 10

Best descriptor of Inquiry Science Lessons	% of Respondents
Existing Science in Pre-K lesson(s)	58
New lesson(s)	50
Modified Science in Pre-K lesson(s)	42

Of respondents, about two-thirds facilitated open and focused explorations for their inquiry science lessons, and one-quarter mostly facilitated open explorations.

TABLE 11

Type of Inquiry Science Lessons	% of Respondents
Open and Focused Explorations	62
Open Explorations	23
Focused Explorations	15

FACILITATION INTEREST

Respondents were asked to rate their experience teaching inquiry science lessons on a scale from 1, "Not at all enjoyable," to 7, "Very enjoyable." Overall, respondents indicated that their experience teaching inquiry science lessons was very enjoyable (mean = 6.4).

TABLE 12

Scale: 1 = Not at all enjoyable to 7 = Very enjoyable

Rating of Experience	Mean Rating
Teaching inquiry science lessons was …	6.4

FURTHER INTEREST IN SCIENCE AND INQUIRY PROFESSIONAL DEVELOPMENT

Post-respondents also completed questions about their further interest in professional development opportunities related to science and/or inquiry-based science. Most respondents did not seek out professional development related to inquiry science (92 percent); the majority has not sought out resources related to inquiry science (54 percent); and, two-thirds have not helped teachers integrate inquiry science in their classrooms (69 percent).

TABLE 13

Inquiry Science Professional Development	% of Respondents
No	92
Yes	8

Inquiry Science Resources	% of Respondents
No	54
Yes	46

Helped Other Teachers Integrate Inquiry	% of Respondents
No	69
Yes	31

APPENDIX

Removed for proprietary purposes.