



EXECUTIVE SUMMARY OF RESEARCH

CHILDREN AND FUN SCIENCE:

THE IMPACT OF PLAYTIME IS SCIENCE ON YOUNG CHILDREN

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EXECUTIVE SUMMARY

The Program

Playtime Is Science (PS) is an early childhood, hands-on science program that creates partnerships between school, home, and community, involving teachers, administrators, care givers, parents and other family members. It encompasses a process where children are encouraged to wonder, question, and experiment -- in short, to start thinking like scientists everyday. Playtime Is Science stresses that teachers and parents know more science than they think, and so can play an important role in helping children gain interest, confidence, and competence.

The program incorporates science and scientific thinking into children's daily routines through a series of inquiry-based activities using inexpensive and recyclable items familiar to almost every home and classroom -- cooking oil, plastic bottles, empty boxes, old socks. It reinforces the connection between children's play and science learning. The activities focus on the physical sciences, an area often neglected at the early childhood and elementary levels, and help children to develop higher order thinking skills — problem solving, creative thinking, and decision making.

The Study

This two and a half year study of the impact of PS was conducted in a small upstate New York town which we will call Middletown and in a midwestern city we will call New City. In Middletown students were followed through kindergarten and first grade (September 1993 through May 1995), while New City students were followed through the kindergarten year (September 1994 through May 1995). In both sites the Playtime Is Science school was matched with a school serving a comparable population. In addition, in Middletown, data was collected from kindergarten students in the PS school from the year before PS was introduced (May 1993). In each site one group of children participated in PS as well as their regular school program while the second group of children at each site had no PS. At both PS sites parents came in at least monthly to work with students to do PS activities. In addition, teachers in PS sites did PS activities with students along with other hands on science.

At the beginning and end of each school year students were interviewed about what they did, learned, liked and disliked in school as well as on what science was, who did science, if they did science and if they liked science. In addition, students participated in three performance assessments:

- mystery bags/boxes, where students figured out what was in their box/bag and were questioned about what they had done and why
- sink/float with water and different objects year I and different liquids year II where they made predictions and were questioned about their predictions and the reasons behind their predictions
- classification tasks, where students made groupings and were questioned as to what their groupings were and how the groups were similar and different.

Kindergarten data was available from a total of 114 PS children and 45 control children. First grade data was available from a total of 55 PS children and 19 control children, while kindergarten and first grade data was available from 55 PS children and 13 control children.

The Results

- I. PS students are more science aware.
 - a. After being in PS a year, PS kindergarten students are about twice as likely than control students to refer to science/math areas as what they learn and like to do in school.
 - b. After being in PS, more PS kindergarten and first grade students than control students give logical definitions of science.
 - c. After being in PS, PS kindergarten and first grade students are more apt than control students to say that they and their class do science.
 - d. After being in PS, PS kindergarten and first grade students mention significantly more people who they say "do science" than control students.
- II. In some science areas, PS appears to reduce gender differences while all gain.
 - a. At the beginning of kindergarten, boys are more apt than girls to say they do science. However after the kindergarten year there are no gender differences. PS girls who say that they do science increased from 51% to 87% and PS boys increased from 66% to 86%. There was no change in the percentage of girls within the control group saying that they do science (55%), while the percentage of boys in the control group saying they do science decreased from 74% to 59%.
 - b. Initially, both PS and control boys were slightly more apt than girls to say that they do science at home. After PS, both PS boys and girls are more apt to say that they do science at home. PS gender differences were close to eliminated (64% vs 61%). Control group differences were exacerbated over time, ending with 70% of the control boys and 35% of the control girls saying they do science at home.

- III. In one of the two sites, PS students became better and more aware problem solvers, at least in relation to the mystery bags/boxes activity, during both of the years they were tested. This was not the case during the one year the students in the second site were tested.
 - a. After PS, upstate New York PS kindergarten and first grade students use more senses to figure out their answers than do control students
 - b. After PS, upstate New York PS kindergarten and first grade students report using more strategies to figure out the answers than do control students
 - c. After PS, upstate New York PS kindergarten and first grade students are more apt to figure out what object was in the bag.
- IV. After PS, students are more apt to answer science-related "why" questions.
 - a. In mystery bags/boxes, PS students in upstate New York significantly increased the number of their answers to "how" and "why" questions while control student answers remained about the same.
 - b. After PS there was a decrease in the number of PS students having no answer to "why" questions while there was no change in control students.
 - c. After the kindergarten year, PS students were more apt to give answers to why they thought something would sink or float than were control students.
 - d. After the first grade year, a greater number of PS and control students gave answers to why things sink and float than had in the beginning. However, by the end of first grade, PS students were much more apt than control students to attribute sink/float behaviors to the different liquids.
- V. There were few differences among PS and control students during the kindergarten or first grade years in grouping and classification, perhaps because unlike the other activities, there was little direct mapping between PS and the activity.
- VI. Not surprisingly, after being in school and growing older, all students, PS and control, list a greater number of things that they do, learn and like in school.