



**INSTITUTE FOR
Learning Innovation**

**NEW YORK HALL OF SCIENCE
Phase 1: Assessing the Impact of an After-School Program**

**Submitted by:
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June 2001

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EXECUTIVE SUMMARY

The New York Hall of Science (NYHS) engaged the Institute for Learning Innovation, an Annapolis, MD-based non-profit learning research organization, to conduct an evaluation study of two education programs. This study was designed to be carried out in two phases: Phase I examined the impact of the after-school programs on participants in grades 5-8; and Phase II will assess the long-term impact of participation by high school and college students in the NYHS Science Career Ladder program. This report summarizes the findings of Phase I of the study.

Specifically, the Institute implemented a quasi-experimental post-only evaluation design and compared a sample of 5th-8th grade students who participated in the NYHS after-school program (treatment group) to a sample of 5th-8th grade students from the same schools who did not participate in the NYHS program (control group). The guiding research question for this phase of the study was to assess how participation in the NYHS after-school program has impact on students in the areas of:

- Attitude towards, interest in, and/or perception of science and scientists
- Personal goals and aspirations
- Leisure time choices

Data from students were collected in a way that had the most ecological validity, in other words, in a manner that most closely resembled the natural ways that students thought about and experienced science at the Hall. Students in both treatment and control groups were asked to participate in a three-part experience at the NYHS that included: 1) an initial discussion followed by a hands-on activity; 2) an exhibition visit where students were allowed to spend some free time; and 3) a closing discussion.

Data were collected from students via focus group-like conversations, pencil-and-paper surveys, and observations. In addition, parents whose children have participated in the NYHS after-school program were asked to participate in one of two focus groups about their perceptions of the program and the benefits it has on their children. All data were gathered over a period of 2 days on March 15 and 16, 2001.

The findings of this study revealed that the NYHS after-school program provided children with rich and meaningful experiences. Children who participated in the NYHS after-school program demonstrated a greater interest in and more positive attitude towards science than did students not involved in the program. Similarly, the parents of the participants also noted that their children were increasingly eager to go to the after-school program because, as one mother put it: “he tells me he’s learning a lot here.” This finding is particularly important in light of the fact that for many parents, the initial motivation to bring their children to the program had more to do with the safe, interesting, and child-friendly environment the NYHS represented, rather than any expressed interest in science.

In terms of children’s leisure time choices, the data suggest that all children liked to play computer games, surf the web, watch television, and socialize with friends. Children said they liked doing things on the computer because they enjoyed learning. Television was also a source of entertainment, but a few children said they learned from watching television. Socializing was a favorite activity as well, which makes sense, given that establishing peer relationships is a very important developmental stage for the older elementary and middle school child. A notable difference between children who participated in the NYHS after-school program and those who did not was in their attitudes towards reading and homework as a leisure option. In particular, students who participated in the after-school program were more likely to express interest in reading than were non-participating children.

Observations of participating and non-participating children during a hands-on science activity and free-time in an exhibition suggests that the NYHS after-school program contributes to students’ ability to work together whether or not they know each other. There was also some evidence from Institute observations to support the idea that participation in the program helps children to develop their problem-solving skills. In addition, the children who participate in the NYHS after-school program seemed to be more focused and engaged in an interactive exhibition.

Reports from parents strongly supported the findings from the observations and focus group discussions with children in the treatment group. Parents were wholeheartedly and enthusiastically complementary of the NYHS after-school program. They provided many specific examples of ways in which their children benefited both educationally and socially from participation in the program. Given these parents strong interest in providing quality after-school experiences for their children, the most frequent suggestion for improvement in the after-school program was to allow their children to come more than once a week.

In terms of other recommendations to improve the NYHS after-school program, the Institute would suggest that this might be a good time to begin providing some parent involvement sessions to teach parents how to further support their child’s interest in science. In particular, previous research by the Institute suggests that many parents do not understand the importance of experimenting, that is they often consider it “mess-making” and not learning. When parents are also provided with experiences where they

are invited to engage in hands-on experiments, they gain in their understanding of the learning process in which their children participate.

Also, improving communication with the schools and schoolteachers so that information about NYHS programs gets distributed to students and their parents is an important task that should be undertaken. At the same time, it will be necessary to consider that such a marketing effort may increase the demand for the after-school program, which would require an increased supply of spaces and program facilitators. This then creates other problems related to how children are selected for inclusion in the program. If the NYHS began to charge a fee for the after-school program, this would certainly lessen demand. Furthermore, depending on the amount charged, a fee would probably begin to lessen the diversity of students in the group—and currently, it is the economic, social, and ethnic diversity of the participants that is one of the greatest strengths of the NYHS after-school program.

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INTRODUCTION

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Specifically, the Institute implemented a quasi-experimental post-only evaluation design and compared a sample of 5th-8th grade students who participated in the NYHS after-school program (treatment group) to a sample of 5th-8th grade students from the same schools who did not participate in the NYHS program (control group). The guiding research question for this phase of the study was to assess how participation in the NYHS after-school program has impact on children in the areas of:

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METHODS

Data from students were collected in a way that had the most ecological validity, in other words, in a manner that most closely resembled the natural ways that students thought about and experienced science at the Hall. A quasi-experimental post-only evaluation design was developed and included the following groups:

- **Treatment Group:** 6-10 children in grades 6-8 who have participated consistently in the NYHS after-school program for three of the last five semesters.

- **Control Group #1:** 6-10 children in grades 6-8 who have participated in their school's after-school program for three of the last five semesters.
- **Control Group #2:** 6-10 children in grades 6-8 who have not participated in any after-school program during the last 5 semesters.
- **Parent Focus Groups:** two groups of 10-15 parents of NYHS after-school program participants.

The NYHS staff was responsible for identifying and recruiting treatment and control groups, as well as arranging for students to visit the NYHS on the scheduled days for the evaluation. The NYHS staff was also responsible for recruiting and organizing the two parent focus groups.

Students were asked to participate in a three-part experience at the NYHS that lasted for a total of 50 minutes.

1. Initial Discussion and Activity: Prior to the visit to the NYHS, treatment and control group students participated in focus groups where researchers interviewed students as to their interest in science, leisure time choices, and career interests (See Appendix A for the pre-visit focus group protocol). In addition, children were asked to complete a written activity rating instrument (See Appendix B for a copy of the survey). In addition, students were led by NYHS staff in a hands-on science experiment, Float & Sink. Researchers observed the ways that students solved problems and worked together (See Appendix C for a copy of the observation protocol).

2. Exhibition Visit: Institute researchers observed all three groups during 20 minutes of free time in the Psychology exhibition. Researchers were looking for the degree and quality of peer-to-peer and child-to-explainer social interaction, as well as evidence of group problem-solving skills (See Appendix C).

3. Closing Discussion: At the end of the students' experience, the Institute researchers led a discussion where children were asked to reflect on their time and activities at the NYHS (See Appendix A for the post-visit focus group protocol).

In addition, parents whose children have participated in the NYHS after-school program were asked to participate in one of two focus groups that lasted about 50 minutes each. Researchers were interested in learning more about parents' perceptions of the impact the NYHS after-school program had on their children's attitudes towards and interest in science (See Appendix D for a copy of the parent focus group protocol). All data were gathered over a period of 2 days on March 15 and 16, 2001.

FINDINGS

The Institute collected data from a total of 25 students and 30 adults:

- Treatment Group: 7 students who had attended the NYHS after-school program for at least 2 semesters (all Hispanic; 5 boys and 2 girls – ranged from grades 4-7);
- Control Group #1: 8 students who were not currently attending any after-school program (all Hispanic; five boys and three girls – ranged from grades 2-8);
- Control Group #2: 10 students who were attending an after-school program at their school (all Asian and all female – from grades 7-8).
- Parent Focus Groups: 30 adults whose children participated in the NYHS after-school program (27 Hispanic, 2 Indian, 1 African American; 29 were female, one was male).

There were some inequities in the demographic profiles of the control groups that reduced the ability to compare them to the treatment group. Specifically, control group #1 included students from a wide range of grade levels and control group #2 students were all in the 7th or 8th grade. In addition, all the students in control group #2 were female and of Asian background. Nevertheless, comparisons could sometimes be made and some very useful findings were revealed.

A. Student Attitudes Towards Science

All but one of the students in the treatment group self-reported that they were “more interested” in studying science compared with other subjects they study in school. By comparison, half of the students in control group #1 reported feeling “more interested;” the other half said they felt “less interested” or “about the same.” All ten of the students in control group #2 indicated that their feelings about studying science remained “about the same” as that of other subjects. This is an encouraging finding that strongly suggests that NYHS after-school students like to study science in school.

When asked in the focus group about their favorite thing about science, treatment group students mentioned that they enjoyed hands-on, interactive science experiences such as, “mixing stuff up,” “learning about rockets and what poisons do to people,” and “doing projects, like making ice cream.” When asked about things they did not like as much about science, treatment group students had a variety of answers such as, “when your projects don’t work out and sometimes it explodes and it gets all over you,” “the problems are too hard,” and “when you have to make something.”

By comparison, control group #1 students indicated that they liked doing experiments but could not explain or elaborate further. They strongly stated that they did not like “book

science,” which in their perception comprised the majority of school science instruction. Control group #2 students said they enjoyed learning about weather and pressure, concepts they were currently studying in school. When asked what they did not like about science, they said they found science “hard” because “you must use your brain” and “you have to think.”

A. 1) Student Interest in and Behavior during Hands-On Science Activity

As part of the three-part evaluation, researchers observed students as they participated in a hands-on science activity. During this activity, students watched as a NYHS facilitator demonstrated how different things float and sink, and then asked the students to do experiments with things that float, sink, and partially float and sink (“flink”). Institute researchers observed the children as they worked on the task, first noting how they oriented to the problem-solving task and how they oriented and interacted with each other and/or the adult facilitator.

All three groups appeared to enjoy this task and eagerly joined in. There were some differences between the treatment group and control group #1, but no discernible differences between the treatment group and control group #2. The treatment group students interacted with each other as if they knew each other fairly well, although, in fact, several of the participants attended the NYHS after-school program on different afternoons, and therefore did not really know each other. The girls in control group #2 were all very good friends and clearly demonstrated well-developed patterns of social interaction. Thus, the treatment group and control group #2 looked very similar in the way the students worked with each other. This finding suggests that the NYHS after-school program positively contributes to the way students learn to work together. The students in control group #1 did not know each other very well, but unlike the students in the treatment group, they were much more hesitant and restrained in the ways they oriented both to the task and to each other.

On the whole, the treatment group and control group #2 students oriented quickly, first listening to the facilitator’s instructions about things that float, sink, or “flink,” and then immediately experimenting with their materials. The students immediately figured out that they needed to put things together in order to create something that would “flink”—they began by putting a couple of items together, and then continually added to them. Students in control group #1 seemed to enjoy the task but were slower to respond to the directions and more timid about testing their assumptions.

Students in the treatment group and control group #2 began working together to find things that would “flink.” They took turns experimenting, building on each other’s ideas, and also talked among themselves about results, working together to progress with the task. They clearly worked by trial and error, putting things together, then putting their creations in the water, watching them float or sink, then pulling them out of the water,

and adding something else. In addition, there was visible evidence that the students were making predictions as they went – the researcher overheard several children commenting, “Oh, that will sink probably” or “I bet that will still float.” The fact that the girls in control group #2 talked to each other in Chinese, made it impossible for the researcher to understand what they were talking about but their actions strongly indicated that their discussions were focused on how to solve the problem. Several of the pairs came up with very creative solutions to making an object that would “flink.” Students in control group #1 were generally quiet. When they spoke at all their voices were very low. The students in all three groups interacted little with the explainer. After she gave them their instructions they went about experimenting on their own, with only a few students asking a question or two.

A. 2) Student Interest and Behavior in the Exhibition

After participating in the hands-on activity, all three groups of students were invited to visit the exhibition by the American Psychology Association. The students were told they could spend 20 minutes doing whatever they wanted in the exhibition. Institute researchers observed the ways the students oriented to the space and interacted with exhibit stations, as well as noted the nature of their social interactions with each other and with NYHS staff. The observations revealed that there were fairly substantial differences in the ways that each of the three groups experienced the exhibition.

Overall, the treatment group students appeared fairly focused at the exhibit at which they stopped – there was little evidence of the “ping-pong” effect during which children run from one place to another. When the students were first “let loose” in the exhibition, they quickly dispersed into small groups of 2-3 at various exhibits. The two girls in the group stayed together most of the time, while the group of five boys stayed together for at least half of the time. The students spent between 30-60 seconds at each station, appearing to engage in serious attempts to try and figure the exhibit out, either by doing something (e.g., running a finger through the IQ maze, turning the Interference panel repeatedly, building shapes, or playing the interactive game), or by watching other visitors do something there.

In each of the cluster of children in the treatment group, there were many visible signs of social interactions: the children worked together to figure out what to do at an exhibit, they watched each other interact with an exhibit component, they laughed together, discussed things together, and played together. As was the case in the Float and Sink activity time, the Institute researcher observed that the students interacted together as though they were very familiar with each other. Some of the students displayed problem-solving skills while they were in the exhibition. In one of the more salient examples, two boys were observed engaged in figuring out the interactive game. At first, the boys did not appear to understand what they were supposed to do at the game, but together they read the instructions and pieced it together. The same thing happened with two girls

when they approached the Chinese Character drawing. They worked together to figure out what they were supposed to do, and then did it.

Treatment group students did not interact much with the NYHS staff, or she with them. Although she told them that they could ask her questions, the students did not approach her or asked any questions. For her part, the facilitator sat down and did not talk with the children—other than to tell them not to crawl inside a large tent that was in the corner of the exhibition—until it was time to leave the exhibition.

The behavior of students in control group #1 was generally less engaged than that of the treatment group. They drifted rather quickly (ping-pong effect) from one station to the next, not focusing on any one station for more than a few seconds. The only exhibit that held their interest for any considerable length of time was the Magic Carpet. These students quickly showed signs of boredom. They did not engage with the NYHS staff person but did wander over to where the researcher was sitting and wanted to know how long they had to stay in the exhibition.

The students of control group #2 tended to move through the exhibition as one big group. They alternately hesitated, squealed with delight, and hung on to each other. The Magic Carpet station intrigued them the most. At first they just hung around the edges watching what other people did, then eventually jumped in and fully interacted with the exhibit. There was a fair bit of bouncing from one station to the other, trying things quickly. But after the first 10 minutes, some girls would come back to stations to explore them more fully. They were all very interested in the station that had Chinese writing. Occasionally, one girl would break away from the group to wander around but was constantly attentive to what the larger group was doing. These “loners” would either very quickly re-join the group or be called back into it by the others. There was some evidence of problem solving but the majority of their behavior could be classified as orienting to the space.

B. Student Attitudes Towards Leisure Time Choices

Students were asked to indicate the level of interest they had in various leisure time activities. In particular, students rated how much they liked to do specific activities including: playing computer games/surfing the Internet, reading, playing sports/doing exercise, watching TV, visiting places, hanging out with friends/family, building/fixing/creating things, doing homework, participating in clubs, doing church activities, and playing instruments/dancing. Students were asked to rate the extent to which they like doing those activities on a four-point scale, where 4 = “very much interest” and 1 = “no interest.”

There were several common leisure activities across the treatment and control groups. All three groups indicate high interest in playing computer games, watching television, and

socializing with friends or family. They liked computers for various reasons. Surfing the web was very interesting to students because they got to find out things, it was fun, and, for some children, it was a social activity. Students like watching television because they considered it their entertainment and some said they learned from watching certain shows. Socializing was considered fun and important to all the children. All three groups were also less interested in building, fixing, or creating things. This is an interesting finding given that students liked hands-on science. Perhaps the phrase “build, fix, or create things” did not, in their minds, relate to conducting experiments in science activities.

The areas where treatment and control groups differed were both predictable and surprising. The treatment group and control group #1 students were slightly more interested in sports and exercise than were the students in control group #2, which is not too surprising since control group #2 consisted of all girls. However, half of the girls in control group #2 did note they had “some” interest in sports or exercise. In addition, a number of students in the treatment group and control group #1 indicated that sports and exercise were one of their top three favorite things to do because it was a healthy thing to do, it gave them good exercise and made them strong. The only girl in control group #2 who listed sports as one of her favorite three leisure activities said it helped her diet.

Some of the puzzling differences among the groups were in their responses to visiting places, participating in scouts and clubs, attending church activities, and doing music/dance activities. The treatment group and control group #1 were more interested in visiting places than were the girls in control group #2. However, only one student in the treatment group listed visiting places as one of favorite three things to do and his reason was because he could hang out with friends. Three students in control group #1 said visiting places was one of their favorite leisure activities and their reasons were because “you get to know places around you,” “it’s fun,” and “you see different things.” None of the girls in control group #2 listed visiting places in the favorite three list.

The students in the treatment group and control group #1 were more likely to be interested in scouts/clubs and church activities than were the girls in control group #2. Only one child, she was in control group #1, listed either of those activities in their top three. Similarly, treatment and control group #1 students were more likely to be interested in playing musical instruments or dancing than were the control group #2 students. However, more of the students in control group #2 listed music and dance in their top three than did students in the other two groups. Their reasons were because they “love it” and because music and/or dance relaxed them.

It was quite surprising to see the differences in the areas of reading and doing homework. The treatment group students were much more likely to say they were very interested in reading than were students in control group #1. However, only two students in the control group said reading was in their top three choices and one in control group #1 listed it as a

favorite. Students in control group #2 expressed some interest in reading but four girls listed it as one of their favorite activities. All the students in all three groups who listed it as a favorite activity said it was because they learned things from reading.

Students in the treatment group and control group #2 were more likely to indicate high to moderate interest in doing homework, while students in control group #1 were more likely to indicate little or no interest. Two students in both the treatment and control group #2 listed homework as one of their favorite things to do. It was not surprising that the Asian girls in control group #2 had such a high interest in homework as many of their comments in the focus group suggested that they had a very serious attitude towards school. Because the treatment group and control group #1 were so similar in age and ethnicity, it was unusual that the treatment group was more interested in homework. This finding suggests that perhaps the treatment group's involvement in the NYHS after-school program has enhanced their interest in their school work.

C. Parent Perceptions of After-School Program Impact

Institute researchers also conducted two focus group interviews with parents of children who participate in the NYHS after-school program; some of the adults were parents of children in the treatment group. Many of the parents who agreed to be in the focus groups spoke only Spanish so a translator was made available to communicate with researchers. Parents were asked why their children were in the NYHS after-school program, what benefits their children were getting from participation, what new things they had learned about their children as a result of participation, and ways that the NYHS could help them help their children learn in science.

C. 1) Why Families Participate in the After-School Program

Parents had many reasons for keeping their children in the after-school program. In some cases, parents noted that the children were the ones who initiated the idea to participate. Children had heard of the program from their friends, or younger siblings had heard older siblings discuss the program, and the children had anxiously waited until they were old enough to participate. Parents responded to the after-school program very positively because their children were happy and were having fun there. In fact, the children reportedly became insistent when parents were not able to bring them to the NYHS. For example one mother reported, "My daughter's in your program, and before the Tuesday – which is the day that she comes to the program – she's very excited and says, 'Mom, you have to bring me to the program. We have to go to the program.'" Another parent recounted a story about a day when bad weather prevented her from bringing her children to the NYHS, a testament to how difficult it is for some parents to get their children to the program:

“For me it’s not very easy to come here. I live very far to here. Now I don’t have time. I have to take two trains to come here, but I have to. Sometimes we come 3:30 or after 4 because they say, ‘We can’t miss our program today, and I have to learn about... I want to go.’ One day this winter the snow was very bad and I couldn’t get them here. It was a very bad day.”

Another reason parents keep their children in the after-school program stems from parents’ concerns about finding structured quality experiences for their children. Some parents worried that allowing their children to watch too much television would be bad for them, and they felt it was important to guide their children in different directions. Thus, the NYHS after-school program was seen by the parents as an excellent, more active and content-rich alternative to letting their children sit at home passing the time by watching television. The structure of the after-school program also appealed to parents because it appealed to their children. Parents reported that their children spoke favorably about the snacks, the teacher, and the relaxed atmosphere. As one parent said:

“This program is different because it’s loose and so my son feels more relaxed and comfortable. He opens up more. The program isn’t strict and there are kids his age in it. Also, the people who help him are very nice, not like his teacher who makes him nervous—he’s a little afraid of her, you know because he’s quiet. But he’s very happy here—and he tells me that he’s learning a lot here. And he says that if he doesn’t feel like reading about the moon, he can read about dinosaurs.”

Another parent felt that the time spent at the NYHS after-school program made her son more agreeable when at home:

“My child is very active and he’s always looking for things to do and since he always finishes his homework early, he wouldn’t have anything to do, and he’d go and do whatever he could. But now he can come here after-school in the afternoon and when he comes home, he’s more relaxed and can sit down and read a book or he can come with me to run errands.”

Other parents agreed that one of the reasons they have their children in the program is that they are learning new things and they enjoy the process of learning. In addition, many parents felt that the NYHS program offered their children important learning experiences that were not available in school. For example one parent said, “Both of my children like learning here, they’re advancing, and they’re interested in coming... Also, in school they don’t teach them about the planets and things like that.” Another parent felt that the learning her son was doing at NYHS would be important for him to use in the future.

C. 2) How Children Benefit from Participation

When asked to describe the ways in which their children benefited by participation in the NYHS after-school program, parents were eager to express the many ways the program was helping their children. The comments clustered around two main categories:

1) educational or learning benefits and 2) social benefits of the program.

i) Educational Benefits

The study revealed that there is no doubt parents expect and rejoice in the rich learning experience that is provided for their children at the NYHS after-school program. In particular, parents felt the program was helping their children with school work. They liked that homework was finished when the children came home so the students had time to do other things. Frequently, parents said those “other things” included doing experiments at home. Some parents felt that the program helped their children make connections in other areas and several parents believed that their children who had special needs or learning disabilities especially benefited by participation in the NYHS after-school program. Some representative comments by parents are as follows:

“My daughter told me, ‘Mommy, this is a good program for us because when we go to school we know—when the teacher is going to ask about something, we know what is there, because we are learning it in the program and we can tell about it.’”

“Before coming to the program, my son had difficulties in doing activities at school, especially science activities. And after being in the program, now he finds it rather simple to do a lot of the activities that they’re introducing in school.”

“Once he gets home, his homework from school is done.”

“The reason it’s so good is that they create more things, you know. They have more ideas to get experiment at home. This is good for them, they learn to do something else at home.”

“My son is retaining a lot of information and making new connections. What he’ll do is, he’ll see something here and transpose it onto Channel 13, or if I take him to the Museum of Natural History, he’ll make a correlation with something he experienced at the [New York Hall of Science].”

“He’s a quiet child and not very quick with his hands and so he was always at home. But the program is really helping him now and he gets speech therapy at school. With my son, I would take him out to the park here or to another park—

but in the summer, he came here for a program, and I noticed that it was doing him a lot of good. “

“My son has a lot of trouble with concentrating, and since he’s been coming here, the program has helped him with that.”

ii) Social Benefits

All of the parents interviewed mentioned that one of the greatest benefits of the NYHS program is that “it helps the children socially” by helping them become comfortable among other children. Specifically, parents noted that their children have the opportunity to meet and “interact with different children from different countries and different races.” A selection of representative comments follows:

“[My son] made friends and the people he was meeting were different, and with the science, he’s having fun, he likes it, and he’s coming home more interested and enthusiastic each time. Yes, I’m very happy that my son is in the program and that you accepted him, even though he’s only in first grade. He has become very interested and very motivated. I’m very happy with the program.”

“I have a son and a daughter and they both like learning here, they’re advancing, and they’re interested in coming. My boy is the only male [in our family], the rest of my children are girls, and so he can come here and meet other boys. “

“The program has benefited in that it helps them socially—they interact with different children from different countries and different races. And they grow from that. And I can see that my child feels more secure with other kids in a group now.”

“Yes, the program has helped my boy in school—he was so timid and quiet and how he meets other kids. So yes, this program helps them get along with other children, and also interact with them, talk with them. He used to be very quiet and closed-off.”

“My son likes to collaborate more now. Before he liked to work alone.”

C. 3) What Parents Learn About their Children

Parents were asked if they had learned anything surprising or new about their child as a result of their participation in the NYHS after-school program, to which many parents responded that the program had given them new insight into their children. A number of parents mentioned that they found out that their children liked doing a range of interesting things on their leisure time. Parents frequently said their children wanted to

follow up at home on ideas and experiments they had done at NYHS. One parent said her child explained carefully what she did at the program and “now asks me to buy this and buy that so they can do science experiments at home. And they’re very excited about having learned new things.”

One parent said her son is very interested in cooking now because he enjoys mixing things together, another parent mentioned that her sons increasingly watched more Discovery Channel programs and less cartoons. One parent explained in detail how her sons’ increased interest in science made bedtime more difficult:

“My sons, have always been interested in the Learning Channel or Discovery Channel. But now, they are even more interested. Sometimes I have to fight with them because it’s 9:00, 9:30, to 10:00 PM, and they have to go to sleep, and they say, ‘Mommy, please, you have to wait. I want to finish to see these programs, because they’re telling us about the moon, about experiments,’ or something they’ve done, and they love it.”

One parent was surprised that her son could actually do all of his homework in the short time provided at the after-school program which was faster than he ever did it at home. One parent said “Last week they had a telescope, and my daughter brought it home and was experimenting with it.”

Other parents noted that they began to realize that their children were becoming so interested in science that they wanted to follow a career interest in science. Speaking enthusiastically about her son’s newfound aspiration to be a scientist, one mother said:

“Yes, my son is very excited about having learned new things. He talks about the moon and the planets, that they have some material—I forget what it is now—and he’s so happy now, and he’s been telling me he wants to work in the sciences...He tells me he’s learning a lot here. And he says that if he doesn’t feel like reading about the moon, he can read about dinosaurs....and he’s made me buy him books, including one about dinosaurs that you can color.”

And another mother explains a revelation she had at a teacher/parent conference in school:

“When I went to the parent/teacher conference three days before, the teacher told me that my child is good in science. I don’t know, but she told me that maybe in the future he’s going to be a good scientist. I don’t know, but she saying that. And I say that he’s in this program. That’s good for him.”

C. 4) How NYHS Can Help Parents Help Their Children

Parents were asked if there was anything that the NYHS could do to help parents support and encourage their child in science. One parent, who suggested that the NYHS provided more information to help parents help children, said:

“I homeschool, and there’s going to be a time when I’m not going to be able to answer all those scientific questions, and to have a helpline, or some sort of companion. Because I’m sure even kids bring stuff home, and we’re finding that a lot of the textbooks are incorrect, so the experiments aren’t working, okay? And that’s been a big issue. ‘60 Minutes’ did a whole exposé on a science book had 128 experiments written incorrectly.”

In support of that idea, a few parents said they would either like the NYHS to teach the children how to do the experiments on their own at home or provide parents with information about how to help their children. The parents were most complementary of the program and mainly expressed the desire for their children to be able to come to the program more than once a week. Some parents noted that the information about the program through the schools was not very reliable. Most parents indicated they had heard about the program from other parents, in a very ad hoc fashion.

CONCLUSIONS AND RECOMMENDATIONS

All evidence from this study strongly suggests that the NYHS after-school program provided children with rich and meaningful experiences. Children who participated in the NYHS after-school program demonstrated a greater interest in and more positive attitude towards science than did students not involved in the program. Similarly, the parents of the participants also noted that their children were increasingly eager to go to the after-school program because, as one mother put it: “he tells me he’s learning a lot here.” This finding is particularly important in light of the fact that for many parents, the initial motivation to bring their children to the program had more to do with the safe, interesting, and child-friendly environment the NYHS represented, rather than any expressed interest in science.

In terms of children’s leisure time choices, the data suggest that all children liked to play computer games, surf the web, watch television, and socialize with friends. Children said they liked doing things on the computer because they enjoyed learning. Television was also a source of entertainment, but a few children said they learned from watching television. Socializing was a favorite activity as well, which makes sense, given that establishing peer relationships is a very important developmental stage for the older elementary and middle school child. A notable difference between children who participated in the NYHS after-school program and those who did not was in their attitudes towards reading and homework as a leisure option. In particular, students who participated in the after-school program were more likely to express interest in reading than were non-participating children.

Observations of participating and non-participating children during a hands-on science activity and free-time in an exhibition suggests that the NYHS after-school program contributes to students’ ability to work together whether or not they know each other. There was also some evidence from Institute observations to support the idea that participation in the program helps children to develop their problem-solving skills. In addition, the children who participate in the NYHS after-school program seemed to be more focused and engaged in an interactive exhibition.

Reports from parents strongly supported the findings from the observations and focus group discussions with children in the treatment group. Parents were wholeheartedly and enthusiastically complementary of the NYHS after-school program. They provided many specific examples of ways in which their children benefited both educationally and socially from participation in the program. Given these parents strong interest in providing quality after-school experiences for their children, the most frequent suggestion for improvement in the after-school program was to allow their children to come more than once a week.

In terms of other recommendations to improve the NYHS after-school program, the Institute would suggest that this might be a good time to begin providing some parent involvement sessions to teach parents how to further support their child's interest in science. In particular, previous research by the Institute suggests that many parents do not understand the importance of experimenting, that is they often consider it “mess-making” and not learning.¹ When parents are also provided with experiences where they are invited to engage in hands-on experiments, they gain in their understanding of the learning process in which their children participate.

Also, improving communication with the schools and schoolteachers so that information about NYHS programs gets distributed to students and their parents is an important task that should be undertaken. At the same time, it will be necessary to consider that such a marketing effort may increase the demand for the after-school program, which would require an increased supply of spaces and program facilitators. This then creates other problems related to how children are selected for inclusion in the program. If the NYHS began to charge a fee for the after-school program, this would certainly lessen demand. Furthermore, depending on the amount charged, a fee would probably begin to lessen the diversity of students in the group—and currently, it is the economic, social, and ethnic diversity of the participants that is one of the greatest strengths of the NYHS after-school program.

¹ Evaluation of Our Place Program for the California Science Center LASER project (1998), Institute for Learning Innovation, Annapolis, MD

Appendix A

Student Focus Group Protocol

STUDENT Pre-Visit FOCUS GROUP PROTOCOL

Start out with an explanation of this evaluation. Emphasize the importance of better understanding their thoughts and experiences.

1. Introductions: Do all of you know each other? Go around and say your name, your grade, and what school you go to.
2. Tell me what kinds of things you do between the end of school and dinner time.
(Probes: Who makes the decision about what you do? E.g., parents, child, joint decision. How often do you do the things you do after-school? Are they science, art, sports, etc., related?)
3. If you could do anything you wanted to do after-school, what kinds of things would you like? (Probes: Why? Would you like to do the same type of thing everyday or have a variety of things to do? Why?)
4. What sorts of things have you thought you might like to do when you grow up? Why?
(Probes: Interest in science-related careers?)
5. What is your favorite thing about science? What is your least favorite thing about science?
(Probe: What kinds of peer pressure do you feel in regards to doing well in school? In science?)

POST-SESSION DISCUSSION

1. So, tell me how it was? What did you like about it? What could we do to make it more enjoyable, interesting to you?
2. What part did you like best? Least? Why? (Probe for specific interests in free-time and activity time)
3. Do you have any questions about today's session?

Appendix B

Student Written Survey

STUDENT SURVEY

NAME: _____

1, Compared with other subjects you study in school, how do you feel about studying science?
(Circle one)

Less interested	About the same	More interested
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3. Look at this list of possible things to do after-school. Put a check mark ✓ in the column that represents **how much you would like to do that activity.**

ACTIVITY	☺☺☺☺ VERY MUCH INTEREST	☺☺ SOME INTEREST	☺ A LITTLE INTEREST	☹☹☹ NO INTEREST
Play computer games/Internet				
Read				
Play sports/exercise				
Watch TV				
Visit places				
Hang out with or talk to friends or family				
Build, fix, or create things				
Do homework				
Scouts/Clubs				
Church Activities				
Play instruments or dance				

Add your own activity idea if you want to:

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4. What three (3) activities are your favorites?

1. _____ Why? _____

2. _____ Why? _____

3. _____ Why? _____

Appendix C

Student Observation Protocol

NYHS STUDENT OBSERVATION PROTOCOL

ACTIVITY TIME

How did children orient to the task during the activity time?

How did they orient to and interact with each other?

How did they orient to and interact with explainer?

What problem-solving skills were observed?

EXHIBITION FREE-TIME

How did children orient to the space/interactives during the free-time?

How did they orient to and interact with each other?

How did they orient to and interact with explainer?

What problem-solving skills were observed?

Appendix D
Parent Focus Group Protocol

PARENT FOCUS GROUP

Thanks for coming this evening. We appreciate you helping the NYHS make better after-school experiences for your children

1. I realize that many of you may not know each other. Let's take a minute to go around and introduce ourselves, give the age(s) of your children in this program, tell us why your child is in this program.
2. Do you think participation in the NYHS After-School program has benefited your child? If yes, how so (give examples)? If no, why not?
3. Do your children ever talk to you about this program when they are at home? If yes, what do they talk about? (Give specific examples) If no, have you ever over-heard any of their comments about the program? (Give examples)
4. Have you learned anything surprising about your child as a result of his/her being in this program? (Give specific examples)
5. Think about your child. What can the NYHS after-school program staff do to further spark and support your child's interest in science?
(Probe: How can the NYHS help parents support their child's interest in science?)