



Sisters4Science 2005



Abigail, Aleta and Jamilla watching Laurie Parker demonstrate physical change.
Photo: A. Patel, © Project Exploration



Camille and Paige making friends at Reptile Fest!
Photo: A. Patel, © Project Exploration



Women in Science Luncheon participants Girls' Health and Science Day 2005.
Photo: E. Vecchione, © Project Exploration



S4S doing teamwork to reach their goal at the 2005 Leadership Retreat.
Photo: A. Patel, © Project Exploration

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Alora surfing the internet to learn what makes a good website.

Photo: A. Patel, © Project Exploration



Dr. Vinny Aurora demonstrating how to examine a patient's eye-sight.

Photo: A. Patel, © Project Exploration



Jennifer learning that not all snakes bite!

Photo: A. Patel, © Project Exploration



Kiarra and Alicia rehearsing their play for the "Showcase of Knowledge"

Photo: A. Patel, © Project Exploration



S4S reflecting on how the Sisters4Science program addresses barriers to science for women.

Photo: A. Patel, © Project Exploration



Rashawndria presenting her poster on a healthy human body based on her learning at the Body Worlds exhibit.

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*You start off shallow, slowly climbing the stilts of the sky.
You beam light across me and warm up the day
So bright and so magnificent.
You seem so small and yet you trick them all.
To you I say... Hello.
This is for you, I hope you like it.*

—*Sisters4Science* member, upon seeing the sun rise above the horizon at the 2005 Leadership Retreat.

This journal entry captures the essence of Project Exploration's *Sisters4Science* program, which aims to inspire, challenge, and enhance participants' understanding of the world and themselves through science.

Background

Project Exploration is a science education nonprofit that works to make science accessible to the public— especially city kids and girls. In order to accomplish our mission, we work in three areas:

- **Youth Development Programs** provide transformative experiences with science for minority city kids and girls. We run three programs: *Sisters4Science*, *Junior Paleontologists*, and *Dinosaur Giants*.
- **Services for Schools and Teachers** offer in-school programs, teacher professional development, and specialized curricula designed to foster inquiry-based learning.
- **Exhibits and Online Initiatives** enable us to reach our most broad and diverse audiences.

Sisters4Science (S4S) is a weekly after-school program that combines science exploration with leadership development for minority middle and high school girls. The program takes place in partnership with Triumphant Charter School in the Auburn-Gresham neighborhood and Young Women's Leadership Charter School on the Near South Side.

S4S sessions are held after school each week for two hours at each site and typically involve 12-15 girls per session. *S4S* puts girls and their interest at the center of the

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program. At the beginning of the program, the girls create a *Sisters4Science* “Code of Conduct,” which reflects their core beliefs and values, and they pledge to always behave in ways that reinforce and develop these values. This gives the participants a high level of ownership of the program and also develops their decision-making and leadership skills. In addition, girls fill out an interest survey, which Project Exploration staff use to shape the activities, assessments, and evaluation throughout the year. In 2005, girls chose to delve into topics ranging from human anatomy, chemistry, and engineering; to girls’ health, sexuality, and gender. Sessions are typically taught by women scientists representing fields as varied as chemistry, medicine, biology, geology, and scientific illustration. In addition to classroom experiences, monthly field trips are an integral component of *S4S*.

A typical *S4S* session begins with a warm-up activity to get the girls energized for the session, build their comfort level with each other, and create a positive group dynamic. This is followed by a hands-on activity with women scientists in which girls explore a specific scientific concept. This exposes the *S4S* program participants to various roles played by women in the scientific world and challenges their perception about what women can and cannot do. The girls also get to ask the women scientists questions about their educational and career paths.

Each session ends with journaling, during which the girls respond to a question or prompt, which is followed by a highly structured reading and discussion format. Our writing and discussions create a safe space for the girls to explore their personal and scientific experiences. We conduct journaling sessions with an explicit rule created by the girls, “What happens in *S4S*, stays in *S4S*.” Journaling helps record their learning, thoughts, and emotions, as well as builds their communication skills. Additionally, reflection during journaling helps girls become confident and comfortable about expressing themselves and develops their notion of sisterhood.

The field trip component compliments and enhances the girls’ classroom experiences with the women scientists. Not only do program participants get the opportunities to explore places outside of their communities, but they also get to have a shared group experience with girls from other schools. Interactions with people they have never met before builds their communication skills, and further develops their confidence and self-esteem.

***S4S* 2005 at a Glance**

Introduction

This year, the *Sisters4Science* program created a safe space for girls to explore and be curious, exposed girls to a wide variety of women scientists, and developed girls’ leadership and communication skills. The program maintains an ‘open door policy’ where any girl from the school can come to any session. Sixty-eight girls attended *S4S* sessions this year, a 19% increase from the previous year. Forty *S4S* girls were consistent participants in the after-school sessions and field trips. There were a total of 16 weekly sessions held at each of the *S4S* schools, five field trip experiences and an overnight Leadership Retreat. This year’s sessions included an extensive unit on Bodies and Systems, in which the girls learned about the particulars of the human body. This

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unit was complimented by a field trip to the Museum of Science and Industry's "Body Worlds" exhibit. *S4S* also developed an exciting new partnership with About Face Youth Theater to enhance the girls' capacity to share their stories, experiences, and knowledge.

Assessment of *S4S* Program Goals

GOAL: Expose girls to the wide variety of roles played by women in science

In 2005, *S4S* program participants interacted with over 20 women scientists—a 67% increase from the previous year—through classroom sessions and field trips. The women scientists included a mechanical engineer, paleontologist, chemist, and web designer. The following responses capture the essence of exposing the girls to women scientists as a core goal:

- *Laurie was most important to me because I needed to see a scientist that is in love with science, really loves her job, and that inspires me.*
- *Melina is my favorite because she went to graduate school and no one I know has gone to graduate school.*
- *Ellen was very important for me because she showed me something I never knew.*

GOALS: Create a safe space for girls to explore science and develop leadership skills.

Create an alternative educational model that combines science with leadership development

The *S4S* sessions were held on a regular basis and also maintained a similar structure. This created a high level of familiarity and comfort, which led to high and consistent participation. Another indicator that we were able to reach this goal is demonstrated in quotes from the year-end evaluation:

- *I used to think that science was boring, stupid, and I didn't get it or know why it's important, but now I know many new things and that there is a lot more I could learn.*
- *I used to be self-conscious and nervous when I heard the word science but now I am more confident when I deal with science.*
- *I learned how to keep trying because scientists try stuff over and over again.*

The *S4S* girls also participated in five field trips, which included participation in an engineering career fair at Northwestern University, and visits to their engineering and chemistry labs, Reptile Fest at University of Illinois at Chicago, and the Museum of Science and Industry's "Body Worlds" exhibit. In addition to providing the girls' with new insights and perspectives, the field experiences also intrigues them on a level impossible to achieve otherwise. The following statements from their writing illustrate this point:

- *This was a great experience for us girls to see what we can do with our lives and careers.*
- *I have definitely concluded that this school (Northwestern University) is on my college list, even though I'm only in 8th grade—it's never too late to start.*
- *It's just so great that I can visit a science museum and learn about the human body because most children don't have a chance to do this.*

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This year's Leadership Retreat took place in Lake Geneva, Wisconsin during spring break in March. Not only did we have a record number of 23 *S4S* program participants, but also Laurie Parker, a chemist and *S4S* presenter, and Roberta Pondexter, a parent chaperone, also accompanied us. During the two days, the girls were challenged mentally, physically, as well as socially, and had the rare opportunity to think about how they, as *S4S* participants, impact and influence the program and the world around them. In addition to doing team building activities and group challenges, they also read and wrote together, all the while discussing and reflecting upon barriers to science for young girls and women. Experiences such as this not only give the girls a rare opportunity to develop their leadership and communication skills, but also to enhance their self-esteem.

- *I personally contributed to the team when I listened to my other teammates ideas and didn't put them down. I also tried to put all the ideas together to see how they would turn out.*
- *I feel like if I want to grow up and be a scientist and I was the only girl and the men scientists tried to put me down, I would still keep on going.*
- *This weekend meant a lot to me... the way that this will change me when I go back to Chicago is just to know that I have accomplished something in life.*

GOAL: Help develop the girls' identity and increase their self-esteem

Self-development and growth are an integral part of leadership development. *S4S* was able to make a positive impact on the girls' self-esteem and communications skills, as well as build their confidence and understanding of science.

- *I used to be impatient and didn't get along with most people, and it would take me a long time to get to know people but now I am patient, and get along with others. Now I know how to get to know people better, and how to say things about them.*
- *I used to be a control freak with uncontrollable rage and attitude problems but now I am a *S4S* and I feel like I could do anything I want and share things in a group.*
- *I used to be self-conscious and nervous when I heard the word "science," but now I am more confident when I deal with science.*

GOAL: Raise public awareness of issues facing girls' science education

In April, the girls participated in the fifth annual Girls' Health and Science Day, a one-day conference on girls' health issues. In addition to participating in this unique day, the *S4S* program participants helped decide what sessions and topics to cover at the conference. At the conference, they participated in workshops on sexuality, reproductive health, self-defense, and gender. They also participated in the "Women in Science Luncheon" where they got the opportunity to have an intimate lunch and conversation with zoologists, an epidemiologist, and a curator, to name a few. This luncheon has been such an important part of the girls' experience that in their evaluations they have requested a separate day just to meet and get to know women scientists.

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GOAL: Girls' interests drive the curriculum

Since the girls' interest drive the curriculum, it was imperative to learn that out of 55 program participants who filled out an evaluation, 44 felt that *S4S* responded to their interests "well" or "very well." As a result, *S4S* was able to maintain its high attendance and consistent participation in the program through the year.

S4S "Showcase of Knowledge"

The weekly classroom sessions culminated in a "Showcase of Knowledge" at the Chicago Children's Museum at Navy Pier. The girls presented their learning in the *S4S* program by performing short plays and presenting a mural to their family members, teachers, scientists, and alumni *S4S* members that came out to show their support and dedication to the program. The evening included a keynote speech by mechanical engineer Me'lani Joseph, and honoring of the *S4S* program participants with certificates for their hard work this past year. The following quote captures the significance of this evening:

- *My favorite S4S moment was when we were downtown to present our play we came up with. It was memorable for me because I was brave enough to stand up in front of a large crowd.*

This past year has been filled with several exciting moments, memories, and experiences. The following quotes summarize the overall impact that *S4S* had on program participants:

- *S4S is where all girls should be. They (S4S) should be in every all-girl and co-ed schools.*
- *I really appreciate S4S for giving me the chance to be part of a group like this. This has really helped me in science. I just want to say, thank you!*

S4S on the Horizon

Sisters4Science is eagerly looking forward to the next program year. Not only are we sustaining our work with the existing schools, but are also expanding the program to an additional school. In addition, we will be laying the groundwork for creating a formal cohort of women scientists, *Women in Science*, to bolster our work with this special group. We will work with the *WIS* group to plan out the sessions to fulfill the *S4S* program goals and the participants' interests. The group of women will be trained on working with minority girls and classroom management skills. Furthermore, we will also be hosting a separate luncheon for program participants to interact with women scientists. Another important addition to the *S4S* program is going to be including a summer field component, which will enhance their experience and understanding of science and leadership.

Sisters4Science hopes that this synopsis of our program year has informed, enhanced, and broadened your understanding of our work—through the lens of science of course! If you have any questions about our *Sisters4Science* work, you may contact Youth Programs Manager Conor Barnes at 773.834.7624 or at cbarnes@projectexploration.org. You can also visit us online at www.projectexploration.org.

S4S 2005 Session Overview

S4S sessions and field trips are designed to support the following S4S program goals:

1. Create a safe space for girls to explore science and develop leadership skills
2. Expose girls to the wide variety of roles played by women in science
3. Help develop the girls' identity and increase their self-esteem
4. Improve girls' overall school performance by developing goal setting, decision-making, and communication skills.
5. Create an alternative educational model that combines science with leadership development
6. Girls' interests drive the curriculum
7. Raise public awareness of issues facing girls' science education

Date	Session	Presenter/ Facilitator	Activities	Journal Prompt/ Reflection	Highlights and observations
1/10/05 1/12/05	Getting to Know Each Other		<ul style="list-style-type: none"> • Getting to know each other • Sharing what we are curious to learn about • Fill out interest sheets 	No journaling.	High turnout the first day at both schools!
1/18/05 1/19/05	The Science Tool Kit	Dr. Melina Hale, University of Chicago	<ul style="list-style-type: none"> • Learning the Science Tool Kit • Making observations about a cricket and predicting how far it will jump 	<i>I used to think... But now I...</i> statements based on what they learned about crickets. <i>What was the most surprising thing you learned today?</i>	A lot of the girls overcame their fear of insects and participated in observing the crickets jump.
1/25/05	Field Trip: IMAX Movie		<ul style="list-style-type: none"> • Field trip: Navy Pier IMAX movie: "Aliens of the Deep" 	No journaling.	Seeing Ph.D. scientists, and the movie's director, James Cameron, be completely awed by the beauty of the deep ocean and be at a loss of words. Besides, THIS IS AWESOME!

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1/31/05 2/2/05	Team Building		<ul style="list-style-type: none"> • Brainstorming skills required to work as a team • Participating in a team building activity • Reflecting on their process during the activity to see if they used the skills they mentioned earlier 	<i>Write down two words for "teamwork" and how you used them (or failed to use) during the activity.</i>	The girls got EXTREMELY frustrated when they could not work together and figure out how to solve the problem. However, as soon as they figured it out they were energized and understood that they will need to work as a team throughout the program.
2/7/05 2/9/05	Girls' Health and Science Day (GHSD) Planning		<ul style="list-style-type: none"> • Suggesting topics they wanted to cover at GHSD • Reviewing last year's program to make suggestions and recommendations • Making "Healthy Girl" posters 	"Healthy Girl" poster presentation.	The girls were given a unique opportunity to help organize an event like GHSD. They also got to present their posters to their peers and developed their presentation and communication skills.
2/14/05 2/16/05	Engineering: Building a Bridge Structure	Ellen Worsdall, Alex and Erica, Northwestern University	<ul style="list-style-type: none"> • Thinking about how to solve problems as a scientist and as a team • Outlining a process that they will use for the activity • Bridge building activity with index cards and staplers to hold a 5 lb ream of paper and make it cost-effective 	<i>How did you solve a problem as a scientist and do teamwork to finish your goal?</i>	The girls followed the steps they had outlined before doing the activity and there was a high level of cooperation. One of the groups actually built a structure without using staplers. Presenter Ellen Worsdall has been doing this activity for years with incoming college freshmen and mentioned to the girls that no one had ever built the structure without staplers!

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2/22/05 2/23/05	Chemistry: Chemical vs. Physical Change	Dr. Laurie Parker, University of Chicago	<ul style="list-style-type: none"> • Copper plating activity • Making necklaces from copper plated nuts and washers 	<i>Describe something that surprised you today and talk about a chemical change and physical change you saw happen today.</i>	The girls had an interactive discussion with Dr. Laurie Parker about her career path to chemistry. The girls were surprised to find out that Laurie did not always get A's in math and had to work very hard in her classes. She explained to the girls that just because you don't get A's in math and science does not mean that you should get frustrated and not pursue it.
2/26/05	Field Trip: Northwestern University Engineering Career Fair: "Count on Us to Shape the World"		<ul style="list-style-type: none"> • Listening to Keynote speaker, Vidya Babu, Director of Software Engineering at Cisco Systems • Participating in a Design Competition to make an environmentally friendly and self-propelling car • Getting a personalized tour of Northwestern's science and engineering labs 	The girls wrote: <i>I used to think... But now I...</i> statements, based on their experience at the engineering fair. They also wrote thank you letters to Ellen Worsdall and the organizers of the conference.	The girls had a unique opportunity to tour some of the most well-equipped labs of Northwestern University's McCormick School of Engineering. Their experience there challenged the girls' perceptions of engineering and inspired some of them to apply to Northwestern University!
3/2/05	Passing It On: Team Building		<ul style="list-style-type: none"> • Developing a list of things that makes <i>S4S</i> a unique program • Deciding what activities they would like to cover in the session: warm-up, team building, <i>S4S</i> Code of Conduct, science activity and journaling • Making signs to put up in the school inviting 6th grade girls to participate 	No journaling.	The girls were eager to have the opportunity to facilitate a <i>S4S</i> session for 6 th grade girls and to show them what makes this a unique program and safe space for girls. The fact that they selected to present all the critical components of the program demonstrated their understanding of what makes <i>S4S</i> a unique program.

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3/9/05	Passing it on: Team Building		<ul style="list-style-type: none"> • Facilitating an entire <i>S4S</i> session with a warm-up, team building activity, <i>S4S</i> Code of Conduct, scientific observation activity and a journaling session • Explaining in their own words why each of the activities is an important part of <i>S4S</i> 	<i>What about today wants to make you want to come back?</i>	<p>The girls demonstrated great leadership and presentation skills. Additionally, the following quote captures the highlight of the session: <i>What I did today would make me come back because it was challenging, exciting, and we had to use teamwork and listen to each other... I also explored what a seahorse feels like and looks like and it was very fun. We made predictions and we observed and analyzed things and these are the type of things I would like to do at S4S.</i></p>
3/14/05	Technology: What Makes a Good Website?	Roberta Lai	<ul style="list-style-type: none"> • Thinking about how we use the internet • Brainstorming and coming up with a checklist of things that make a good website for girls • Surfing the websites and judging them based on the checklist they came up with • Coming up with a list of websites to share with participants of Girls' Health and Science Day • 	Presentation on their favorite website and why they would recommend it to other girls.	The girls were excited to come up with a list of web resources for other girls and to use their learning in <i>S4S</i> in a very meaningful way. The list was distributed to participants at GHSD.
3/21/05 to 3/22/05	Leadership Retreat in Lake Geneva, Wisconsin	Dr. Laurie Parker, University of Chicago	<ul style="list-style-type: none"> • Team Building • Journaling • Reflecting 	<p><i>How did you work together as a team?</i> <i>How did you contribute to the team as individual?</i></p> <p><i>How does S4S help address the lack of women in science?</i></p> <p><i>How will you be different when you go back to Chicago?</i></p>	There was a noticeable change in the girls' attitude towards teamwork, communication, and leadership. The girls also got to learn about gender disparities in science and reflect how <i>S4S</i> works to address these issues.

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3/28/05	Bodies and Systems: Vertebrate Anatomy	Tori Hanson, University of Chicago	<ul style="list-style-type: none"> • Learning about the Human and Cat Skeletal System • Comparing similar bones in different tetra pods • Playing “Simon Says” to learn the various bones of the human body 	<i>Pick two of your favorite bones and explain why they are your favorite bones.</i>	The girls were intrigued to learn the similarities between the human vertebrate anatomy and other animals like cats and dinosaurs.
3/30/05	Bodies and Systems: Conducting Neurological Exams	Dr. Vinny Aurora, University of Chicago Hospitals	<ul style="list-style-type: none"> • Learning about the five human senses and how they are connected to the nervous system • Learning how to check for sight, hearing, touch, and human reflexes in patients • Having an detailed conversation about Vinny’s medical education and her career 	<i>Talk about a good or bad experience you had while visiting a doctor, as well as qualities that a good doctor should have.</i>	The girls could not wait to go home and show off their neurological examination skills to their family members.
4/2/05	Field Trip: Reptile Fest		<ul style="list-style-type: none"> • Attending the largest educational event about reptiles • Having the opportunity to actually touch several reptiles and see them up close • Learning about the unique qualities of reptiles from experts 	The girls participated in a scavenger hunt at Reptile Fest.	Camille, a <i>S4S</i> program participant overcame her fear of reptiles by to learning more about them. In fact, we had a hard time moving her from the snakes when it was time to go!

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4/4/05 4/6/05	Bodies and Systems: Human Muscular System	Kristi Guyton, University of Chicago	<ul style="list-style-type: none"> • Learning about muscles, what they are made of and how they function • Coloring the various facial muscles of the human face • Doing an interactive activity to learn how the most important muscle- the heart- circulates blood • Getting ready for their field trip to see the "Body Worlds" exhibit 	<i>What changes have you seen in yourself after the Leadership Retreat?</i>	Kristi did a fun, educational, and interactive activity with the girls on how blood flows from the lungs and takes oxygen to the heart, which then goes into our muscles.
4/9/05	Field Trip: "Body Worlds" Exhibit at the Museum of Science and Industry		<ul style="list-style-type: none"> • Embarking on an unusual journey to learn about the human body 	The girls drew pictures of three organs of the human body before going inside the exhibit and then drew them once they saw them in the exhibit. They also reflected on some of the most surprising, beautiful, and disgusting things they saw at the exhibit.	There were six female undergraduate science majors that volunteered to serve as chaperones for the trip. Thus, small groups of 3-4 girls had their own personal guide through the exhibit. The girls also realized the importance of taking care of their bodies from viewing the exhibit: <i>I know now that you really have to take care of your body because it is important to do so.</i>
4/ 11/05 4/13/05	Bodies and Systems		<ul style="list-style-type: none"> • Wrapping up the unit on Bodies and Systems • Putting together a puzzle on the human anatomy • Making posters about healthy bodies 	<i>What do you expect to learn from Girls' Health and Science Day?</i>	Most of the girls' presentations were about how much harm smoking causes to your lungs, since a lot of the lungs at the exhibit were discolored from tar.

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4/22/05	Girls' Health and Science Day		<ul style="list-style-type: none"> • Listening to Keynote Maggie Brown • Attending various workshops on health, sexuality and gender • Having lunch with a women scientist • Putting together short plays about making healthy choices 	Girls performed plays on situations in which they made healthy choices.	The girls truly appreciated the information they learned that day, since it is not often that they get to learn accurate information about their bodies and how to take care of them.
4/25/05 4/27/05	Evaluation of GHSD		<ul style="list-style-type: none"> • Participating in a focus group on GHSD 	<i>I used to think...But now I...</i> statements about their learning from GHSD	The discussion was productive and the girls gave excellent feedback on how GHSD can be improved next year.
5/2/05 5/4/05	Preparing the <i>S4S</i> Showcase of Knowledge		<ul style="list-style-type: none"> • Reviewing the year and highlighting key moments • Brainstorming ideas on how to present their learning • Making recommendations on what else they want at the Showcase 	No journaling.	The girls had a great time talking about the <i>S4S</i> program year and highlighting key moments. They decided to do a play and make a mural to demonstrate their learning in <i>S4S</i> .
5/9/05 5/11/05	Theater Workshop	Danny Alvarez and Jessy Sanjurjo, About Face Youth Theater	<ul style="list-style-type: none"> • Sharing their favorite <i>S4S</i> stories • Deciding which story they wanted to reenact at the Showcase of Knowledge • Laying out an idea for the play 	The girls presented their favorite <i>S4S</i> stories and moments throughout the session.	The girls cooperated well and worked together as a team to select a story and come up with the play.

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5/16/05 5/18/05	Practice for Showcase		<ul style="list-style-type: none"> • Practicing their play for the Showcase of Knowledge • Making a <i>S4S</i> mural to present at the Showcase 	No journaling.	The girls felt very good about their presentations and were ready to do the <i>S4S</i> Showcase of Knowledge!
5/24/05	<i>S4S</i> Final Showcase of Knowledge		<ul style="list-style-type: none"> • Listening to a keynote speech by Mechanical Engineer Me'Lani Joseph • Presenting their plays and mural to their peers, teachers, families, and women scientists • Getting recognized with certificates for their dedication to exploring, discovering and experiencing! 	No journaling.	The evening was an excellent way to close out the <i>S4S</i> program year. The Showcase gave the girls a very unique opportunity to demonstrate in their own words what the <i>S4S</i> program is all about and what it means to them.
5/30/05 6/1/05	Evaluation of <i>S4S</i> Program Year		<ul style="list-style-type: none"> • Getting an opportunity to tell Project Exploration's staff what they thought about the program and how to improve it next year 	Filling out evaluation forms.	

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6/24/05	Field Trip: Wired NextFest		<ul style="list-style-type: none">• Participating in a science presentation to demonstrate the properties of nitrogen• Getting a personalized tour of the exhibits by Toufic Chanin, NextFest's lead organizer• Meeting some the men and WOMEN who are at the forefront of developing the future of technology		The girls got an opportunity to meet Mayor Daley and have their picture taken with him. The girls were EXTREMELY enthralled and intrigued by the various exhibits at NextFest.
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