

SciGirls 2010

Executive Summary

2010 was the fifth year for the SciGirls program and the fourth year in which we had two camps. The demographics of the camps can be found below.

General Data

Race/Ethnicity	Number	Percentage (N=32)
White/Caucasian	17	54.5%
African American	7	21.2%
Asian	4	12.1%
Latina	1	3.0%
American Indian	2	6.1%
Would rather not say	1	3.0%

School Type	Number	Percent (N =32)
Public	20	62.5%
Magnet/Charter	4	12.5%
Private	8	25%

Grade level (for next school year)	Number	Percent (N=32)
6 th	7	21.9%
7 th	9	28.1%
8 th	8	25.0%
9 th	7	21.9%
10 th	1	3.1%

SES and Science Family Background

94% of the campers had a mother that graduated from college and 85% had a father who graduated from college. All of the campers said that their family expected them to go to college after high school, indicating each family's commitment to education. 65% of the campers believed that their family would support them financially for college, whereas the remaining campers believed that they would have to pay their own way through college. All but one (97%) of the campers planned to go to college after high school, indicating their own commitment to and value placed on education.

27.3% of the campers had a mother who worked in a STEM field and 39.4% had a father who worked in a STEM field. All but two (94%) of the campers said that their family supported their interest in science and thought it was "important for them to learn science". All but two of the

campers reported that their family thinks science is interesting and all but one of the campers said that their family would be happy if they pursued a science career.

All of these girls cited an interest in a STEM field on their application. These results along with the reported family support show that these young women were all interested in STEM at some level and had family support both financially and perceived for their STEM interests.

The campers were asked to list up to three STEM fields that they were interested in; the counts for these were as follows:

	Number	Percent
Life Science	21	65.6%
Physical Science	13	40.6%
Earth/Space Science	12	37.5%
Engineering/Computer Science/Technology	6	18.7%
Medical Doctor	3	9.4%
Animal Science	2	6.3%

Based on survey data, the camp attendees heard about SciGirls from the following sources:

	Number	Percent (N=32)
Parent/Guardian/Grandparent	15	48.4%
Friend	5	16.1%
Teacher	5	16.1%
NHMFL Open House	3	9.7%
NHMFL Outreach	1	3.2%
School poster	1	3.2%
Newspaper	1	3.2%

School Data

Average grades in math and science (self reported)

Grades	Number	Percent (N=32)
A's	15	45.5%
A's and B's	6	18.2%
Not reported	11	36.4%

78% of these students had taken honors or advanced classes before the 2010 summer. 85% planned to take honors or advanced classes in the next school year. Of the 32 who responded, three (9%) did not have the option of enrolling in honors or advanced classes. However, two of these girls planned to enroll in them in the future.

79% of the students had had someone talk to them about becoming a scientist or engineer. 61% had had someone talk to them about the classes needed in middle and high school to prepare them for college. And 55% of the girls had had someone talk to them about the importance of math for their future science career. (The individuals who spoke to these girls were Family members (29/32), Teachers (25/32), and friends (17/32)). All of these students were confident in their overall school abilities since all of them indicated that they were capable of getting straight A's. The campers indicated that their peer group within school valued education (as indicated by their desire to get good grades) and 55% of the campers indicated that members of their peer group were also interested in a STEM career. Most of these campers said that their close friends were girls (75%) although having role models who were women was not necessary for most of these girls (65%). Only 30% of these campers believed that gender discrimination existed in STEM careers.

Career Motivations

All of these campers indicated that they wanted to help others in their future career. All of these campers also wanted to work in a field where they could better understand how the world works.

Demographics separated by camp.

Grade level	SciGirls I (N=16)	SciGirls II (N=16)
6 th graders	44%	0%
7 th graders	66%	0%
8 th graders	0%	50%
9 th graders	0%	44%
10 th graders	0%	6%

Race and Ethnicity	SciGirls I (N=16)	SciGirls II (N=16)
African American	25%	18.75%
Asian	12.5%	12.5%
Latina	6%	0%
Native American	6%	6%
White	56.5%	62.75%

School Type	SciGirls I (N=16)	SciGirls II (N=16)
Public	62.5%	62.5%
Magnet/Charter	18.75%	6.25%
Private	18.75%	31.25%

Grades in science and math classes	SciGirls I (N=16)	SciGirls II (N=16)
A's	31%	62%
A's and B's	38%	0%

Not entered	31%	38%
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SciGirls I was open to rising 6th and 7th graders, whereas SciGirls II was open to rising 8th, 9th, and 10th graders. For both camps, 62.5% came from public schools. There was a slight difference in ethnicity and race for the camps with SciGirls I having a slightly more diverse population than SciGirls II.

Both camps had similar demographics for parents graduating from college. One difference between the camps was the number of campers whose parents worked in a STEM field. Eight of SciGirl II campers had a mother who worked in STEM compared to only one of the SciGirl I campers. Campers in both camps had similar levels of family support for their science interest. And students from both camps had similar STEM interests.

More students in SciGirls II had adults and friends talk to them about future plans and the necessary education requirements for these plans.

Self Reported Reasons for Attending the Camp

(The participants could select more than one reason).

	Number	Percent
Interested in science	18	56%
Sounded fun/interesting	14	44%
Learn more about science and STEM careers	9	28%
Make new friends with similar interests	6	19%
Interested in STEM careers	5	16%
Hands on activities/Field trips	3	9%
Looks good on college recommendations	1	3%

The activities that occurred are summarized in the following tables:

SciGirls I Schedule

	Monday July 19	Tuesday July 20	Wednesday July 21	Thursday July 22	Friday July 23
AM	Magnet Lab (Creating Electromagnet)	Leon Sinks (hiking sinks and talking about Karst system)	Animal Shelter (Tour of shelter, presentation on animal diseases, observe spay).	Full Earth Farm (Tour of farm with discussion of the science behind organic farming).	Engineering activity
PM	Water Testing at Magnet Lab (discussion of water pollution and its effect locally and globally)	Wakulla Springs (swimming and boat ride)	Observed different pests under microscopes, learned about the effects of heat on animals and how to give an IV to an animal)	Girls worked on water testing Presentations	Antarctic Research Facility at FSU

	Monday July 26	Tuesday July 27	Wednesday July 28	Thursday July 29	Friday July 30
AM	SATS	Wolf Preserve	WFSU	Quarry (Explored local quarry and collected bones, teeth, rocks) during lunch a local paleontologist explained what they had found.	Surveys, finish projects
PM	SATS	Wolf Preserve	FSU Chemistry Outreach	Work on Projects	WFSU Reception 5:00-7:00

SciGirls II Schedule

	Monday July 19	Tuesday July 20	Wednesday July 21	Thursday July 22	Friday July 23
AM	Magnet Lab (Creating Electromagnet)	Leon Sinks (hiking sinks and talking about Karst system)	Engineering (Dr. Englander from NHMFL did powerpoint presentation on engineering)	Full Earth Farm (Tour of farm with discussion of the science behind organic farming).	Marine Lab with Dr. Hughes (Described what she did and then had the girls collect samples and simulate her daily activities)
PM	Water Testing at Magnet Lab (discussion of water pollution and its effect locally and globally)	Wakulla Springs (swimming and boat ride)	Nanotubes – Engineer explained what nanotubes are and the girls created them out of balloons.	Girls worked on water testing Presentations	In the afternoon, Ricki Ott spoke to the girls about her career in science and advocacy.
	Monday July 26	Tuesday July 27	Wednesday July 28	Thursday July 29	Friday July 30
AM	Animal Shelter (Tour of shelter, presentation on animal diseases, observe spay).	SATS	SATS	Quarry (Explored local quarry and collected bones, teeth, rocks) during lunch a local paleontologist explained what they had found.	Surveys, finish projects
PM	Observed different pests under microscopes, learned about the effects of heat on animals and how to give an IV to an animal)	SATS	SATS	Work on Projects	WFSU Reception 5:00-7:00

Post Survey Data

General Data

An important indicator of a successful camp are the number of participants who would tell others to attend and since most of the SciGirls participants heard about the camp via other people, these recommendations are crucial. All but one of this year's participants said that they would recommend this camp to a friend. All but one student claimed that their expectations for the camp were met. (The one outlier for both of these categories was interested in the medical field and this was not covered during the camp. However, her other comments regarding the camp were positive.) The campers were asked to explain why they felt that their expectations were met. Below are a few comments.

SciGirls was a whole lot better than I thought it would be. At first I thought only a couple of days would be fun, but it turns out the whole thing was fun!!

My expectations for SciGirls were actually exceeded because we went to a lot of cool places and did a lot of hands on things and we met lots of girl scientists.

My expectations for SciGirls were met by allowing me an opportunity to learn about new and interesting areas of science in a fun environment with other girls who shared similar interests.

The program allowed me to actually learn new things about science.

To triangulate and support the campers' survey responses, we also surveyed parents on the final night of the camp. Parent surveys were handed out to parents/guardians as they walked into the reception. Of the 32 campers who were present, 31 parents completed a survey and returned it to the researchers. Based on these responses, we were able to identify the following:

- All of the parents surveyed felt that the application process met their expectations (78% strongly agreed).
- All of the parents surveyed felt that the information regarding the camp calendar and activities was well organized and arrived in a timely manner (81% strongly agreed).
- 94% of the respondents felt that the length of the camp was just right, one parent thought it should be longer and another was not sure.
- All of the respondents felt that the cost of the camp was reasonable (81% strongly agreed).
- 50% of the parents said that their perceptions of WFSU had changed (more positive) as a result of the camp. The remaining 50% already had positive views of WFSU)

Increased my awareness regarding the extent of their community involvement.

I was not aware of the participation in education.

I have always loved WFSU, but now I see how involved WFSU is in the community. They really make a positive difference.

I did not realize that WFSU has such a strong connection with the scientific community.

More socially engaged than previously perceived.

- 66% of the parents said that their perceptions of NHMFL had changed (more positive) as a result of the camp. The remaining 34% already held positive views.

Had no idea they devoted so much energy to outreach.

Their ability to break down some tough science to kids this young is awesome.

I have always loved the Mag Lab, but now I see how involved they are in the community. They really make a positive difference.

Great to get kids, especially girls involved in science and ability to see real world science careers.

I am glad to see that they show such an interest in our youth.

The NHMFL has a fantastic education program.

I see the science learning initiative augment the research initiative.

Changes in Science Interest

There were some statistically significant changes from the pre to the post survey for the participants. More students indicated that they look forward to science class after camp. And more students indicated that they planned to join extracurricular science activities during the next school year after camp.

Based on the post survey responses, the majority of the participants felt that the camp had increased their interest in science (78%) and science careers (97%). Those students, who did not mention an increased interest, said that they already had a high interest in science and STEM careers before camp. These young women indicated that the camp had helped them maintain this interest. When the participants were asked to explain why they felt that their interest had changed, here are some of the comments that they wrote:

Now I know that science isn't just mixing two chemicals together it's saving someone's life it's studying fossils.

I realized that there is more science out there than I thought, and I am now determined to pursue a career in science.

I am more interested now that I have seen what other types of science there is. Now I am even more passionate about pursuing a career in science.

I learned you can have fun while learning. That scientists aren't super boring geniuses.

I was interested in science before SciGirls, but I didn't have as much appreciation for it as I do now. I am much

more interested in science now because I got to do so many things that were hands on and helped me learn while having fun. I love science more than I did before, even though I was interested to start with!

Activities that had largest impact on students interest in science

The students were asked to list the activities that had the largest impact on their interest in science. (Students could list more than one activity). These activities and a comment that best exemplifies the general description are included below.

	Number	Percent	Comments
Marine Lab	10	31%	<i>I really learned how the effects of anything could change ocean life.</i>
Animal Shelter	10	31%	<i>Going to the animal shelter because I now know that I really want to become a vet.</i>
Quarry	7	22%	<i>The quarry, I didn't realize how much looking for clues of the past interested me.</i>
Wolf Preserve	3	9%	<i>Going to Seacrest. I never thought people could be so passionate and caring to an animal like they were. Now I know what a true scientist is.</i>
Nanotube Activity	3	9%	<i>The engineering activity affected my interest in science the most because I learned so much that was extremely interesting.</i>
Water Testing	3	9%	<i>The water testing affected me the most because that was the thing I knew least about.</i>
FSU (Chemistry)	2	6%	<i>The chemistry demonstration because that is now my new career choice.</i>
WFSU	2	6%	<i>Going to WFSU. Now I kinda want to be a director like the real director I met</i>

Teachers Observations of Participants' Interest in Science

The teachers post survey comments supported the top four activities listed above. The teachers indicated that all of these activities were “hands on”, which kept the girls interest and exposed them to STEM fields that they were not familiar with (i.e. quarry and wolf preserve) or that they did not know much about the daily activities (i.e. marine biologist and veterinarian). One teacher noticed that some of the girls’ views of science changed in that they saw science fields as areas where scientists can help others and the world: “Many girls’ perspectives changed in that they began to see science as something that is done to help change the world, even in small ways. Their views changed in that they learned that science can be about interacting with the environment and it involves working with others.”

Another teacher expressed how the girls’ “eyes were opened” to the variety of options there are in STEM fields:

“I felt as if the students walked away with a broader understanding of what science is and what types of jobs that you could have within the realm of science. They were constantly discussing the fact that they didn’t know scientists did “that” or that they would get to work outside. So I do believe that on some level their perceptions were changed. I think in particular this is true about engineering. I find that most of the girls have very little knowledge of what engineers do and exposing them to those experiences really opened their eyes.”

Two of the teachers discussed the observed changes in certain students who did not appear interested in science at the beginning of camp. “By the middle of camp she showed genuine interest in the science we were exploring. She even was actively participating in the activities that were happening and led the other girls when she was asked.” Similarly, the other teacher described how one group of girls who were not showing an interest in STEM fields at the beginning, were very “involved” by the end.

Parent’s Perceptions of Changes in Daughters’ Interest in Science and Science Careers

The parents served as another source of triangulation for this category. All but one of the parent respondents felt that the camp had increased their child’s interest in science. The one parent, who disagreed, wrote that her daughter was already highly interested in science before the camp. 84.4% of the parents said that the camp increased their daughter’s interest in science careers. Those who were unsure or disagreed wrote that their daughters already had a strong interest in science careers.

(N=32)	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
My daughter's experience at the camp increased her interest in science	28 (87.5%)	3 (9.4%)	0%	1 (3.1%)	0%
My daughter's experience at camp increased her interest in science careers	25 (78.1%)	2 (6.3%)	4 (12.5%)	1 (3.1%)	0%

Changes in Views of Scientists

Students

Half of the campers had met a scientist before attending camp. By the completion of the camp, all of the participants had met, worked with, and talked to a STEM professional in our community. 91% of the campers said that they could see the STEM professionals that they met as role models or mentors for their future careers. (The three girls who said no to this question

indicated that they were still unsure of their future career and therefore, couldn't make a statement about mentors).

There were a number of positive statistically significant changes in the campers views of scientists based on the pre and post surveys. After camp, more students believed that scientists work with other people to solve problems not alone in sterile laboratories. Significantly more students recognized that scientists do not follow a set method to solve the problems (i.e. the scientific method) after the camp. And significantly more students recognized that scientific conclusions can change when new evidence is presented.

Before the camp, only one-third of the girls had a positive view of scientists. Based on the post survey responses and subsequent comments, we saw a large improvement in participants' views of scientists with 67% of the respondents discussing a positive view.

	Changed from a stereotype to a positive	Maintained positive view	Maintained stereotype of scientists
Number	11	11	10

Comments that were coded as stereotypes described scientists as working in sterile labs, having white hair, mixing potions, etc. Two examples of these are below:

I picture potions, solutions, purple gloves, a white, jockey robe. Problems to solve on a chalk board, equations, and goggles.

I actually always picture an old man with a bald spot in a bright white lab coat. It is an image that stuck with me ever since I was a child...

Although eleven girls changed their views of scientists from a stereotype to a positive view, it is still alarming that after meeting and working with multiple STEM professionals, (none of whom looked like the stereotype they described), ten girls maintained their stereotypical views. These individuals who maintained a stereotypical view of scientists may be good candidates for a follow up interview to determine their reason for this response. The other students who responded positively said the following:

Scientists don't just work in a lab; I realized that there are more careers to do with science than I thought, and some of them that I didn't know anything about are interesting. I think that science is a broad word now, that it isn't just one thing and there are many more things to it, different fields of science and such.

When I picture a scientist, I picture someone who finds things out about our world and makes ideas about how to do things based on their data.

I picture a scientist as someone who asks questions, investigates, and experiments. They are smart, unafraid to try

something new, and creative. Scientists go out and do something to benefit the world.

Now I picture a ordinary person who wants to do good in the world.

At first I imagined a man in a white coat with chemicals but now i see regular people outside testing water and just doing thing that we do on a normal basis.

Now, when I think of a scientist I think of someone with a waterproof notebook in their hand observing the behavior of zooplankton in the wet lab at the Marine Lab.

Teachers' Observations of Participants' Changes in Views of Scientists

The teachers again served as a source of triangulation for the positive changes described by the students. One teacher described the trajectory of some of the older girls who were making fun of a scientist, who was leading the boat tour on the second day of camp. But by the end of camp these girls were asking scientists questions and showing general respect and interest. Another teacher summarized the positive changes in students' views of scientists as:

The girls were constantly talking about how cool the scientists were and how cool their jobs were. I think the camp gave them a chance to see scientists as real people not as these very distant people that they had very little in common with. I think that the many scientists that we work with do a great job of interacting with the kids and giving them an experience that shows the girls that scientists are not always nerdy lab people. I also think they have the opportunity to see that scientists can be farmers or chemists ...and everything in between. Rather than just seeing them as one particular stereotype.

The Benefits of an All-Girls Camp

SciGirls began as an all-girls camp because that was the stipulation of DragonFly television for funding. The directors of the camp have continued to maintain the all-girls aspect because they feel that it is beneficial. This benefit was mentioned by the majority of the participants, parents, and teachers.

Students

Ninety four percent of the participants said that they liked the camp being just for girls. Two girls said that they did not like the all-girls atmosphere.

Some of the positive responses were:

I go to a public school and while I do not dislike boys it was nice to be with just girls for awhile.

Girls can relate about the things they did and girls are easier to handle but I also think there should be a coed one.

Because the social environment was very good, and more girls need to be encouraged to learn science.

Having the camp be just for girls means there are less distractions and it can focus on getting more women into the realm of science. (plus nerdy guys my age are gross!)

I don't have to worry about boys making fun of me or what a boy thinks of me and it also gives me a chance to be the real me and speak my mind and not have to worry if someone thought it was stupid.

People sometimes think that boys are more into science than girls, and we can show them that that isn't true. Girls kind of think in similar ways too.

When the positive responses (n=30) were further analyzed, they fell into four categories:

Categories	Number	Percent	Comment
Easier to focus/less worried about impressing boys/easier to express oneself	17	57%	<i>Because it helps girls to focus on science than just thinking how cute a guy is.</i> <i>Because then you were able to express yourself more.</i>
Easier to make friends/nice to be around just girls	9	30%	<i>it is sometimes nice to get away from boys for a while</i>
Need more women in STEM	7	23%	<i>I think it was a lot more fun being just all girls and also because not many girl enroll in a science career.</i>
Less competition	2	7%	<i>I like the camp being just for girls because it's not as competition based as it would be if there were boys too.</i>

The two participants who did not like that it was an all-girl's camp gave the following reasons:

"No because I think Boys would like to do the camp as well."

"It was a little too gender oriented."

Both of these participants indicated that they had a lot of male friends and felt that they related better to boys than girls.

Parents

All of the parents who responded to this question (N=29) thought that the single gender aspect of the camp made a positive difference for the campers.

At this age girls might be more inhibited (self-conscious) to express themselves around boys. It empowers the girls.

It gives the girls an opportunity to lead.

Yes, it does make a difference. For girls this age, they normally have body image issues. If we take boys out from

the mix, they can be more focus on more important issues.

Gives the girls a non-competitive space to listen, participate, and ask questions.

Teacher Observations

The teachers were the third source of triangulation for the observed benefits of the single gender atmosphere. One teacher described how she believed some of the shy members of the group would have struggled to “speak up and ask or answer questions” if boys had been present. She said that without the single gender component, “it would have taken much longer for many of these girls to have the confidence to answer questions and work together”.

Another teacher believed that the all-girls environment allowed the young women to meet more girls with similar academic interest and to see that “its okay to explore those interests”. The other two teachers discussed how the single gender allowed the girls to focus on science as opposed to worrying about “how they looked”.

Increased Confidence

Although increasing participants’ confidence levels is not a primary goal of the camp, each year, parents indicate anecdotally that their child’s confidence has increased. To triangulate this, we included this topic on the post parent survey and teacher survey. All of the parents indicated that participation in the camp had increased their daughters’ confidence in meeting new people and confidence in succeeding in science.

(N=32)	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
My daughter's experience at the camp increased her confidence in meeting new people	20 (62.5%)	12 (37.5%)	0%	0%	0%
My daughter's experience at the camp increased her confidence in succeeding in science	27 (84.4%)	5 (15.6%)	0%	0%	0%

This increase in confidence was also supported by teacher surveys as well. Two of the teachers described observed changes in individual girls. The first example described the changes in confidence of a shy girl who participated in SciGirls I.

It took her three days before she spoke to the others in the van. It took her several more days to be able to eat lunch with a peer group. She was one of the first girls to raise her hands to

answer questions. As the camp went on, she began to answer more questions from the scientists almost always correctly. By showing her intelligence, other girls began talking more to her which allowed her confidence to grow as time progressed. She became less timid in the group and more confident in herself in all areas.

This example summarizes many of the students who come to this camp: individuals who have a strong interest in science and large knowledge base but who have often been ostracized in the social setting of school. This camp gives girls like this the opportunity to use their knowledge and be respected and admired for it. Two of the other teachers provided similar examples of girls who showed more confidence by talking and interacting more as the camp continued. These girls discussed how beneficial it was to be around other people with similar interests. They described how comfortable they felt asking questions and participating and not having to worry about people making fun of them

The other example provided by a SciGirl I teacher described the increased confidence in one of the campers who had been told that she would not be successful in her desired STEM career.

“One student in particular had been told by her family that she probably wouldn’t be able to be a vet. After meeting Dr. Reeves who told her to never let anyone tell her “what she can and can’t do” I was able to see a visible change in the way she participated and the way she talked about her future career. She had several conversations in the car where she would say “I am going to be a vet, and I know it will be hard, but I really want to do it”.

And finally all of the teachers described the confidence they observed in the students in their overall willingness to try new things (i.e. “watching a surgery”, “picking up fish”, “hiking”, “snorkeling”) or just show an interest in some STEM topics that may not be regarded as “cool” or “fun”. The students expressed this change in confidence in terms of pursuing STEM careers and the change in perception they developed as exemplified by one student’s comment: *“Now I know that science isn’t just a geeky thing.”*

Scientists as Mentors

Before the camp, half of the participants had never met a scientist. This camp provided them with not only the opportunity to meet and talk to scientists but to learn more about what they do. By the end of the camp, all but three students said that they had met a person during the camp who could serve as a science role model or mentor. One of the goals of this camp is to help students learn more about science and science careers; it is wonderful to see that an unintended consequence of this goal is exposing girls to science role models and mentors. To conclude, we chose to let the students and parents speak for themselves.

Student comments:

SciGirls was much more than I could have hoped for. I will be back! This camp is AMAZING! They care a lot about

science and know what you have to do to learn about and get a career in science.

It was the best camp I have ever been to and it was totally and completely worth waiting for and being excited about!! it was one of the best experiences ever.

I have learned more about science in the past two weeks than I did in the entire last school year.

Parent comments:

This is a very organized camp that is a phenomenal opportunity for young girls to explore different areas of science. Thank you!

She had a wonderful time- said that without prompting. She also had a conversation she initiated about what she thinks she would be good at for a profession-I talked about science careers.

Diversity of experience is really great. Website is up to date and competently organized and informative.

This has been a wonderful experience for her. She learned so much and had a great time during the 2 weeks.