Key Findings from Project Scientist, Summer 2018

Elizabeth Stearns
University of North Carolina at Charlotte (UNCC)

Sandy Marshall
Project Scientist
Overview of Findings

• Findings from
  • Surveys of scholarship girls attending Project Scientist
  • Draw-a-Scientist Test
  • Interviews with scholarship girls
  • Interviews with interns
Survey Instrument

• Fourteen questions overall
  • Series of questions from the Program in Education, After-Care, and Resiliency (PEAR) Common Instrument to measure science interest
  • Additional survey items specific to Project Scientist
  • Items to assess growth mindset
• 4-point scale: Strongly disagree (1), Disagree (2), Agree (3), and Strongly agree (4)
Survey of Project Scientist Campers
Project Scientist Survey: Summer 2018

This is a survey with no right or wrong answers. Please answer the following questions as honestly as you can. This survey will help us learn about students’ interest in Science, Technology, Engineering and Math (STEM). Please indicate how much you DISAGREE or AGREE with the following statements.

If you have any questions, please raise your hand and ask for help.

For each of the following statements, please circle the number that best describes what you think about the statement. Mark only one answer please!

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I get excited about science.</td>
<td>☒</td>
<td>☐</td>
<td>☑</td>
<td>☒</td>
</tr>
<tr>
<td>2. I like to participate in science projects.</td>
<td>☒</td>
<td>☐</td>
<td>☑</td>
<td>☒</td>
</tr>
<tr>
<td>3. I will need science for my future work.</td>
<td>☒</td>
<td>☐</td>
<td>☑</td>
<td>☒</td>
</tr>
<tr>
<td>4. Science is fun.</td>
<td>☒</td>
<td>☐</td>
<td>☑</td>
<td>☒</td>
</tr>
<tr>
<td>5. I do science-related things that are not for schoolwork.</td>
<td>☒</td>
<td>☐</td>
<td>☑</td>
<td>☒</td>
</tr>
<tr>
<td>6. I want to work harder when something is hard or challenging for me.</td>
<td>☒</td>
<td>☐</td>
<td>☑</td>
<td>☒</td>
</tr>
<tr>
<td>7. I know or have met a woman scientist.</td>
<td>☒</td>
<td>☐</td>
<td>☑</td>
<td>☒</td>
</tr>
</tbody>
</table>
Survey Findings Overview

- Project Scientist continues to attract girls who have very positive attitudes toward science.
- Before the camp started, almost all girls agreed or strongly agreed that “I get excited about science.”
- N=77
Girls who attend Project Scientist are very enthusiastic about science in general. Before camp started, 95% strongly agreed that “science is fun.” Only one girl disagreed that “science is fun.” N=77

Girls are also very confident in their own ability to do science. 90% strongly agree that “I can do well in science.” 94% strongly agree that “women are good at science.”
Changes in Science-Related Attitudes

• Substantial change was seen in exposure to female scientists from girls’ first to last day at Project Scientist
  • Most other measures were already so positive that there was no room for growth

• Comparisons were based on scholarship students who attended Project Scientist camp and answered questions at the beginning and end of their camp experiences (N=38)
Percent Strongly Agreeing that they Knew a Woman Scientist at Beginning and End of Project Scientist Program

<table>
<thead>
<tr>
<th></th>
<th>Pre-camp</th>
<th>Post-camp</th>
</tr>
</thead>
<tbody>
<tr>
<td>I know or have met a woman scientist</td>
<td>61%</td>
<td>83%</td>
</tr>
</tbody>
</table>
Findings from Draw-A-Scientist Test

- Girls are given a blank piece of paper with the prompt, “draw a picture of a scientist” at the beginning and end of their time at camp.
- Each picture is coded using the DAST-C rubric, which assigns 1 point for each of 15 potential elements included in the picture.
- The higher the DAST-C number, the more stereotypical the depiction of the “scientist”
Findings from DAST-C

- Drawings at the end of camp depicted less stereotypical depictions of scientists than drawings at the beginning of camp.
- Even the stereotypical depictions featured female scientists.
Findings from DAST-C

- At the beginning of camp, 18% of girls depicted a male scientist only.
- At the end of camp, only one girl drew a male scientist in her DAST
  - Albert Einstein
  - My scientist name is Albert Einstein. He is doing chemistry.
  - My scientist is making a volcano.
Examples of DASTs

This is me!

It is a woman scientist acting like a boss in her white coat.
I drew a girl about to do her science work.

I drew a woman scientist mixing a bunch of liquids together and creating something.

I drew a person in a lab coat that is studying matter of bacteria.
Summary of Survey Findings

• Project Scientist attracts girls who hold positive attitudes toward science before the program begins and have a great deal of confidence in their own abilities to do well in science

• Girls are more likely to know or to have met a woman scientist at the conclusion of the program

• Drawings of scientists reveal girls are more likely to think of scientists as being women at the end of the summer
Student Interviews

• Five scholarship students from 99th Street Elementary were interviewed to gain more in-depth understanding of their experiences at Project Scientist

• Interviews were 10-15 minutes in length

• Questions ranged from description of school and favorite classes to more specific questions regarding their experiences with Project Scientist
Findings from Student Interviews

• Several themes featured prominently in the student interviews
  • Love for science
  • Project Scientist effects
    • Confidence in science
    • Opportunities in science
    • Growth mindset
    • Role models in science

**In following slides, direct quotes are presented in italics**
Students Love Science!

• I like science because you get to learn a lot of new things about the world.

• I like building stuff in science and mixing things around in science.”

• My favorite subject is science because I learn about the world and everything that's with the environment. Science is really fun. It's not all about, like, just sitting in a lab coat and doing writing. It's really fun, actually.
Confidence in Science

• Project Scientist gave girls confidence that they would do well in science classes in the future, partly by exposing them to various topics
  • I'll do well because this Project Scientist really helped me with science
  • [I’ll do] a good job [in middle school science], because there's like a science camp and I learned a lot about science …We learned about, like, finding fossils, like when we went on our expedition, and we learned about, like, there's this one project that we did with science, like, we were learning about different, like, metaphors, like, for rock…we learned about different methods that, like, dinosaurs do to help them survive.
Opportunities in Science

• Project Scientist gave girls opportunities to expand their knowledge of science beyond the opportunities to learn that they had in school
  • I don’t really have science classes in school...I didn’t really like engineering and then when I saw the hyperloop, like engineer stuff, I liked it better.
  • We don't do science [in school] that much because -- because we have, like, we have to have more into math.
  • It [Project Scientist] helped me see that not everything in sciences are boring, it's actually really fun and interesting to learn new things, and it helped me, like, view different perspectives of things.
Growth Mindset

• Project Scientist emphasized a growth mindset that girls frequently mentioned.
  • *I learned that if you mess up on the first try, keep trying until you get it right.*
  • *I used to give up whenever I don’t get stuff right, and people keep telling me to come on, and, like, keep trying, but I never listened to them. Now I do.*
  • *I thought science was like — I know science was fun and stuff, but I thought science was going to be, like, too hard to do and I couldn’t really do it that much. And so once I came to Project Scientist I learned that it’s, like, you can have hard times but — and it’s okay to fail because you can always learn from your mistakes, and you can always push through that.*
Role Models in Science

• The girls also discussed how important role models were and how they enjoyed the STEM Superstars and project staff.
  • And so I like — I like about what I do at Project Scientist because we get to learn a lot and we get to figure out what we want to be, and it’s so great to see inspiring woman come up and to take the time and talk to us, and we love it. I love it because we get to see how these women who do their job inspire people.
  • I learned this summer that — at first I thought there was a lot of — I thought there was only men, so the first day we had to draw somebody who was a scientist, and the first person I drew was Einstein because I thought there was only men. And so what I learned at Project Scientist, there was a lot more women in science and so we should encourage women to do science.
Intern Interviews

• Seven summer interns at both California and North Carolina sites were interviewed to gain more in-depth understanding of their experiences at Project Scientist

• Interviews were 15-25 minutes in length

• Questions ranged from discussions of academic background to more specific questions regarding their experiences with Project Scientist
Findings from Intern Interviews

• Love for science
• Career plans in STEM
• Career connections from Project Scientist
• Professional development
Love for Science

Project Scientist interns were very enthusiastic about science.

• Oh, I love science. I've loved science my whole life. Something about exploring the world around us is just amazing. A lot of the principles of, like, life also apply to the scientific principles, which kind of makes sense because we live in this world. But just seeing -- I don't know, just seeing the intricacy of the world around us down to, like, every little atom and subatomic molecule all the way up to, like, the whole ecosystem that we live in, it's just amazing to see how it all works together so effectively, and the role that we play in that.

• I like how broad it [science] is. I mean, I've narrowed it down to marine biology, but there's still so many things I can do with it…I think I like that flexibility of not being stuck kind of doing the same type of thing.

• I just really enjoy how science studies -- well, since I do love biology, like, studies life and the reality of this world, and tests, like, what we see. And then we can really just learn about, like, our own bodies and all the life around us, and even, like, the laws of physics that sometimes we can't fully understand.

• I guess my general attitude towards it [science] is that I enjoy that it challenges me and I like that it allows me to think in a variety of different ways.
Role Models in Science

Interns discussed how important STEM Superstars were to them and to the kids.

- I realized that these kids really do like seeing women in the science field. So like, I learned that it's really important that these kids have a role model to look up to. So that's another thing that motivates me to keep going in science, that there are more role models that these kids can look up to, and then hopefully grow up to become.

- So a lot of times we see that -- or we hear that there aren't that many women in engineering, so to see people that are able to kind of overcome those barriers, and that there are actually women that do it. Even though they're in the minority, they are able to do it. And there are whole companies in the Charlotte area that are, not just engineering, but even like tech companies that are primarily women that run the company, and I didn't even know that existed. So seeing that, and then seeing how, like, everyone is able to work together to make it so that it's not the way that it is right now is really nice to see.
Role Models in Science

• For a normal day we'd start out with our STEM Superstars, which was just a presentation from a woman in a STEM field, usually related to what we were doing that week. And I, myself, really liked them, and I know that the girls liked them. I think for the younger ones...I think introducing them to a female figure, like in engineering, from that age is important, even if they're not completely understanding what they're saying. But I don't know, I also like seeing just other women in STEM fields as well.

• It was inspirational hearing some [STEM Superstars] that will say they started on an unconventional path and still got to where they got, because I took a year off of school, and I transferred a little bit late, so hearing that they didn't become successful at, like, 22 years old is -- eases your mind, I guess.

• Because we actually got to see a lot of women who are researching specifically, and like, I don't know why, but I just never realized that there's women, like, working really hard, like, in their labs every day, and they're just, like, really passionate about their work. So I think, like, that was so inspiring and so cool to see.

• I honestly feel like a lot of the fellows and I, we would be talking, and I truly think that we benefited just as much if not more from the STEM Superstars than the kids did. Just because, like, I don't know, we -- I don't know, appreciate it more -- not appreciate it more, but I guess we kind of understood what was going on more. But yeah, there was a lot of STEM Superstars that I really enjoyed.
Career Connections in STEM

Interns translated some of the things they learned into future action.

• I think the last week, we went to visit research labs. And so we went to UCLA and USC labs, and that really made me realize how important it was for me to start doing research as soon as possible. Because these -- we're like -- people talking about what they're researching and it's stuff I've never heard of. Like this one group of girls was trying to make TV colors, which was so cool. So it really made me realize that, oh, I need to get this done. I need to be like them and start researching. So that really motivated me.

• I think what I learned is that I would like to continue doing education outreach, like further into my career.

• I think, like, seeing the STEM Superstars and seeing what they do and what they're passionate about, like, did make me -- because they're like, oh, this is a really cool field to grow into, or people who are doing research definitely encouraged me to at least try out research while I'm at Berkeley.

• I guess since we focused on a wide variety of STEM Superstars, there wasn't -- there was careers that I didn't necessarily ever, like, actually think to be interesting or, like, even existing. So I guess in that sense, I learned along with the girls that there's so many different fields outside of just, like, being a lawyer or like, being a doctor and things like that.
Professional Development

Interns learned many lessons during the summer, including those that will help with future career development.

• Well, I learned how hard coding is, because I've never really been into computer sciences, and my first week at USC was tech week, and that was, like, so awesome. It was just so amazing seeing, like, 5-year-olds learn how to code. It was so cool, because I barely knew how to code. So I was learning with them how to code.
• But because of this [interning at Project Scientist], I was challenged to balance all these different things at once, and it was exhausting at times, but it was a really good experience for time management purposes.
• A lot of the women [STEM Superstars] ran their own businesses, which was interesting to see how they were able to manage running their business and managing their own families, having a personal life outside that too. So that was really nice to see how they are able to do that.
• One really amazing thing that I learned from Project Scientist is how to manage an organization as big as it is, and be very organized about it. They had, like, every minute of the day timed out...And to see how they book and manage all of that at the same time and have everything so detailed and planned so well is amazing. So I really liked seeing that.
Professional Development

Interns learned many lessons during the summer, including those that will help with future career development.

• So I love being a manager…I loved the idea of organizing, like, just people, and kind of getting a big-picture idea of things. So I really liked having a big-picture look at Project Scientist this summer and seeing the weak spots and the strong spots. It was nice.

• Something that I did really realize this summer in talking with Sandy (phonetic) a lot about how a company runs is how much I like the feel of a start-up. Before this I had always thought I would go to a big corporation and be some kind of middle manager, but I really admire Sandy and what she does. And I think it would be really interesting to do that kind of job where you have a company that isn't as big and kind of getting to take more ownership of it. And you see your work -- like, you see the results of your work more in such a smaller company, which is really nice. And the culture of the company where I know everyone who works here

• I think that seeing how the girls in the camp were out of school, and then they were going right back into school, but how they still got involved with whatever we were learning in the classroom and made it fun made me think about how, hey, I can go back to school, it's not that bad. And like, I should -- yeah, like, they can do it, I can do it sort of thing. They were pretty great.
Professional Development

Interns learned many lessons during the summer, including those that will help with future career development.

• Just like working with people, especially in a professional setting. I've done that before, but usually, most of my colleagues were, you know, around my age.

• So I guess, like, being in a setting where I was responsible as an adult, like, the -- I don't know. The site director, the teachers would say, okay, well, there's the adult. It was kind of, like, weird for me to be, like, well, I'm the adult, like, in this situation...I'm like, what? Who, me? So I guess to kind of take on that responsibility of, like, being in charge...So I guess just, like, learning to balance that and, like, being in a professional setting where you were, like, held liable for certain responsibilities, things like that. Because I never really worked -- I mean, like, I've been a student. So I haven't really worked, like, days where I'd be there, like, from 7 to, like, 6. So that was great for me.
Alternatives to Project Scientist

When asked what else they might have been doing if they had not been working at Project Scientist, interns had various answers.

• If I wasn't at Project Scientist, I'd probably be working at the summer camp. So I was going to be with kids anyway, except with Project Scientist, I was with kids and science. But without Project Scientist, I would have just been with the kids.
• Probably just working, like, a retail job or something. I didn't really have time to do any other sort of internship because I got back so late in the summer from studying abroad. So that's probably what I would have been doing.
• I probably would have kept looking for a coding internship until the last second, and then if I hadn't, like, given up and looked for a receptionist job or a food job if I really couldn't find anything.
• I might have gone — or stayed up in Berkeley to take summer classes. I think that was my main other option.
Key Findings from Project Scientist, Summer 2017

Elizabeth Stearns
University of North Carolina at Charlotte (UNCC)

Sandy Marshall
Project Scientist
Survey Instrument

- Twelve questions overall
  - Series of questions from the Program in Education, After-Care, and Resiliency (PEAR) Common Instrument to measure science interest
  - Additional survey items specific to Project Scientist
  - Items to assess growth mindset

- 4-point scale: Strongly disagree (1), Disagree (2), Agree (3), and Strongly agree (4)
Survey of Project Scientist Campers

Project Scientist Survey: Summer 2017

This is a survey with no right or wrong answers. Please answer the following questions as honestly as you can. This survey will help us learn about students’ interest in Science, Technology, Engineering and Math (STEM). Please indicate how much you DISAGREE or AGREE with the following statements.

If you have any questions, please raise your hand and ask for help.

For each of the following statements, please circle the number that best describes what you think about the statement. Mark only one answer please!

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I get excited about science.</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. I like to participate in science projects.</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. I would like to have a STEM job in the future.</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Science is fun.</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Survey Findings Overview

- Project Scientist continues to attract girls who have very positive attitudes toward science
- Before the camp started, almost all girls agreed or strongly agreed that “I get excited about science”
- N=17
Girls who attend Project Scientist are very enthusiastic about science in general.

Before camp started, 75% strongly agreed that “science is fun.”

No girls disagreed that “science is fun.”

N=17
Changes in Science-Related Attitudes

- Substantial change was seen in several areas from girls’ first to last day at Project Scientist
  - Exposure to female scientists
  - Future STEM aspirations

- All change was in a positive direction
  - No science-related attitudes worsened during the program

- Comparisons were based on scholarship students who attended Project Scientist camp and answered questions at the beginning and end of their camp experiences (N=14)
Percent Strongly Agreeing that they Knew a Woman Scientist at Beginning and End of Project Scientist Program (n=14)

"I know or have met a woman scientist"

Beginning: 36%
End: 86%
Percent Strongly Agreeing that “I would like to have a STEM job in the future” (N=14)
Percent Strongly Agreeing that “I could see myself as a scientist one day” (N=14)
Summary of Survey Findings

• Project Scientist attracts girls who hold positive attitudes toward science before the program begins

• Girls are more likely to know or to have met a woman scientist at the conclusion of the program

• Girls’ STEM aspirations improve over the summer

• Attitudes toward science showed positive change for girls
  • Especially notable considering the overall positive orientation toward science shown by campers prior to the beginning of camp
Project Scientist Key Findings
Summer 2016

Elizabeth Stearns
University of North Carolina at Charlotte (UNCC)

Sandy Marshall
Project Scientist, Founder/CEO
Overview of Findings

- Findings from surveys of girls attending Project Scientist for the first time (UNC Charlotte and Caltech)

- Findings from Draw-a-Scientist Test
Survey Instrument

• Twenty questions overall
  • Series of questions from the Program in Education, After-Care, and Resiliency (PEAR) Common Instrument to measure science interest
  • Additional survey items specific to Project Scientist
  • Items to assess growth mindset

• Assessed on 4-point scale: Strongly disagree (1), Disagree (2), Agree (3), and Strongly agree (4)
Survey of All Project Scientist Campers

Project Scientist Survey: Summer 2016

This is a survey with no right or wrong answers. Please answer the following questions as honestly as you can. This survey will help us learn about students’ interest in Science, Technology, Engineering and Math. Please indicate how much you **DISAGREE** or **AGREE** with the following statements.

If you have any questions, please raise your hand and ask for help.

**For each of the following statements, please circle the number that best describes what you think about the statement. Mark only one answer please!**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Science is something I get excited about.</td>
<td><img src="image" alt="Strongly Disagree" /></td>
<td><img src="image" alt="Disagree" /></td>
<td><img src="image" alt="Agree" /></td>
<td><img src="image" alt="Strongly Agree" /></td>
</tr>
<tr>
<td>2. I pay attention when people talk about recycling to protect our environment.</td>
<td><img src="image" alt="Strongly Disagree" /></td>
<td><img src="image" alt="Disagree" /></td>
<td><img src="image" alt="Agree" /></td>
<td><img src="image" alt="Strongly Agree" /></td>
</tr>
<tr>
<td>3. I would like to have a science or computer job in the future.</td>
<td><img src="image" alt="Strongly Disagree" /></td>
<td><img src="image" alt="Disagree" /></td>
<td><img src="image" alt="Agree" /></td>
<td><img src="image" alt="Strongly Agree" /></td>
</tr>
<tr>
<td>4. I talk about recycling, the environment, energy, or sustainability with my family.</td>
<td><img src="image" alt="Strongly Disagree" /></td>
<td><img src="image" alt="Disagree" /></td>
<td><img src="image" alt="Agree" /></td>
<td><img src="image" alt="Strongly Agree" /></td>
</tr>
<tr>
<td>5. I like online games or computer programs that teach me about science.</td>
<td><img src="image" alt="Strongly Disagree" /></td>
<td><img src="image" alt="Disagree" /></td>
<td><img src="image" alt="Agree" /></td>
<td><img src="image" alt="Strongly Agree" /></td>
</tr>
</tbody>
</table>
Project Scientist continues to attract girls who have very positive attitudes toward science.

Before camp started, almost all girls agreed or strongly agreed that “science is something I get excited about.”
Girls who attend Project Scientist are very enthusiastic about science in general. Before camp started, 68% strongly disagreed that “science is boring.”
Changes in Science-Related Attitudes

• Statistically significant positive change was seen in several areas from girls’ first to last day at Project Scientist
  • Exposure to female scientists
  • Thoughts about hard work and persistence
  • Science-related attitudes

• Comparisons were based on more than 180 children who had never attended Project Scientist and answered the survey at the beginning and end of their camp experiences
Exposure (%) to Female Scientists at Beginning and End of Project Scientist Program (n=188)

- Beginning: 42.1%
- End: 81.9%

Bar chart showing the increase in exposure to female scientists from beginning to end of the program.
Summary of Survey Findings

• Project Scientist attracts girls who hold positive attitudes toward science before the program begins

• Girls are more likely to know or to have met a woman scientist at the conclusion of the program

• Girls’ growth mindset also improves
Findings from Draw-A-Scientist Test

- Girls are given a blank piece of paper with the prompt, “draw a picture of a scientist” at the beginning and end of their time at camp.
- Each picture is coded using the DAST-C rubric, which assigns 1 point for each of 15 potential elements included in the picture.
- The higher the DAST-C number, the more stereotypical the depiction of the “scientist.”
Findings from DAST-C

- Drawings at the end of camp depicted statistically less stereotypical depictions of scientists than drawings at the beginning of camp.
- Girls frequently depicted themselves as scientists.
Several Types of Science Depicted

Geology

Botany

Meteorology

Computer Science

Chemistry
Findings from DAST-C

- Girls were significantly less likely to draw a male scientist at the end of camp (9.7%) than at the beginning of camp (23.1%)
The campers showed examples of the growth mindset in their DAST drawings.
Findings from Project Scientist

- Project Scientist had a substantial impact on girls who attended the camp
  - Exposure to role models succeeding in science was key in this process

- Attitudes toward science showed positive change for girls across both sites of the camp
  - Especially notable considering the overall positive orientation toward science shown by campers prior to the beginning of camp
Key Findings from Project Scientist, Summer 2015

Elizabeth Stearns
University of North Carolina at Charlotte (UNCC)

Sandy Marshall
Project Scientist
Overview of Findings

• Findings from surveys of girls attending Project Scientist

• Findings from Draw-a-Scientist Test

• Findings from interviews with college-aged interns working at Project Scientist
Survey Instrument

• Ten items taken from the Program in Education, After-Care, and Resiliency (PEAR) Common Instrument
  • Series of questions to measure science interest
  • 4-point scale: Strongly disagree (1), Disagree (2), Agree (3), and Strongly agree (4)

• Additional survey items specific to Project Scientist
  • Eight items
  • Same 4-point scale
# Survey of All Project Scientist Campers

## Project Scientist Survey: Summer 2015

This is a survey with no right or wrong answers. Please answer the following questions as honestly as you can. This survey will help us learn about students’ interest in Science, Technology, Engineering and Math. Please indicate how much you **DISAGREE** or **AGREE** with the following statements.

If you have any questions, please raise your hand and ask for help.

For each of the following statements, please circle the number that best describes what you think about the statement. Mark only one answer please!

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Science is something I get excited about.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I like to participate in science projects.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I like to see how things are made (for example, ice-cream, a TV, an iPhone, energy, etc).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I am curious to learn more about science, computers or technology.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I want to understand science (for example, to know how computers work, how rain forms, or how airplanes fly).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Project Scientist continues to attract girls who have very positive attitudes toward science.

Before the camp started, almost all girls agreed or strongly agreed that “science is something I get excited about.”
Girls who attend Project Scientist are very enthusiastic about science in general.

Before camp started, almost 80% strongly disagreed that “science is boring.”
Changes in Science-Related Attitudes

• Statistically significant change was seen in several areas from girls’ first to last day at Project Scientist
  • Excitement about science
  • Excitement about computer programming
  • STEM career aspirations
  • Exposure to female scientists
  • Perceptions of friends’ attitudes toward science

• All statistically significant change was in a positive direction
  • No science-related attitudes worsened during the program
Science Interest at Beginning and End of Project Scientist Program (n=245)

Science is something I get excited about

- Beginning: 3.50
- End: 3.60
Perception of Science as “Boring” at Beginning and End of Project Scientist Program (N=240)

Science is boring

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>1.39</td>
<td>1.25</td>
</tr>
</tbody>
</table>

**Legend:**
- Blue: Beginning
- Red: End
Interest in Computer Programming at Beginning and End of Project Scientist Program (n=234)

I like online games or computer programs that teach me about science

- Beginning: 3.29
- End: 3.42
I would like to have a science or computer job in the future

STEM Career Aspirations at Beginning and End of Project Scientist Program (n=242)
Exposure to Female Scientists at Beginning and End of Project Scientist Program (n=240)

I know or have met a woman scientist

- Beginning: 2.86
- End: 3.22
Perceptions of Friends’ Attitudes at Beginning and End of Project Scientist Program (n=239)

My friends like science

Beginning: 3.12
End: 3.24

UNC CHARLOTTE
Summary of Survey Findings

• Project Scientist attracts girls who hold positive attitudes toward science before the program begins

• Student interest in science and STEM career aspirations grow significantly during the program

• Girls are more likely to know or to have met a woman scientist at the conclusion of the program
Findings from Draw-A-Scientist Test

- Girls are given a blank piece of paper with the prompt, "draw a picture of a scientist" at the beginning and end of their time at camp.
- Each picture is coded using the DAST-C rubric, which assigns 1 point for each of 15 potential elements included in the picture.
- The higher the DAST-C number, the more stereotypical the depiction of the "scientist"
Findings from DAST-C

- Drawings at the end of camp depicted statistically less stereotypical depictions of scientists than drawings at the beginning of camp.
- Girls frequently depicted themselves as scientists.
DAST Examples

This Scientist is using code to make a game.
Findings from DAST-C

- Girls were significantly less likely to draw a male scientist at the end of camp (9%) than at the beginning of camp (16%)
Interviews with College-Age Interns

Interns praised the intern experience for several reasons

• Preparing them for teaching and leading classrooms

• Matching with veteran teachers was key

• Building confidence in teaching science

• Inspiring girls’ confidence in STEM
RESPONDENT: The teachers were great….just to walk by their classroom and watch them interact with their classrooms and their energy and how they interacted with their classrooms. I learned so much just from watching them interact...

RESPONDENT: Well with each lesson, for example we dissected sea urchins and I helped my teacher who was {PS teacher} prepared, just get the sea urchins down there and I got to help the students actually dissect sea urchins and just be involved. Yeah it was really exciting, be involved with the lesson and just kind of act like I was … a second teacher almost so it was a really awesome experience. I enjoyed it.

RESPONDENT: I really liked the hands-on in – class experience I got, especially being with {PS teacher}, she gave me a lot of …I got a lot of experience and observations with her. I learned a lot about everything from classroom management skills to teaching methods and how to differentiate for different students and how different hands-on activities work and how important they were to the girls. We were actually with the youngest girls… We made molds and casts of seashells and the girls absolutely loved it. We used play-doh to use a mold of the seashell and put it in the bottom of a Dixie cup and then we poured plaster of Paris on top of it. The next day we were able to pull the paper cups off and take the play-doh off and the girls were able to take home their casts of the seashells. It was so amazing to see the girls’ faces…they thought it was THE coolest things. So that was one of my favorite ones to do.
RESPONDENT: Being in college and taking college courses on education you kind of learn like strategies and um get kind of like the um how to deal with certain situations but you don’t actually get that hands-on experience so I think working with a teacher and getting to see how they prepared for the lessons and how they actually completed the lessons was very helpful . . . because that is something that you don’t see until you are actually in a classroom so I think that was very helpful to work with a veteran teacher and just see their preparation styles and their teaching strategies.

RESPONDENT: {PS teacher} was amazing just to like walk by her classroom or watch her interact with her students. I was not in her classroom but I feel like just watching her and watching her energy and watching how her classroom reacted to her with her high energy, I learned so much just from you know watching them interact from a distance.
INTERVIEWER: So why do you feel like you will be more confident teaching science now?

RESPONDENT: I didn’t really get a chance to like teach on, teach full on lessons, so like getting to see how lessons are taught and like that it is okay to make mistakes and like not everything works and not everything is going to go the way you want it to but like seeing that firsthand was nice. And seeing how just because something didn’t work one day doesn’t mean it cannot work another day.

RESPONDENT: Yes. I, I mean I think any of their, anything that we did could be changed to be either more challenging for upper grades or you know just gathered down a little bit for um the younger grades depending on how you plan the topic or the lesson . . .And I think really just having that inquiry based learning and letting them discover their own answers is great because that works in all grade levels and you know depending on their age level they are going to come up with different, different ideas and different answers . . .
RESPONDENT: It was hugely beneficial. I met so many people I wouldn’t have otherwise met and I really felt like I acted instead of just talking the talk, I really walked the walk um because I always say that it is really important to get girls and women interested in STEM subjects and into STEM careers and majors. But I have never really done any action to back that up and being a part of Project Scientist you can really see that impact you are making on girls’ lives when you talk to them about science and I can really see that more and more girls are going to go into STEM subjects, which is really exciting because I know that the more women are represented the easier it will be for future women in STEM.

RESPONDENT: One of the girls looked at me and she goes, “now we’re being scientists,” and I was like, “well, yeah” and she goes, “I thought only boys were scientists.” You know they thought like I did, I remember doing the DAST in class in one of my college courses and you know if you are a man in the lab with glasses and a coat and it was really fun to see you know how some of the girls thought the exact same way as me at the beginning of the week and you know other girls were drawing you know they were drawing adults. They weren’t drawing kids, they weren’t drawing themselves, and then by the end of the week it was, “well I am a scientist you know I can be a scientist now, I don’t have to wait until I am grown up,” and it was really awesome to just see them change and you could see it in the middle of the week when it hit them that they were a scientist. I had 4-year-old’s, even at age 4 that they were scientist and you know it didn’t have to be well you have to go to school to be a scientist or you know you have to be a boy to be a scientist or you have to be a grownup or anything, it was awesome just to see them like realize, “hey I am being a scientist and I am sitting in a classroom doing an activity.”

RESPONDENT: I think Project Scientist has done a good job where it is cutting down those barriers and those thoughts that women cannot do it {have a STEM job} just by showing what women are involved and opening the girls’ eyes to things that they can do.

…I know she was like it was so cute because she just looked at me and she goes “we’re being scientists,” and I said, “yeah you know you, that’s what you are doing right now, this is science, like this is what scientist do every day.” And she is like, “I thought boys were scientists,” and I was like, “no, anybody can be a scientist.” And you know that was what we talked about a lot it was, one of the girls asked me she goes, “why are there no boys here?” I said “because this is for girls. Girls are way better than boys.” And she just kind of laughed and she said yeah. It was awesome just to see them excel.
Findings from Project Scientist

• Project Scientist had a substantial impact on both girls who attended the camp and the college-aged interns who worked with them

• Attitudes toward science showed positive change for girls across all sites of the camp
  • Especially notable considering the overall positive orientation toward science shown by campers prior to the beginning of camp

• College-aged interns benefitted from hands-on experience in the program
Findings from Analysis of Draw-a-Scientist Test, Summer 2014

Sandy Marshall
Project Scientist Academy
Elizabeth Stearns, Ph.D.
UNCC Department of Sociology
January 2015
Draw-A-Scientist Test

• Children were given the direction to “draw a picture of a scientist”
  • Provided with crayons and pencils
  • Monday and Friday mornings of each week they spent at camp
DAST Coding

Standard scale
- DAST-C
- Multiple coders used to establish reliability
- Scale ranges from 0-15
- Higher scores represent more stereotypical views of science/scientists

DAST-C Items include:
- Lab coat
- Eyeglasses
- Facial hair
- Male scientist
- Indications of danger
- Technology (computers, microscopes)
AVERAGE DAST-C VALUES BY NUMBER OF WEEKS SPENT AT PROJECT SCIENTIST CAMP, SUMMER 2014

Average DAST Values:
- Start 1st Week: 3.8
- End 1st Week: 3.4
- Start 2nd Week: 3.7
- End 2nd Week: 3.4
- Start 3rd Week: 3.4
- End 3rd Week: 3.0
- Start 4th Week: 2.8
- End 4th Week: 3.3
- Start 5th Week: 3.1
- End 5th Week: 3.1

Trend over weeks:
- Values generally decrease over the weeks.
Findings

- Students began the camp with fairly unstereotypical ideas of who a scientist is and what a scientist does relative to others in their age cohorts.
- At the end of the week, students had less stereotypical depictions of who a scientist is/what a scientist does.
- Students who spent five weeks at camp drew the least stereotypical pictures.
DAST Comparison: Scientist Becomes Less Stereotypical, Age 10

Instructions:
Draw a picture of a scientist.

Name: #008

Instructions:
Write a sentence describing what you have drawn.

Me!
DAST Comparison: Fewer Symbols of Science in End of Week Drawing, Age 6
PERCENTAGE OF DAST DRAWINGS SHOWING MALE SCIENTISTS BY NUMBER OF WEEKS SPENT AT PROJECT SCIENTIST CAMPS, SUMMER 2014
Findings

- One item on the DAST-C is the depiction of male scientists.
- Pictures were coded as showing male scientists if ONLY male scientists were shown.
- Children were less likely to draw male scientists at the end of each week of camp than at the beginning.
- Those who spent five weeks at camp were least likely to depict only male scientists.
DAST Comparison: Male Scientist at Beginning of Week, Age 6

Instructions:
Draw a picture of a scientist.

Name: #083

Instructions:
Draw a picture of a scientist.

Name: #083
DAST Comparison: Girl “Observing” at Beginning of Week Becomes “Scientist” at End of Week, Age 11

Instructions:
Draw a picture of a scientist.

Name: #034

Write a sentence describing what you have drawn.
I drew a girl looking at a scientist at work.

Instructions:
Draw a picture of a scientist.

Name: #034

Write a sentence describing what you have drawn.
A scientist writing on a whiteboard.