STEM Santa Fe envisions a world filled with analytical citizens exploring complex issues for the betterment of society.

STEM Santa Fe
Expanding Your Horizons Conference
Saturday, October 13\textsuperscript{th}, 2018

SUMMARY REPORT
by Raquela Thomas & Lina Germann
expanding your horizons

FALL 2018 EXPANDING YOUR HORIZONS CONFERENCE
SATURDAY, OCTOBER 13, 2018 AT SANTA FE COMMUNITY COLLEGE
FOR NORTHERN NM GIRLS IN 5TH-8TH GRADE

Many thanks to our sponsors!

Gold Level Sponsors

Los Alamos National Laboratory

Wildflower International Ltd.

Ingersoll Rand

SFCC Santa Fe Community College

Silver Level Sponsors

AFRL The Air Force Research Laboratory

LAWIS

MEOW WOLF

Bronze Level Sponsors

del Norte Credit Union

Awesome Hungover Santa Fe

New Mexico Lambda

Los Alamos National Bank

SMA

FLOW Science

Walmart

1
1 Introduction

The mission of STEM Santa Fe is to advocate for, develop, and provide STEM programming, mentoring, and resources for all youth, especially under-represented groups in STEM, to realize their potential and expand their opportunities in a dynamic world.

STEM Santa Fe annually organizes the Santa Fe Expanding Your Horizons (EYH) conference to promote Northern New Mexico girls’ interest in Science, Technology, Engineering and Mathematics (STEM). Girls in 5th through 8th grades are most vulnerable to losing interest in STEM, mainly because of lack of: awareness of the importance of STEM in creating a better world, the many different STEM careers available, and confidence that they can achieve success in STEM fields. One way to prevent the loss is through offering a fun, engaging program that provides hands-on learning, encouragement, and connections to females with similar interests, as well as women in STEM role models.1

Our world has seen significant changes in the past three decades that are largely due to advances in STEM fields. Pioneers in these fields have changed the way we work, the way we play, and the way we think. However, more often than not, the female perspective is not represented in STEM fields.

Historically, the STEM labor market has been growing at a higher rate than the total and has fared better in periods of economic decline as seen in 2007-2009. Furthermore, STEM careers receive higher salaries and experience lower unemployment rates than the total workforce2. STEM skills are no longer limited to labs, but are necessary skills in all fields. The ability to think analytically to solve problems, persistence to solve complex issues, and contributing to teams is essential in all careers in the 21st century.

Despite the benefits of pursuing a STEM career and the overall growth of the STEM labor market, women remain underrepresented. Only 15% of engineering and 25% computer and mathematical sciences professionals are women3. When looking at demographics, this statistic becomes even less with only 10% of positions in science and engineering being held4 by women in minority groups.

Research shows that 5th-8th grade girls who are involved in STEM activities outside of school are more than twice as likely to choose STEM classes in high school, feel creative through STEM activities, understand the job options in STEM and feel empowered to make an impact in the world through STEM. Engaging with female role models is also shown to have a positive effect on these same attributes5.

5 Microsoft and KRC Research 2018 Closing the STEM Gap: Why STEM classes and careers still lack girls and what we can do about it. Available at: https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE1UMWz
2 Program

At this year’s Expanding Your Horizons conference we were honored to have the keynote address delivered by the Director of the National Science Foundation Dr. France A. Córdova. In addition to this inspiring keynote address, the conference consisted of interactive workshops led by women professionals and a STEM and College fair featuring STEM exhibits and demonstrations. The girls were able to connect with their peers and with professional women in STEM serving as positive role models, while gaining exposure to the different career possibilities in STEM.

2.1 Conference Schedule at Santa Fe Community College

7:45-8:45 Check In & Ice-Breaking Activities
8:45-9:50 Welcome & Keynote Address, Jemez Rooms
10:00-11:10 Workshop Session I
11:15-12:25 Workshop Session II
12:30-1:30 Lunch and Raffle, Campus Center
1:30-3:00 STEM & College Fair, Jemez Rooms

2.2 Keynote Presentation

While we have always strived to have female role models that our population of girls can relate to as our keynote speaker, this year was particularly inspiring! Dr. France A. Córdova, Director of the National Science Foundation, spoke and connected with our participants. She shared her own personal and professional journey through the many different STEM positions she held. The talk concluded with a long line of girls who had the opportunity to ask Dr. Córdova their questions.
2.2.1 Keynote Speaker Biography

Dr. France A. Córdova is an astrophysicist and the 14th director of the National Science Foundation (NSF), the only government agency charged with advancing all fields of scientific discovery, technological innovation, and science, technology, engineering and mathematics (STEM) education. NSF is a $7.8 billion independent federal agency; its programs and initiatives keep the United States at the forefront of science and engineering, empower future generations of scientists and engineers, and foster U.S. prosperity and global leadership.

Dr. Córdova was deputy group leader in the earth and space sciences division at Los Alamos National Laboratory from 1988 to 1989 and staff scientist from 1979 to 1989. She was on the faculty of the Pennsylvania State University and was head of the department of astronomy and astrophysics from 1989 to 1993. Most noteworthy in her career path, Córdova became Purdue University’s first female president, 2007-2012. Under her leadership, Purdue received record levels of research funding. Prior to joining Purdue, Córdova served as chancellor and distinguished professor of physics and astronomy at the University of California (UC) Riverside from 2002 to 2007. At UC Riverside she was instrumental in launching a medical school and a community-university art museum complex. Under her watch, UC Riverside became a national model for the academic success of underrepresented students.

Córdova's scientific contributions have been in the areas of observational and experimental astrophysics, multi-spectral research on x-ray and gamma ray sources and space-borne instrumentation. She has published more than 150 scientific papers. From 1993 to 1996, Dr. Córdova served as NASA’s chief scientist. She is a recipient of NASA's highest honor, the Distinguished Service Medal, and was recognized as a Kilby Laureate. The Kilby International Awards recognize extraordinary individuals who have made "significant contributions to society through science, technology, innovation, invention and education." Córdova was elected to the American Academy of Arts and Sciences and is a National Associate of the National Academies. She is also a fellow of the American Association for the Advancement of Science (AAAS) and the Association for Women in Science (AWIS).

The oldest of twelve children, Córdova attended Stanford University, where she graduated cum laude with a bachelor's degree in English in less than four years. Among other activities, Córdova conducted anthropological fieldwork in a Zapotec Indian pueblo in Oaxaca, Mexico, and won a national writing competition to be a Mademoiselle magazine guest editor. She went on to earn her PhD in physics from the California Institute of Technology. In 2007, Córdova was given Caltech’s Distinguished Alumni Award, and she was named to Stanford’s Multicultural Hall of Fame in 2008. Córdova is married to Christian J. Foster, a science educator, and they have two adult children.

What is the National Science Foundation?
The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..." NSF is vital because it supports basic research and people to create knowledge that transforms the future. This type of support: is a primary driver of the U.S. economy, enhances the nation's security, and advances knowledge to sustain global leadership.
The NSF has an annual budget of $7.8 billion (FY 2018) and fund 27% of the total federal budget for basic research conducted at U.S. colleges and universities. In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing. They fulfill their mission chiefly by issuing limited-term grants to fund specific research proposals that have been judged the most promising by a rigorous and objective merit-review system. Most of these awards go to individuals or small groups of investigators. Others provide funding for research centers, instruments and facilities that allow scientists, engineers and students to work at the outermost frontiers of knowledge.

NSF’s goals -- discovery, learning, research infrastructure and stewardship -- provide an integrated strategy to advance the frontiers of knowledge, cultivate a world-class, broadly inclusive science and engineering workforce and expand the scientific literacy of all citizens, build the nation’s research capability through investments in advanced instrumentation and facilities, and support excellence in science and engineering research and education through a capable and responsive organization. We like to say that NSF is "where discoveries begin.”

2.2.2 Comments on Keynote

The following comments were provided by the girls in surveys filled out at the conference:
[France Cordova] “was VERY inspiring and I’m honored that I got to speak with her.”

“We met a real scientist who worked at NASA.”

“I really liked the talk at the beginning of the morning”

[The best part of the conference was] “meeting and listening to France.”

[The best part of the conference was] “learning about her life”

[The best part of the conference was] “The keynote speaker”

[The best part of the conference was] “I got a signature”

[The best part of the conference was] “Asking the questions”
2.3 Workshops

Participants were able to attend two workshop sessions that were closely aligned with their interests based on their registration. There was a total of 16 different workshops led by women STEM professionals with an emphasis on hands-on, problem solving activities.

2.3.1 Workshop Descriptions and Presenters

Reach for the Sky: An Engineering Challenge (Debbie Post) Do you have what it takes to build a tower with limited resources that will withstand the breeze of a fan? Learn project management, engineering, and real world constraints such as schedule, budget, performance and customer satisfaction. Additional concepts are the value of teamwork, prototyping and testing, and learning from “failure” to improve next time.

Debbie Post is a Distinguished Member of the Technical Staff at Sandia National Laboratories with a B.S. and M.S. in Electrical Engineering. She has lead teams of engineers to design and manufacture aerospace-defense equipment — making engineering happen in the real world.

The Physics of Sediments (Dr. Anastasia Piliouras) Conduct experiments to determine how quickly sediment of different sizes, shapes, and densities falls through a column of air, water, salt water, and corn syrup. Learn about the basic physics that influence how sediment moves and collects to form landscapes and sedimentary rocks.

Dr. Anastasia Piliouras is a Postdoctoral Research Associate in Earth and Environmental Sciences at Los Alamos National Laboratory. She is a coastal geomorphologist, and she is interested in how vegetation and climate impact coastal landscape change.

Magnets and Motors (Dr. Imelda Atencio) Learn about magnetic fields and how these fields can be used to make an electro magnet and a motor, with hands-on activities on each concept.

Dr. Imelda J. Atencio started her career as an Optical Engineer at the Air Force Research Laboratory (AFRL) in 1987, working in areas of optical design, adaptive optics, optical communication, and quantum key distribution. She is currently the Deputy Chief for the Laser Division at AFRL. She received a BS in EE in 1986 from New Mexico State University, and MS
and PhD in Optical Sciences in 1993 and 2003 respectively from the University of Arizona. One of her passions is mentoring students of all ages encouraging them to pursue STEM related fields.

**DNA Detective (Joann Mudge)** Use DNA sequences to solve interesting real world problems, working with the same tools that scientists use in their research!

**Joann Mudge** is a scientist at the National Center for Genome Resources. She does DNA-based research and has a passion for teaching STEM and helping to train and energize the next generation of scientists.

**Goats, Sodas, and Fake News...Oh My! (Dr. Claire Bowen and Dr. Mary Frances Dorn)**

Use math and statistics to find the best odds through game theory. Will you be rewarded with something sweet or will you end up with a goat? Learn how statistics are used to shape our understanding of world and national events.

**Dr. Claire McKay Bowen** and **Dr. Mary Frances Dorn** are statisticians at Los Alamos National Laboratory. They collaborate with other scientists on problems such as working on discovering what causes faults on super computers and predicting damages from hurricanes and other severe storms.

**Circuit Playground Express (Sandy Frost, Lucia Short, Veronica Camari)** The Circuit Playground Express is a small microcontroller board with LEDs, buttons and sensors built it. This workshop will involve programming with Microsoft MakeCode (block-based), Python and the Arduino IDE C++.

**Sandy Frost** is an electrical and computer engineer who works as a solutions architect, developer and certified security specialist at Los Alamos National Laboratory. She earned her Master of Science in Computer Engineering from Florida Atlantic University. As a Scientist Ambassador with the Bradbury Science Museum, she enjoys communicating the impacts of her work with the local community and visitors to the museum from all over the world.

**Lucia Short** is a computer scientist with experience in various fields. She started her career in Russia in geosciences field with Institute of Volcanology. Then she worked for media, such as TV and news papers. After she
came to US, she finished her degree in computer science and worked for Los Alamos National Laboratory supporting scientific research. Her hobby is designing computer games.

Veronica Camari is a proponent of technology for the betterment of humanity. Her professional background is in the integration and implementation of technology for operational efficiency and innovation. Her Masters degree is in Network Communication engineering with an emphasis in Software Defined Networking. She is most passionate about Amateur Radio, and organizations that promote STEM as well as our young women in pursuit of technical careers.

Aquatic Insects And Water Quality (Jenna Stanek and Dr. Shannon Gaukler) Explore the different types of aquatic insects that can be found in rivers, lakes, or streams. The presence of different species can tell us a lot about water quality! Use metrics to identify the water quality yourself!

Jenna Stanek has worked for the Los Alamos National Laboratory since April 2018 as an Environmental Technician. She earned her M.S. in Wildlife and Fisheries Biology from Clemson University, a B.S. in Biology and Ecology from Western State Colorado University, and a B.A. in Environmental Policy and Spanish at Albright College. She has worked on an assortment of projects for various species such as yellow-billed cuckoos, brown-capped rosy finches, brown-headed cowbirds, least bell's vireos, willow flycatchers, mountain yellow-legged frogs, rainbow/golden trout, stoneflies, and dobsonflies.

Dr. Shannon Gaukler currently works as an Environmental Professional for Los Alamos National Laboratory. She is the technical lead for the Soils, Foodstuffs, and Biota Program, and monitors soils, crops, eggs, milk, native vegetation, fish, small mammals, deer, elk, and other animals to determine whether Laboratory operations are affecting chemical concentrations in these media. She earned her Doctoral Degree in Biology from the University of Utah in 2014.

The Physics of Toys (Dr. Ruth Howes) Most toys operate on the basis of physics principles and so can be used to teach physics. We will do this and HAVE FUN at the same time including going outside if the weather is good.

Dr. Ruth Howes is a nuclear physicist who last worked at NSCL on very neutron-rich isotopes of light elements. Her most recent publication is on women physicist in the U.S. right after World War II. She also volunteers in the Santa Fe Public Schools.

Girl Powered Robotics (Shelly Gruenig, Bethany Gruenig, Reva Kientz, Jordan Kuckartz) This workshop is hands on fun where girls will learn about our patented kid-friendly Engineering Design Process as well as drive robots. They will hear from the girls of R4Robotics about how being on a robotics team has impacted their lives.
Shelly Gruenig is a wife and mother, homeschool mom, STEM Entrepreneur and 13 year founder and coach of R4Robotics. Her goal is to make radical change in STEM by introducing as many young women to their STEMtastic abilities as possible.

Super Slimy Science with Explora Educators (Hali Willis, Emma Citizen and Carolyn Gore) Explore basic polymer chemistry, measurement, and ratios by playing with slime. In this hands-on workshop, we will practice experimental design, inquiry-based learning, and data recording. We will also go over the basic polymer chemistry behind slime making, the simple ingredients needed to make a slime lab, and how to use the math of measurements and ratios along the way.

Explora. Explora is an innovative experiential learning center with a mission of creating opportunities for inspirational discovery and the joy of lifelong learning through interactive experiences in science, technology, and art. Explora addresses its mission by providing innovative program and exhibit activities that illuminate basic concepts and engage people of all ages with the tools and equipment related to scientific phenomena.

A Hands-On Introduction to Arduino (Alia Long) Learn about the Arduino hardware and software and then program it to do simple things, like making a LED blink and accepting input form a push-button and potentiometer.

Alia Long is a scientist in advanced cyber systems research at Los Alamos National Laboratory. She is an electrical engineer with a Master of Science degree from the University of Oklahoma. Most of her experience is with hardware design, which she now uses to develop cyber-physical systems and security research for critical infrastructure and internet of things.
Fueling the world with algae **(Jenna Schambach)** Analyze algae samples to correctly identify different types of algae being used in biofuels. Learn about renewable energy and how algae is key component of this science!

**Jenna Schambach** is a Post-Master's researcher in the bioenergy and biome sciences group at Los Alamos National Laboratory studying ways to improve the growth of algae in order to make biofuel. She received both a Bachelor's degree in biological sciences, and a Master's degree in marine biosciences from the University of Delaware in 2015 and 2017, respectively.

A Tale of Three Planets: The Goldilocks Zone **(Susan Breyer)** Investigate possible causes for the differences in our local planets. All three started out with similar characteristics, but evolved into three very different planets. We will create a "human timeline" to simplify our solar system's history, and discover the characteristics astronomers might use as they investigate nearby exoplanets.

**Susan Breyer** is a retired Science educator. She received a bachelor's degree in Education from William Paterson University, a master's degree in Environmental Science from Montclair State University and a master's degree in Technology Education from Wilkes University. She is the author of Hooked on Science published by Prentice-Hall, 1990.

The Social Life of Pennies **(Dr. Vanessa Job)** Is it possible for 25 pennies to be placed flat so each penny touches exactly 3 other pennies? Use logic and probability to solve mysteries in this exciting workshop!

**Dr. Vanessa Job** is a Ph.D. student in Computer Science at the University of New Mexico and a machine learning intern at the Ultrascale Systems Research Center. She is also a retired
homeschool parent. She loves to work with middle school students who want to know more about computer science and mathematics.

**Rockin’ the Greens! Growing Hydroponically (Jessica Shoemaker and Bobbi Martinez)**
Get a look at the basics of hydroponic growing - water quality, plant selection and soil-less media. You will get to seed different types of plants in different soil-less media as well as learn the basics of testing water quality of hydroponic and aquaponic systems.

*Jessica Shoemaker* and *Bobbi Martinez* are the head and assistant growers for an indoor vertical farming company producing local leafy greens to the Albuquerque market. Both presenters attended the SFCC CEA program and are now pioneering indoor vertical hydroponics in New Mexico.

**Fun with Snap Circuits (Heidi Morning and Jan Frigo)** Build an FM radio and/or a motion detection circuit with snap circuits, experiment with modifications to the circuits to learn how circuits work.

*Heidi Morning* received her Bachelor’s in Computer Engineering from California State University Bakersfield and her Master’s in Electrical and Computer Engineering from the University of California at Davis. Currently, Heidi works at Los Alamos National Laboratory’s Intelligence and Space Research division. There she seeks to create, deliver, support and exploit innovative sensing systems for space-based, airborne, and ground-based applications to address critical national security and scientific challenges.

*Jan Frigo* is an electrical engineer at Los Alamos National Laboratory. She has been working in the areas of reconfigurable computing systems and low power, low resource deployable distributed systems. Previously, she worked in the area of spacecraft controls analysis, and spacecraft electrical system design, test, integration and launch operations. Jan enjoys building robots from scratch as well as programming robots to accomplish interesting tasks. Her other interest are music, art, history, foreign language, cycling, skiing.
2.3.2 Responses to Workshops

Many of the girls said that the workshops were the best part of the conference. Surveys filled out by the girls at the conference provided the following information and comments.

In the girls’ words:
“The teachers are really fun and challenging.”
“I really loved both of the teachers because they were really fun and helpful.”
“The people that taught us stuff were nice and informative.”
“We did a lot of nice team work”
“The best part was us getting to make Slime.”
“I got to do hands on work that required real life problems.”

[The best part of the conference was] “Physics with toys. SOSOSO FUN!!!”
“The best part [of the conference] was making our flagpole actually withstand the fan.”
“being a mad scientist in slime with explora.”
“Robotics was the best part because we got to drive robots”
“I learned what civil engineering is and I'm now interested in it.”

3 By The Numbers

Girls who participated: 163
Girls who registered to attend: 199
Workshops: 16 hands-on STEM workshops, presented by 27 female STEM professionals
STEM and College Fair groups: 21 with many more than 25 exciting STEM demos
Adult volunteers day of conference: 58 (not counting workshop presenters or STEM Fair presenters)
High school volunteers day of conference: 13
Behind the scenes adult volunteers: 8
Number of student surveys received after the conference: 152
Chart 1: Percentage of girls returning (based on surveys)

- 31% yes
- 69% no

Chart 2: Grades represented (based on registration forms)

- 5th: 65 girls
- 6th: 46 girls
- 7th: 31 girls
- 8th: 17 girls

Chart 3: Ethnicities represented (based on registration forms)

- No response: 9 girls
- White: 44 girls
- Sephardic: 1 girl
- Native American, White: 1 girl
- Native American: 15 girls
- Mixed: 1 girl
- Latin: 1 girl
- Italian: 1 girl
- Hispanic, White: 9 girls
- Hispanic, Native American: 1 girl
- Hispanic, Native American: 1 girl
- Hispanic, Native American: 1 girl
- Hispanic, Native American: 1 girl
- Hispanic, African American: 1 girl
- Hispanic: 63 girls
- European: 1 girl
- Asian, White, Pacific Islander: 1 girl
- Asian, Hispanic: 2 girls
- Asian: 7 girls
- African American: 1 girl
Chart 4: Participants’ attitudes towards STEM before and after the conference (scale 1-5)

(based on surveys; data do not include girls who responded 5 before and after)

Chart 5: Girls’ interest in returning

Are you interested in returning to STEM Santa Fe EYH next year?

- yes: 96%
- no: 3%
- maybe: 1%

Chart 6: Connections made

Do you plan on keeping in touch with any of the girls you met today?

- yes: 28%
- no: 67%
- maybe/IDK: 4%
Table 1: Schools Represented vs. Number of students

<table>
<thead>
<tr>
<th>School</th>
<th># students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academy for Technology and the Classics</td>
<td>6</td>
</tr>
<tr>
<td>Acequia Madre Elementary</td>
<td>3</td>
</tr>
<tr>
<td>Amy Biehl Community School</td>
<td>5</td>
</tr>
<tr>
<td>Aspen Community Magnet School</td>
<td>4</td>
</tr>
<tr>
<td>Atalaya Elementary</td>
<td>2</td>
</tr>
<tr>
<td>Barranca Mesa</td>
<td>1</td>
</tr>
<tr>
<td>Carlos F. Vigil Middle School</td>
<td>1</td>
</tr>
<tr>
<td>Carlos Gilbert Elementary</td>
<td>2</td>
</tr>
<tr>
<td>Cesar Chavez</td>
<td>1</td>
</tr>
<tr>
<td>Chaparral Elementary School</td>
<td>5</td>
</tr>
<tr>
<td>Desert Academy</td>
<td>1</td>
</tr>
<tr>
<td>Dixon Elementary</td>
<td>1</td>
</tr>
<tr>
<td>El Camino Real Academy</td>
<td>6</td>
</tr>
<tr>
<td>EJ Martinez Elementary</td>
<td>1</td>
</tr>
<tr>
<td>Eldorado Community School</td>
<td>8</td>
</tr>
<tr>
<td>Gonzales Community School</td>
<td>7</td>
</tr>
<tr>
<td>Homeschool</td>
<td>3</td>
</tr>
<tr>
<td>La Tierra Montessori</td>
<td>1</td>
</tr>
<tr>
<td>Mandela Intl Magnet School</td>
<td>9</td>
</tr>
<tr>
<td>Milagro Middle School</td>
<td>1</td>
</tr>
</tbody>
</table>

(based on actual attendance)

About 91% of the girls attended schools in Santa Fe (two of the three home schooled students live in SF county). The rest came from Northern New Mexico.

The number of students who have requested registration waivers has steadily declined over the years. This year 11 out of 163 attendees received waivers and 19 received sponsorship from their schools. When these two groups are combined approximately 18% of attendees received financial support this year. This is again lower from last year where 20% of attendees received financial support. We reach out to Title I schools but it seems the $15 is not a major hardship.

Table 2: Girls’ ratings of the keynote speech and the conference as a whole

<table>
<thead>
<tr>
<th></th>
<th>keynote</th>
<th>conference</th>
</tr>
</thead>
<tbody>
<tr>
<td>average rating (1 to 5)</td>
<td>4.1</td>
<td>4.6</td>
</tr>
</tbody>
</table>
### Table 3: Workshop ratings

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Awesomeness</th>
<th>Difficulty*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fueling the World with Algae</td>
<td>4.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Aquatic Insects and Water Quality</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Arduino</td>
<td>4.3</td>
<td>2.9</td>
</tr>
<tr>
<td>Circuit Playground Express</td>
<td>4.1</td>
<td>2.6</td>
</tr>
<tr>
<td>DNA Detectives</td>
<td>4.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Goats, Soda, Fake News...Oh My!</td>
<td>3.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Magnets and Motors</td>
<td>4.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Physics of Sediments</td>
<td>4.6</td>
<td>2.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Awesomeness</th>
<th>Difficulty*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics of Toys</td>
<td>4.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Reach for the Sky</td>
<td>4.9</td>
<td>3.1</td>
</tr>
<tr>
<td>Girl-Powered Robotics</td>
<td>5.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Rockin' the Greens: Growing Hydroponically</td>
<td>4.3</td>
<td>2.6</td>
</tr>
<tr>
<td>Super Slimy Science with Explora</td>
<td>4.8</td>
<td>2.9</td>
</tr>
<tr>
<td>Tale of Three Planets</td>
<td>4.0</td>
<td>3.0</td>
</tr>
<tr>
<td>The Social Life of Pennies</td>
<td>3.8</td>
<td>3.6</td>
</tr>
<tr>
<td>Average of All Workshops</td>
<td>4.3</td>
<td>2.9</td>
</tr>
</tbody>
</table>

* 1=too easy to 5=too difficult

**Survey Results Summary:**

We saw statistically significant enhancements in the participants’ already positive attitudes towards STEM in all five questions we asked. The largest change was in the girls’ interest in STEM, interest in attending STEM classes, and confidence that they can achieve a career in STEM. Their interest in college and knowledge that understanding math and science is important to be successful in life were both very high before the conference.

Altogether, the workshops had an average rating of 4.3. The Girl-Powered Robotics workshop had the average highest rating (5 of 5), followed closely by Physics of Toys and Reach for the Sky (4.9 of 5). The overall average difficulty rating of all the workshops was 2.9, on a scale where 3 was the perfect difficulty (1 being too easy and 5 being too difficult).

The girls’ responses to conference overall were very positive! They rated the conference 4.6 out of 5, and 96% of the girls said they wanted to return next year. We also asked the girls if they planned on keeping in touch with any of the girls they met at the conference, and 67% said yes with 4% saying “maybe” or “I don’t know”. This is encouraging because one of our hopes is that we can help girls make connections with their peers who have similar interests.
5 Making EYH Possible

The success of this conference is owed to the tireless efforts of a large number of volunteers. We wish to extend our gratitude to all of the volunteers and those who provided items for the girls.

5.1 Planning Committee
Kate Gomez and Alishiya Kapoor, Registration coordinators
Judi Kahl, Volunteers coordinator
Laurel Winter Stritzinger, Ph.D., Workshops coordinator
Jenn Baker, STEM and College Fair coordinator
Raquela Thomas, Ph.D., Assistant to the Chair
Lina Germann, Ph.D., Chair

5.2 Photographers
Barb Odell with all girls media, Estevan Rael from Enchantment Aerials, and Carrie McCarthy with Carrie McCarthy Photography

5.3 Adult Volunteers Day of conference

*Group Guides: Each girl was assigned to a group of 15 with a group guide to supervise her for the duration of the conference. All Group Guides were vetted with background check.
5.4 STEM and College Fair Groups
Explora (4 Tables of demos!), Girls Inc. Of Santa Fe, New Mexico Tech (4 Tables of demos!), Air Force Research Laboratory (AFRL), Sandia Mountain Natural History Center, National Center for Genome Resources (NCGR), New Mexico Environment Department, Santa Fe Fire Department, Santa Fe High School, Navajo Tech, Bradbury Science Museum, Santa Fe Alliance For Science, Northern NM College, University of New Mexico, New Mexico State University, Boeing, Santa Fe Community College, and Ghost Ranch Museums.

5.5 Behind-the-scenes Volunteers
Dr. Ed Barker, Ondine Frauenglass, Yash Morimoto, Bonnie Schwartz, Charlie Shultz, Katie Teague, Dr. Blas Uberuaga, and Lisa Van De Graaff.

Many Thanks to Santa Fe Community College Interim President Dr. Cecilia Y.M. Cervantes for opening the conference and for her warm welcome to the girls.

5.6 High School Volunteers

5.7 Thank you donors of prizes, swag and snacks for the girls:
6 After the Conference

We want the experience and impact of the conference to be solidified and continue on afterwards. Therefore, we have several follow-up events planned in which the girls may choose to participate in after the conference.

6.1 Essay/Video Contest
We asked the girls to compose a 400-500 word essay or a 2-minute video reflecting on how this Expanding Your Horizons conference has impacted and benefited them in their academic or personal life. They were challenged to express their ideas using good organization and specific examples. The deadline is one month from the date of the conference, and prizes will be awarded.

1st Place Prize: Chromebook – donated by Wildflower International
2nd Place Prize: Sterling Silver arrowhead on chain – donated by Malouf on the Plaza
3rd Place Prize: $25 Amazon Gift card – donated by OpenEye Scientific

Additionally, all submissions will receive a certificate of appreciation for their submission; we may also submit the winning essay to local newspapers or share on our website.

6.2 Naming Contest
There are other Expanding Your Horizons conference held annually in New Mexico. In effort to distinguish the conference organized by STEM Santa Fe and because we are turning the conference to be part of a year-long STEM program for girls, we will be renaming the conference, but maintaining the purpose and mission. We asked the girls to utilize their creativity in order to help us with this task. If we choose one of the names suggested, the girl who suggested it will be awarded a $25 Amazon Gift card – donated by OpenEye Scientific.

6.3 Remind App
Many parents and girls are so excited after the conference that they ask about additional STEM events occurring in the community. In order to facilitate communication about these events, we are now offering parents the option to sign up for the Remind app. Remind is an application used by the Santa Fe Public Schools in order to keep parents informed.

6.4 Follow-up Workshops
The workshops are a very important aspect of the conference, as they provide female role models and engaging hands-on activities for the girls. This is why we are currently working on providing quarterly workshops in order to continue to support the girls’ interests and experiences.
7 Summary

STEM Santa Fe leads numerous STEM programs throughout Northern New Mexico that are both project-based and hands-on, providing extended learning experiences and mentorships for our youth. We are a volunteer-based organization of STEM professionals serving as mentors. We aim to reduce disparity in educational opportunities by offering our programs at low to no cost to families, and we especially reach out to the Title I schools in Santa Fe and Northern New Mexico where the need for role models and mentors is the greatest.

STEM Santa Fe is dedicated to providing underserved youth with the inspiration, role models, and support that will help encourage them to pursue STEM careers. Our programming focuses on the unmet need of providing the best environment to support youth who may not otherwise feel comfortable exploring their interest in STEM. STEM Santa Fe is the proud recipient of the 2018 non-profit of the year for the New Mexico Excellence in STEM Award, which was awarded to us in our second year of operation!

Every year the STEM Santa Fe EYH conference improves and this year was no exception! Based on the girls responses to the survey questions, the conference was a great success—they rated it a 4.6 out of 5, and 96% said they would like to return next year. While most of the girls already had positive attitudes towards STEM, they improved after the conference.

The day kicked off with an inspiring, engaging talk by Dr. Frances A. Córdova. The girls responded very positively to her encouragement and her sharing of her personal and professional journey. We were very excited when the girls formed a long line in front of the microphone to ask Dr. Córdova questions after the talk. There were so many that we ran over schedule and had to eventually stop taking questions! She was very gracious, signing autographs and posing for photos with the girls. She also toured the workshops and ate lunch with the girls. Additionally, this was our first year hosting a meet and greet with the keynote speaker. We invited sponsors and partners to attend, and Mayor Alan Webber also attended.

Speaking of firsts, we had the help of 13 high school volunteers from Santa Fe high School, Academy for Technology and the Classics, and Capital High School this year. These students helped the workshop presenters with bringing in and setting up their equipment, and assisted during the workshops. Also, the Santa Fe High School Engineering Department participated in
the STEM and College Fair this year. We are happy to have had all of the high school students join us, and appreciate not only their help but their presence as role model for the younger girls.

This event has had a great impact on a large number of people. The attendees show us this in their survey responses and by returning, but most stunningly by the change in their demeanors from the start of the day to the end. At check-in, many of the girls were quiet and clinging to parents, but at pick-up they were bouncing around, smiling, and exuberantly telling their parents what they did that day. Our hope is that this conference will have a long-term impact on many of these girls, increasing their confidence and the likelihood that they will follow their passion for STEM studies. Not only will this positively impact their futures, but by nurturing their minds we will help increase diversity to STEM fields, which has the potential to ultimately improve the lives of many more people.