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

STEM Santa Fe
STEM Pathways for Girls Conference
Saturday, October 5th, 2019

SUMMARY REPORT

By Martha Formosa, Kate Gomez and Lina Germann

2019 STEM Pathways for Girls Conference

SATURDAY, OCTOBER 5, 2019 AT SANTA FE COMMUNITY COLLEGE

FOR NORTHERN NM GIRLS IN 5TH-8TH GRADE

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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 Pathways For Girls 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 due to a 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 grown 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 workforce[2]. 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 women[3]. When the demographics are further analyzed, this statistic becomes even less with only 10% of positions in science and engineering being held by women in minority groups[4].

Research shows that 5th through 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 attributes[5]. This conference specifically targets this demographic and acts as a kickoff event for future hands-on activities.

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[1] AAUW (2010). *Why So Few? Women in Science, Technology, Engineering, and Mathematics*. Available at: https://www.aauw.org/research/why-so-few/

[2] National Science Board. 2018. *Science and Engineering Indicators 2018*. Alexandria, VA: National Science Foundation (NSB-2018-1). Available at: https://nsf.gov/statistics/2018/nsb20181/

[3] National Science Board. 2016. *Science and Engineering Indicators 2016.* Arlington, VA: National Science Foundation (NSB-2016-1). Available at: https://www.nsf.gov/statistics/2016/nsb20161

[4] National Science Foundation, National Center for Science and Engineering Statistics. 2017. *Women, Minorities, and Persons with Disabilities in Science and Engineering*. Special Report NSF 17-310. Arlington, VA. https://www.nsf.gov/statistics/2017/nsf17310/

[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 Pathways for Girls conference, we were honored to have the keynote address delivered by Energy Engineer Erica Velarde who was named the 2019 NM Energy Manager of the Year by New Mexico Association of Energy Engineers and the New Mexico Energy Services Coalition. In addition to this inspiring keynote address, the conference consisted of interactive workshops led by women professionals and a STEAM 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

7:45-8:30	Girls Check-In & Activities, Campus Center
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
1:30-3:30	STEAM 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's keynote speaker's background was very similar to many of the attendees. Erica grew up in the area, attended local colleges, and now continues to serve her local communities as an energy engineer.

2.2.1 Keynote Speaker Biography

Erica Velarde is a New Mexico licensed Professional Engineer, receiving her B.S. in Mechanical Engineering from University of New Mexico, and an A.A. in Business Administration from Northern New Mexico College. She is a proud mother of three and a first generation college graduate. Erica serves as the Energy Engineer for the New Mexico General Services Department, Facilities Management Division, and is responsible for the implementation of both energy efficiency and renewable energy projects for over 700 facilities statewide. Erica has over 11 years of public service including serving as an engineer for the New Mexico Department of Transportation and the Energy Conservation and Management Division. She is also the Public Co-Chair for the New Mexico Chapter of the Energy Services Coalition (ESC), the Public Vice President for the National ESC Board of Directors, and the Vice President of Northern New Mexico Board of Regents.

Accomplishments, Honors & Awards

Erica has only been in her role as FMD energy engineer for a year and has helped implement two separate Energy Saving Performance Contracts (ESPC) projects in state facilities. These are the first of their kind in New Mexico. Erica is currently leading a $32 million dollar project in Santa Fe, where 50% utility savings will be realized. Energy efficiencies will be implemented on 32 facilities and solar Photovoltaic (PV) on 19 with battery storage on 1 facility in this green energy project. Erica had also been instrumental in promoting and guiding other ESPC projects statewide.

2019 NM Energy Manager of the Year, by NMAEE & NMESC
2017 Energy Engineer of the Year, by Association of Energy Engineers (AEE), NM Chapter
2016 New Mexico Young Energy Professional, by New Mexico Association of Energy Engineers

2.2.2 Comments on Keynote

The following comments provided by surveys the girls filled out at the conference (unedited):

[The best part of the conference was] …

- the anecdotes share by the speaker included.
- When she (*Erica Velarde*) talked about her life
- the keynote speaker
- The talk *(Keynote)* at the beginning
- I think it listening to the engineer
- The way she *(Erica Velarde)* was encouraging us to do good

2.3 Workshops

Participants were able to attend two workshop sessions that were closely aligned with their interests based on their registration. There were a total of 11 different workshops led by women STEM professionals with an emphasis on hands-on problem solving activities.

2.3.1 Workshop Descriptions and Presenters

The Chemistry of Colors and the Physics of Fluids *(Julie Jung)*
The girls will perform experiments in which they will use cabbage juice as a pH indicator of different foods and write with invisible ink while learning about the molecular bases for these observations. Then, the densities and viscosities of a variety of fluids will be compared, and the reasons for these characteristics will be discussed.

Julie Jung is a computational chemist who is from France also lived in Spain and Germany. During her Ph.D., her responsibility was to understand why certain molecules behave like magnets and others do not. Shortly after her responsibility was to figure out why certain molecules catalyze chemical reactions better than others. Now, as a postdoc at LANL, her job is to find new methods to reprocess nuclear waste**.**

Cyber Security Girls Battle for the Internet! (*Shelly Gore)*
Workshop Assistants: Sophie Lundqvist, and Karen Bloom

Learn how Networking, the Internet and Cloud Technology rely on Cyber Security Patrol Forces to combat the evils of viruses and malware - and emails, games, and movies can be safely delivered to schools, homes, and computers all across the world! The Global Information Security Workforce Study predicts there will be a cybersecurity workforce gap of 1.8 million in the next 5 years so let's get patrolling!

Shelly Gore is a Cloud Based IT entrepreneur and Civil Engineer, who works with global, distributed teams on cutting edge technologies for corporations on 6 continents. She is a thought leader for the National Science Foundation's Center of IT Excellence, a presenter at ERP Cloud conferences and a member of the Council of Business Advisors for the Santa Fe Business Incubator.
Workshop Assistants: Sophie Lundqvist, and Karen Bloom

GPS Treasure Hunt! *(Megan McDonald, Yeny Maestas, and Jennifer Johnson)*
Workshop Assistants: Linda Delay, and Susan Torres

This outdoor workshop will cover the basics of using a hand-held Global Positioning System (GPS) Device. Basic GPS concepts, including understanding what GPS is and the basics of coordinate systems will be covered. The workshop will continue outdoors where students will use a GPS device to navigate to different points and collect data to solve a puzzle and find the treasure.

Meghan McDonald is a Principal Engineer with the State Energy, Minerals, and Natural Resources Department Abandoned Mine Land Program. Her work involves safeguarding and reclamation at abandoned mines across New Mexico. Her job gives her the opportunity to visit beautiful places and work on challenging designs to keep people safe from the dangers of historic mining practices. She graduated from New Mexico Tech and University of New Mexico with degrees in Mineral Engineering and Civil Engineering. Meghan is a mother to a preschooler and a baby.

Yeny Maestas is a Staff Engineer with the State Energy, Minerals, and Natural Resources Department Abandoned Mine Land Program (AML). Her work involves safeguarding and

reclamation at abandoned mines across New Mexico. Her favorite part of working at the AML Program is trying to find ways to improve communities that were negatively affected by mining activities throughout the State. She graduated from New Mexico State University with a degree in Civil Engineering. Yeny is a mother of a three-year-old girl and who has a dog and two cats.

Jennifer Johnson is a registered engineer intern working towards becoming a registered professional engineer. She is a Reclamation Engineer for the State Mining Act Reclamation Program, where she reviews reclamation plans and cost estimates for active mines across New Mexico. The job allows her to travel and to inspect hard rock mines during operation through completion of reclamation. Jenn graduated from New Mexico Tech with a degree in Environmental Engineering. She is a proud dog mom to her 13 year-old yellow lab.

Introduction to Circuit Playground Express *(Sandra Frost)*
Workshop Assistant: Veronica Camarillo-Morris

Learn the basics of electronics and programming with the Circuit Playground Express board. We'll start by learning Microsoft MakeCode block-based programming, learn how to "drag and drop" programs onto the board and write programs to create custom light patterns and trigger on events. The board can translate MakeCode into JavaScript, as well as be programmed using the Arduino IDE and Circuit Python.

Sandra Frost is an electrical and computer engineer who works as a solutions architect, developer and certified security specialist at Los Alamos National Laboratory. She was inspired by her Grandfather's "love of learning" and hopes to light the fire for others.

The Physics of Sediments *(Anastasia Piliouras)*
Workshop Assistant: Rachel Glade

The students will conduct settling experiments to understand the physics of how sediments (e.g. rocks, shells) move to create landscapes. This workshop will focus on how grain size, grain shape, and fluid and grain density affect sediment transport and will walk the students through an exercise measuring settling velocities in different fluids and with different sediments.

Anastasia Piliouras a scientist at Los Alamos National Lab, working in Earth and Environmental Sciences. She received her Ph.D. from the University of Texas at Austin in Geological Sciences. She studies how sediments move on Earth's surface and how coastal environments change over time. Her research uses a combination of fieldwork, remote sensing/satellite imagery, numerical modeling, and physical flume experiments. She is the president-elect of the Laramide Chapter of the Association for Women Geoscientists.

Principles of Radiation Protection *(Jenelle Mann and Grace Hughes)*
We will go over the basics of what radiation is and we will focus on using the three radiation protection principles of minimizing time and maximizing distance and shielding in ionizing radiation environments. Additionally, we will show consumer products that produce minimal amounts of radiation and we will discover how different materials make better shields from radiation.

Jenelle Mann is a Radiological Engineer at Los Alamos National Laboratory, primarily focusing on the work performed at the plutonium facilities and by the weapons program. She received a Ph.D. in Radiological Health Sciences specializing in Health Physics and also has a Master of Science degree in Radiological Health Sciences from Colorado State University and an Honor B.S. degree in Nuclear Engineering from Oregon State.

Grace Hughes is a Health Physicist in the External Dosimetry Team at Los Alamos National Laboratory. There she helps facilitate the occupational radiation monitoring of over 7000 lab

personnel and visitors, dose assessments and management, and the implementation ALARA measures. In May 2017, she received her B.S. degree in Radiological Health Engineering, with a minor in Nuclear Engineering from Texas A&M University.

Sunnyside Up (*Erica Velarde and Gail Cooke)*

Girls will be introduced to solar power and to designing solar cars and racing them. Girls will experience firsthand the conversion of solar energy to electrical energy to mechanical energy to kinetic energy as well as what makes a car go faster.

Erica Velarde is a New Mexico licensed Professional Engineer, receiving her B.S. in Mechanical Engineering from University of New Mexico, and an A.A. in Business Administration from Northern New Mexico College. She is a proud mother of three and a first generation college graduate. Erica serves as the Energy Engineer for the New Mexico General Services Department, Facilities Management Division, and is responsible for the implementation of both energy efficiency and renewable energy projects for over 700 facilities statewide.

Gail Cooke is a Clean Energy Project Manager for the New Mexico Energy, Minerals and Natural Resources Department, Energy Conservation and Management Division. Gail was the co-lead in the development of the New Mexico Energy Roadmap, which was created through a grant provided by the U.S. Department of Energy. Gail has 20 plus years of experience working in the areas of air quality and energy-related planning. Ms. Cooke holds a bachelor's degree in environmental design from Texas A&M University and a Master Degree in Urban and Regional Planning from Virginia Tech.

Roller Coasters, Marbles, and Physics *(Debbie Post)*
Students will learn the concepts of potential and kinetic energy, velocity, friction, elastic and inelastic collisions by making roller coasters for marbles out of pipe insulation and masking tape. Students will build marble jumps, roller coasters with one loop, and, as time allows, larger roller coasters in a full class collaboration. Physics and engineering vocabulary will be introduced as part of the activities.

Debbie Post is a systems engineer at Sandia National Laboratories. Debbie received her MSEE from the University of California, Davis, specializing in image processing. Debbie earned her BSEE at the University of Washington, Seattle, specializing in communications theory and digital signal processing. Ms. Post has conducted war games to assess the effectiveness of smart munitions in tactical battlefield scenarios, modeled electrical systems, studied automated system requirements tracking tools, and worked with production for high reliability systems.

Shampoo Chemistry *(Brenda Linnell, Ph.D.)*
Explore the chemistry of the main features in a shampoo and the factors that affect them. Measure, observe and describe. A multi-million dollar industry constantly evolving has basic science in it.

Brenda Linnell, Ph.D., is an Associate Professor of Chemistry at Northern New Mexico College. She is interested in STEM Outreach, Organic pollutant water analysis, Organic Synthesis, and Material/Polymer Science. Dr. Linnell is Co-PI of the INCLUDES STEM Mentor Collective, mentoring college students to share their love for science to middle schools of Northern New Mexico and design and execute lab activities. She has also mentored undergraduate students in their projects on isolation and characterization of organic pollutants in water, plants, and fruits of the region.

Stickin' with Logo Programming *(Tracy Mallette)*
Logo is a great tool to learn key coding concepts and create beautiful art. Learners will discover how to draw with the logo turtle and will pick up key concepts of syntax, variables, and loops.

Through this learning, each girl will create her own piece of art that she can then print into a sticker. Since Logo is web-based, coding and creating can continue whenever she has access to a computer and the internet.

Tracy Mallette grew up loving reading and always wanted to have great adventures. She found those adventures in science and engineering. With a degree in Chemical Engineering, she worked for L'Oreal USA and helped manufacture new make up products. Now as a Ph.D. student in biomedical engineering she makes tiny computers out of DNA.

Wildfire Investigation *(Teresa Rigby)*
Workshop Assistants: Lisa Bye, and Susan Haggerty

How do you find out the cause of a wildfire? Participants will learn what can cause wildfires and examine various sources of ignition. Using tools of a fire investigator, they will form a hypothesis and test their evidence to determine whether it could be their source of ignition.

Teresa Rigby is the Fire Mitigation and Education Specialist for the Bureau of Land Management (BLM) in New Mexico. She started her federal service in 1995 on Dixie National Forest in Utah, followed by Zion National Park, before she moved to the BLM out of Salt Lake City, Utah. She has been a wildland fire investigator for 19 years. She is a board member of the NM International Association of Arson Investigators and holds an Evidence Collection Technician certification. She is a public information officer for emergency incidents and has been a wildland firefighter.

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.

Please note: 144 out of 146 girls that attended responded to the survey.

In the girls' words:

What was the best part of this conference?
Learning new things about how girls can succeed
learning more about science
The best part about this conference is the interaction with girls and the impact of empowering to be strong.
The activities and classes we had, they were both fun and informative.
I liked how creative we all got to be
The activities My opinion on STEM IT'S SO FUN DO IT!
I think the best part was really learning about careers in STEM. Just learning about peoples journeys. It really inspires you and give you more faith in your self.
The part when we were told we could do anything!
Is about talking to all of the strong female leaders
Everything !!!!!! :)!!!!! :) *[14 girls responded "Everything" or "All of it"]*
Learning new stuff. Learning how to use a GPS and the powerful women in STEM
Working together and making new friends
Meeting people that got bullied because of there nerdy ways
I think that the best part of the conference was doing really fun activities.
When we got to use the GPS and walk outside but also work as a team to find treasure
Being able to be more hands on with STEM.
I learned new things that inspired me
Building and using our hands.
Doing the fun activities and learning about different topics.
getting to see a bunch of girls getting together for STEM
When we did the sunnyside up car race

Anything else you would like to share?
This is amazing
I liked meeting other girls and I would like to come back next year.
I enjoyed being with other girls that are interested in S.T.E.M..
I learned a lot about STEM and really enjoy this program
I think that the key note speaker was empowering
I also liked that I got more confidence in myself and that men can't control what girls do.
I had an amazing day!
I really enjoyed this conference and I'm planning to attend this again next year.
Thank you so much for this experience. It was so wonderful and fun.
It was amazing and fun
I like that all of the teachers are so enthusiastic.
The guest speaker was AWESOME! I love her confidence! Would like to come back next year but can't because she will be a freshman
The STEM in very interesting and asome (awesome) to see what someone else love to do!
It's just a really cool program! :)
I made a few friends and they made the program even more fun to be with
I would love to attend next year.
It was really fun
I like that girls can do anything we WANT!!
I had a really fun time
I can't wait to come back next year.
I like how it's not where a teacher is teaching you in school.
Thank you all for making this happen :)
so awesome
I love these conferences so much and I wish it went above 8th grade.
I really like this program, it's very fun and also teaches you a lot.
Just to say I had a lot of fun and learned a lot.
I thought it was really fun and interesting.
Keep doing this it really inspiring.
it was a fun experience.

3 By The Numbers

Girls who participated: 146
Girls who registered to attend: 193
Workshops: 11 hands-on STEM workshops, presented by 15 female STEM professionals
STEAM and College Fair: 39 exhibitors representing 20 groups
Adult volunteers day of conference: 53
High school volunteers day of conference: 8
Behind the scenes adult volunteers: 2
Number of student surveys received after the conference: 144 out of 146 girls that attended

Table 1: Girls' ratings of the keynote speech and the conference as a whole

	Keynote	Conference
Average rating (1 to 5)	4.5	4.7

Table 2: Workshop ratings

Workshop	**Awesomeness** 1 = Boring, 5 = Awesome	**Difficulty** 1=Too easy 5=Too difficult
Chemistry of Colors and Physics of Fluids	4.4	3.0
Circuit Playground Express	4.5	3.0
Cyber Security Girls Battle for the Internet!	4.6	2.9
GPS Treasure Hunt	4.8	2.6
Stickin' with Logo Programming	4.4	3.2
Physics of Sediments	4.8	2.0
Principles of Radiation Protection	4.3	2.5
Roller Coasters, Marbles, and Physics	4.5	3.1
Shampoo Chemistry	4.3	2.7
Sunnyside Up	4.8	2.9
Wildfire Investigation	4.1	2.5

Table 3: Schools Represented vs. Number of students
(Numbers based on actual attendance)

School	#	School	#
Academy for Technology and the Classics, Santa Fe	6	New Mexico School for the Deaf, Santa Fe	3
Acequia Madre Elementary, Santa Fe	1	Ortiz Middle School, Santa Fe	1
Amy Biehl Community School, Santa Fe	2	Pinon Elementary, Santa Fe	7
Anansi Charter School, Taos	3	Pojoaque Sixth Grade Academy	5
Aspen Community School, Santa Fe	1	Pojoaque Valley Middle School	1
Atalaya Elementary, Santa Fe	9	Ramirez Thomas Elementary, Santa Fe	2
Barranca Mesa Elementary, Los Alamos	5	Rio Rancho Middle School, Rio Rancho	1
Carlos Gilbert Elementary, Santa Fe	3	Salazar Elementary, Santa Fe	1
Cesar Chávez Elementary, Santa Fe	1	Santa Fe Girls School	2
Chaparral Elementary, Santa Fe	2	Santa Fe Preparatory School	2
Dennis Chavez Elementary, Albuquerque	2	Santa Fe Indian School	6
E.J. Martinez Elementary, Santa Fe	1	Santa Fe School for the Arts and Sciences	8
El Camino Real Academy, Santa Fe	3	Santa Fe Waldorf School	3
El Dorado Community Elementary, Santa Fe	11	Santo Niño Catholic School, Santa Fe	2
Estancia Valley Classical Academy, Edgewood	1	Sierra Vista Elementary, Albuquerque	1
Fayette Street Academy, Santa Fe	1	St. Michael's High School, Santa Fe	1
Gonzales Community School, Santa Fe	6	Sweeney Elementary, Santa Fe	1
Kearny Elementary, Santa Fe	2	Taos Academy Charter School	1
La Tierra Montessori, Española	1	Taos Charter School	12
Los Alamos Middle School	2	Taos Integrated School of the Arts	3
Mandela International Magnet School, Santa Fe	2	Taos Middle School	3
McCurdy Charter School, Española	1	Turquoise Trail Charter School, Santa Fe	1
Mike Mateo Sena Elementary, Sapello	1	Wood Gormley Elementary, Santa Fe	3
Milagro Middle School, Santa Fe	1	Unknown	1
Monte Del Sol Charter School, Santa Fe	1	Homeschooled	3
Mountain Elementary, Los Alamos	3		

Note: 67% of the girls that attended were from Santa Fe schools, 15% from Taos, and 7% from Los Alamos.

Chart 1: Grades represented
(Numbers based on survey responses)

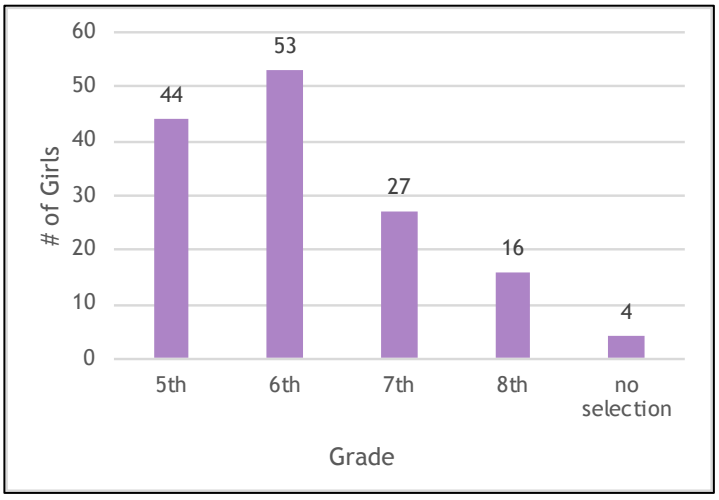


Chart 2: Ethnicities represented
(based on registration forms – Checked all that apply)

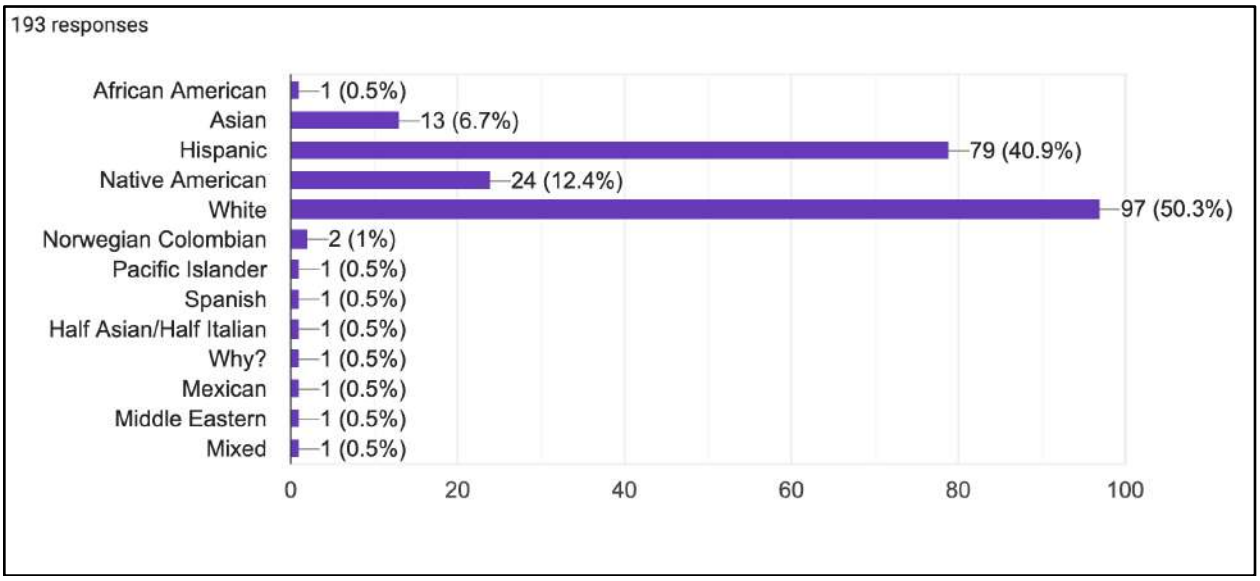
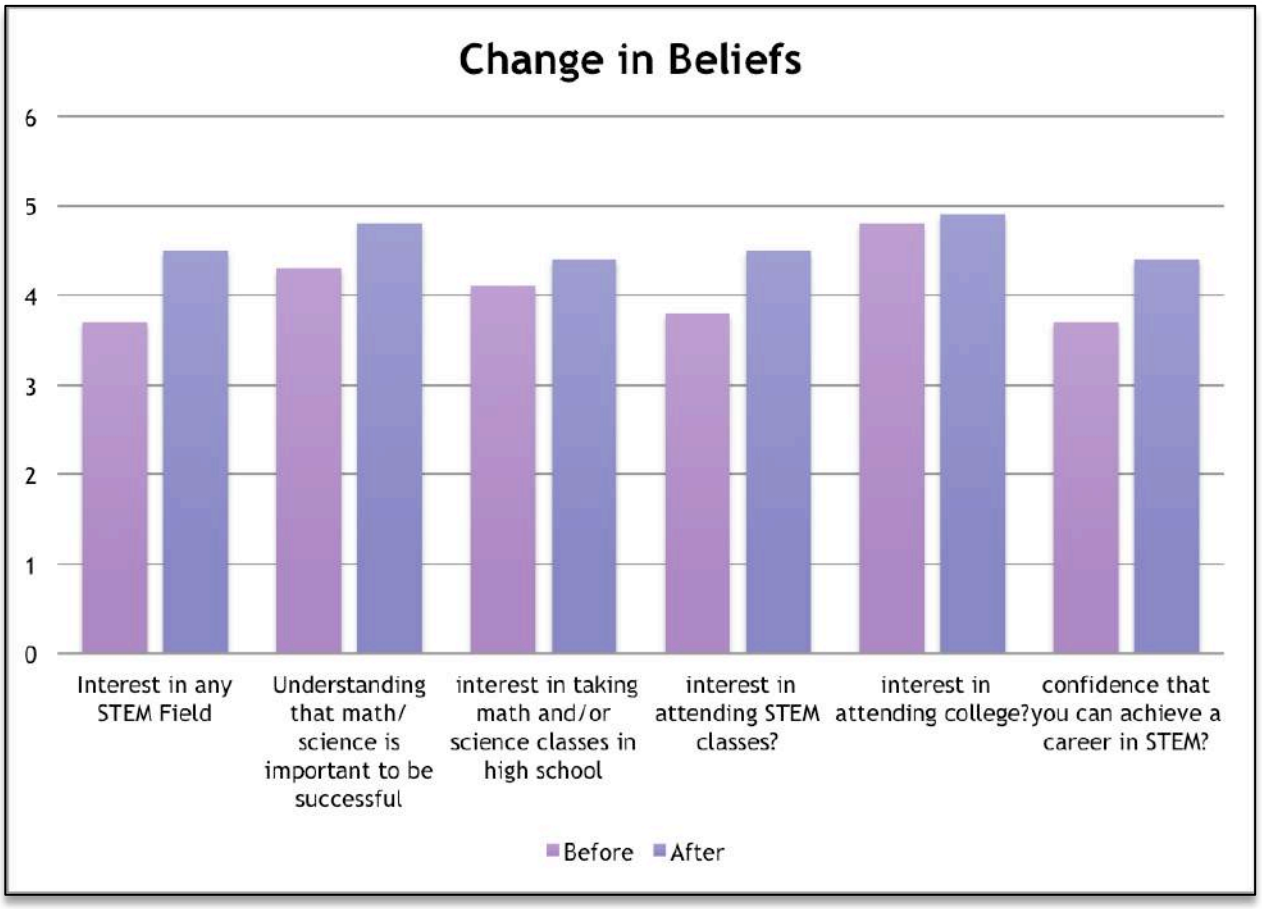
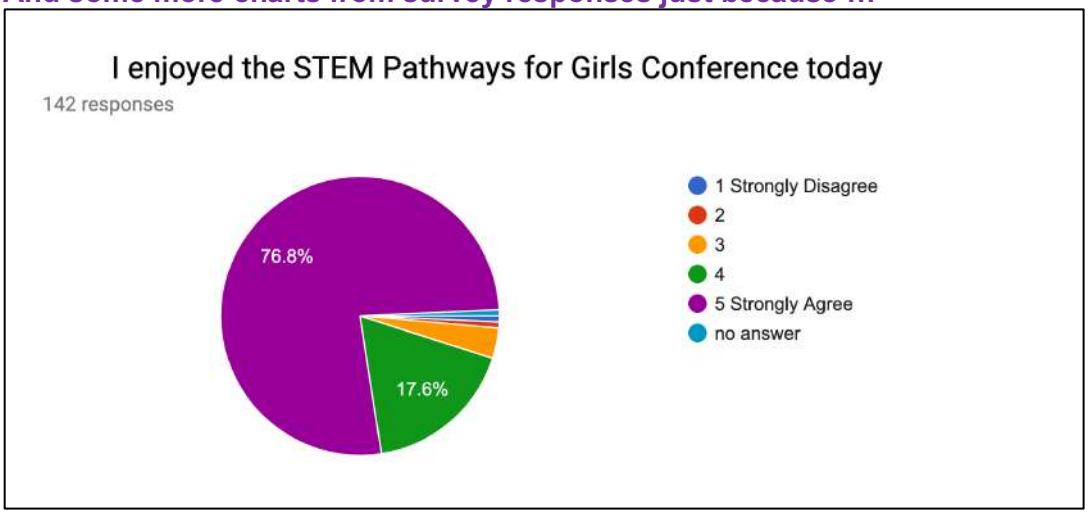
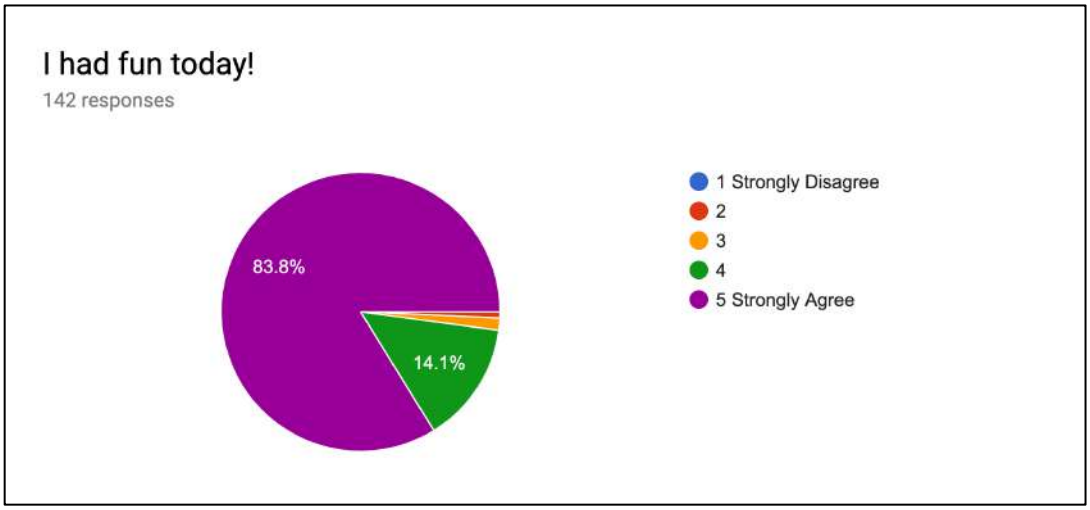


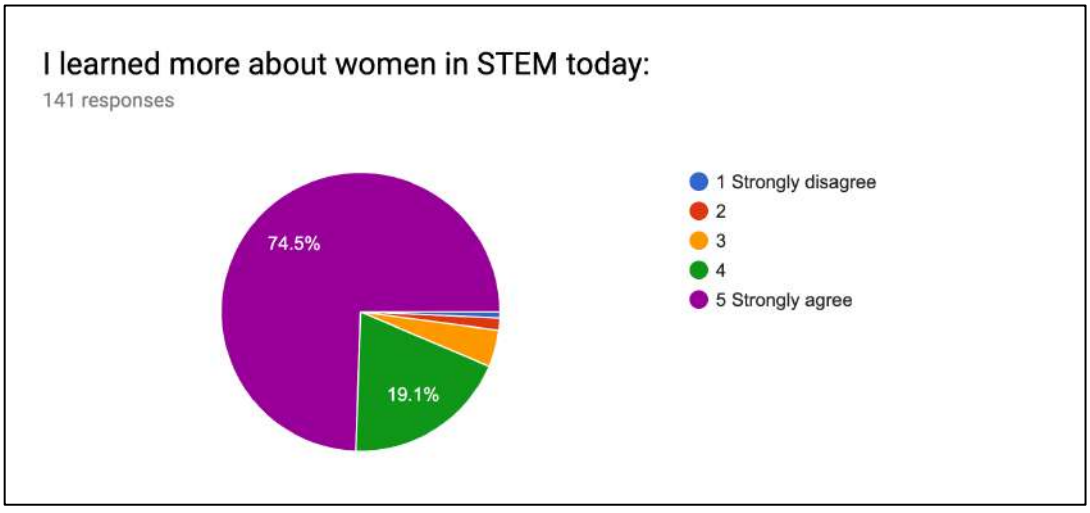
Chart 3: Participants' attitudes towards STEM before and after the conference (scale 1-5)
(based on survey responses: 144 responded out of 146 who attended)



And some more charts from survey responses just because …







4 Making the Pathways Conference Possible

The success of this conference is owed to the tireless efforts of a large number of volunteers.

4.1 Planning Committee

This conference would not be successful without a dedicated planning committee of female STEM professionals from a variety of backgrounds. We are deeply grateful to their long hours of work.

Lina Germann, Ph.D., Conference Chair
Lina Germann is the Founder and CEO of STEM Santa Fe, and the only staff on the committee. Lina is a STEM advocate and community organizer, and an educator. In addition, she worked in the technology industry as a chemist and a marketing specialist as well as served on local boards and committees. Lina enjoys new challenges, Santa Fe's sunsets and watching her two boys grow up.

Kara Luitjohan, Registration Coordinator
Kara graduated from Purdue University with a B.S. in nuclear engineering along with a M.S. and Ph.D. in materials engineering. She is currently at Los Alamos National Laboratory working as a post-doctoral research associate focusing on the relationship between processing, structure, and properties of various metals.

Judi Kahl, Volunteers Coordinator
Judi is a licensed professional Engineer with over 37 years of experience in the water and wastewater field. She is currently the Bureau Chief of the Construction Programs Bureau at the New Mexico Environment Department where she manages a staff of engineers and financial experts overseeing over 300 projects throughout the State of New Mexico.

Raquela Thomas, Ph.D., Workshops Coordinator
Raquela grew up in Santa Fe and earned her Ph.D. in Biomedical Sciences from the Medical University of South Carolina in Charleston, SC, where she studied Human papillomavirus in head and neck cancer. She then worked at a biotech company studying bacteriophage-based systems for detection of microbial pathogens that can be used in biowarfare. Currently she is a a postdoctoral fellow at UNM. Her research is being performed on oncolytic viruses.

Hope Cahill, School Outreach Coordinator
Hope currently teaches 6th and 7th-grade Integrated Science at El Dorado Community School. She believes that teaching is not a profession, but her vocation. In conjunction with teaching, she serves on various committees, including the district's STEM Advisory and Santa Fe High School's Computer Science Advisory, and have mentored students participating in extracurriculars such as the Supercomputing Challenge and the 3M Young Scientist Challenge.

Jenna deCastro, STEAM Fair Coordinator
Jenna was born and raised in Santa Fe, NM and she currently works for a small, woman-owned IT company. She obtained her B.S. in Business Administration from the University of Mary Washington and is currently pursuing an M.S. from American University in Counter-Terrorism and Homeland Security.

Martha Formosa, Communications Coordinator
Martha has worked in the Information Technology industry for over 35 years. She worked at IBM for over 30 years as a software tester, developer and most recently as a manager and project manager in the Linux Development organization. In 2018 she completed a certificate program in Cyber Security. She now works as a contractor for the State of New Mexico on a large Medicaid project.

4.2 Photographers

Barb Odell with all girls media and Kate Gomez, STEM Santa Fe Board Member.

4.3 Adult Volunteers Day of conference

Group Guides (Each girl was assigned to a group of 15 supervised by one or two group guides for the duration of the conference. All Group Guides were vetted with background checks.): Jennifer Pruett, Caitlyn Fick, Alysia Leavitt, Rebecca Zappe, Corinna Saiz, Mary Beth Brady, Kelly Allen, Claire Noonan, Hope Cahill, Sophie Hegmann, Jacqueline Waite, Maria Trujillo, Veronica Espinoza, Rose Ella Esquibel-Alarid

Volunteers:
Ale Collignon, Ann Batum, Ashlyn Flores, Beatrice Montoya, Caitlin Bannan, David LeBard, Erin Mavis, Heather Nordquist, Homa Nassiri, Jane Baker, Jen Black, Jenifer Hooten, Jenn Baker, Jenny Banh, Jere Freeh, Jillian Adams, Kate Gomez, Kelly Muhammad, Kelly Nebgen, Krisztina Boda, Libby Kuehl, Marcie Lombardi, Marge Kelley, Mary Ann Deming, Olivia Trautschold, Olivia Yu, Paul Barclay, Randy Roberts, Rita Caccamise, Rose Doyle, Sarah Montoya, Scott Horschel, Stephen Andrew Ney

4.4 STEAM and College Fair Groups

Bradbury Science Museum, Santa Fe Community College, New Mexico Environment Department DOE Oversight Bureau, Air Force Research Lab New Mexico, New Mexico Institute of Mining and Technology, New Mexico Institute of Mining and Technology – Engineering Department, Explora, New Mexico State University, National Society of Professional Engineers, Bureau of Land Management, Flow Science, Santa Fe High School, Santa Fe Alliance for Science, SimTable, National Center for Genome Resources, Workshop presenter Tracy Mallette with logo programming, UNM Anthropology Department, New Mexico Environmental Department, New Mexico Museum of Natural History and Science, SFCC Trades and Advanced Technology Center.

4.5 Behind-the-scenes Volunteers
Katie Teague and Katie Titus.

Finally, many thanks to Santa Fe Community College President Dr. Rowley and Eric Chavez from Congressman Ben R. Lujan's office for their warm welcome and inspiring words opening the conference.

4.6 High School Volunteers

Malana Martin (Monte del Sol Charter School), Coco Randolph (Santa Fe Prep), Adeline Ney (St. Michaels High School) and Santa Fe High students: Neha Sunkara, Belicia Esquivias, Sage Gonzales, Samantha Spiers, and Maddi Johnson.

4.7 Thank you donors of prizes, swag and snacks for the girls:

Silverline, New Mexico Network for Women in Science and Engineering (NMNWSE), National Center for Genome Resources (NCGR), Los Alamos National Laboratory (LANL), Los Alamos Women in Science (LAWIS), Flow Science, Inc., Souder Miller & Associates (SMA), Ingersoll Rand (IRCO), Santa Fe Botanical Garden, Nambe, AllState, Market Street, Sam's club.

We wish to extend our deepest gratitude to all of the volunteers and those who provided swag items for the girls. Apologies if we missed listing someone or mis-spelled someone's name.

5 After the Conference

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

5.1 Essay Contest

We asked the girls to compose a 400-500-word essay reflecting on how this 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.

1st Place Prize winner:
Mariebella Duran, 8th grader from Taos Academy Charter School, received a Chromebook – donated by Descartes Labs.

Quote from her essay:
"*Attending your conference has helped develop my social skills. I don't have a lot of friends because I am usually a lot more mature than most of the kids at school ... Attending your program has helped me introduce myself to new kids because a lot of them are shy too."*

2nd Place Prize winner:
Flavia Fernandez, 5th grader from Gonzales Community School, received a SNAPTAIN A15 Drone – donated by Wildflower International

Quote from her essay:
"*conference taught computer science, engineering, and physical science. Many young girls will never get this chance, so I am very grateful for this opportunity…. STEM has affected my life and has brought me to a new level. This experience was a big impact on my life, and I cannot thank STEM Santa Fe enough*."

3rd Place Prize winner:
Lilah Herrera, 6 grader, Pojoaque Valley 6th Grade Academy, received a pair of hand-hammered sterling silver earrings – donated by Malouf on the Plaza.

Quote from her essay:
"*My group (of girls) was really kind and spending the day with new people I didn't know was very fun ... I also met many interesting and highly educated instructors … The instructors made learning fun, and they explained things in easier ways so all of us could understand."*

5.2 Follow-up Monthly Workshops

The workshops are a very important aspect of the program, as they provide female role models and engaging hands-on activities for the girls, as well as an opportunity for social interactions with like-minded girls. Therefore our conference is followed by monthly 2-hour workshops in order to continue to support the girls' interests and expand their experience in different STEM disciplines. Every workshop is held on the 1st Saturday of every month except for January 2020.

November 2, 2019
Workshop: Principles of Radiation Protection
15 girls participated

At November's workshop, we welcomed Jenell Mann and Ellee McGurk from Los Alamos National Laboratory (LANL) presenting on The Principles of Radiation Protection. They reviewed the basics of what radiation is, and how we protect workers and the public from the associated hazards. They focused on using the three radiation protection principles of minimizing time, maximizing distance, and shielding in ionizing radiation environments. Additionally, they showed different consumer products that produce minimal amounts of radiation, and the students discovered how different types of materials make better shields from radiation. The students thoroughly enjoyed the opportunity to dress up as a radiation worker.

December 7, 2019
Workshop: The Solar System in Your Hands
16 girls participated

At the December workshop, we welcomed Dr. Amanda Truitt, the Planetarium Coordinator and adjunct professor of astronomy at the Santa Fe Community College. She presented a workshop titled 'The Solar System in Your Hands.' Students explored the solar system and planet distances in hands-on activities along with a tour of the planetarium. Students went home with a pocket solar system and a concept of drawing distances to scale.

6 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. Our organization has a network of STEM professionals serving as mentors and role models. We aim to reduce disparity in educational opportunities by offering our programs at low or no cost to families. We especially reach out to the underserved schools in Santa Fe and Northern New Mexico and to those groups unrepresented in STEM professions, mainly girls, Hispanics, and Native Americans.

STEM Santa Fe is dedicated to providing underserved youth with the inspiration, role models, and support that will help encourage youth to pursue STEM careers. Our programming focuses on the need of providing the best environment to support youth who may not otherwise feel comfortable exploring their interest in STEM.

Erica Velarde kicked off this year's conference at the Santa Fe Community College with an inspiring keynote address. The girls responded very positively to her lecture about her very personal and professional journey. The girls formed a long line in front of the microphone to ask Erica numerous questions after her talk. Erica was extremely gracious with the girls and they seemed to enjoy her talk. Erica led a workshop too and ate lunch with the girls.

Noteworthy: Six teachers volunteered as group guides, all from public schools. They attended the workshops and we asked the workshops presenters to share their materials lists and protocols in order to facilitate the teachers' abilities to take the workshops into their own classrooms.

Every year the conference seeks to improve and this year was no exception. Based on the responses by the girls to the survey questions, the conference was a great success—they rated it a 4.7 out of 5, and all the workshops were rated 4.1-4.8 out of 5 on Awesomeness and 2.0-3.2 on difficulty, where 1=Too easy and 5=Too difficult. While most of the girls already had positive attitudes towards STEM before coming to the conference, their attitude improved after the conference on many levels.

31% of the girls that attended this year's conference are repeat participants and 17% of the registrants asked for a waiver of the registration fee. The early registration fee was $15 and up to $25 for late or walk-in registration. This fee was waived upon request with no questions asked. The follow-up monthly workshops are free will continue February-May 2020.

This year's conference once again had a large impact on attendees, girls and adults. Similar to past years' conference, we noticed a change in the girls' demeanors from the start of the day to the end. Some girls arrived quiet and clinging to parents, but towards the end of the day, they were bouncing around, smiling, and exuberantly telling their parents what they experienced at the conference. 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. Additionally, our hope is that the conference will positively impact their futures and increase diversity in STEM fields, which has the potential to improve the lives of many people.