



motivating young women in science + mathematics

**5th Annual Santa Fe
EXPANDING YOUR HORIZONS
STEM-Computing
Conference for Girls**

**Saturday, October 5, 2013
9:00 am – 3:00 pm
Santa Fe Community College**

<http://www.expandingyourhorizons.org/conferences/SantaFe>

Prepared by Maria Lilie, SFI Learning Lab Assistant

November 14, 2013

Mission:

The mission of Expanding Your Horizons (EYH) is to encourage young women to pursue science, technology, engineering and mathematics (STEM) careers. Through EYH programs, we provide STEM role models and hands-on activities for middle and high school girls. Our ultimate goal is to motivate girls to become innovative and creative thinkers ready to meet 21st Century challenges.

Conference Schedule:

8:00 - 9:00 am Registration
9:00 - 9:30 am Welcome & Keynote Speaker
9:40 – 10:55 am Workshop 1
11:05 am – 12:20 pm Workshop 2
12:30 – 1:15 pm Lunch
1:30 – 3:00 pm STEM-C Fair
1:30 – 3:00 pm Sign out table





Workshop Descriptions and Presenter Biographies

Keynote Speaker: Ellen Cerreta

Ellen Cerreta is the Deputy Group Leader for the Materials in Extremes Group with the Materials Science Division at Los Alamos National Laboratory. Ellen Cerreta received her BS in Aerospace Engineering from The University of Virginia and her Ph.D. in Materials Science and Engineering from Carnegie Mellon University in 2001. Since coming to Los Alamos, she has worked to understand microstructural and substructural evolution of metals under mechanical loads. Ellen is a lead investigator for the High Strain Rate Thrust project in the Center for Materials in Irradiation and Mechanical Extremes. She is a member of the Board of Directors (Membership Director) for The Minerals, Metals, and Materials Society (TMS) and received their International Scholar Award in 2006 and is a Brimacombe Medalist – an award for excellence by mid-career.

Designing Lotion Bottle Pumps (Melissa Carter and Anita Reynolds)

Learn about Flow Science's software and its application areas. Use your newfound knowledge in designing a lotion bottle pump, then use the software to visualize and analyze the results. Melissa Carter currently works for Flow Science as a Computational Fluid Dynamics engineer where her main focus is in metal casting. She graduated from UNM with a Masters in Mechanical Engineering. Prior to Flow Science she worked for Boeing with chemical lasers and design. Anita Reynolds currently works at Flow Science as a Software Engineer. She has been at Flow Science for 5 years. She develops the graphical user interface for the flow modeling software. She holds a B.S. in Electrical Engineering from University of Texas.



The Face of Fractals (Julie Cervantes)

Experience a brief introduction to the world of fractals. Each participant will create her own self-portrait from faces cut from magazines, then these will be combined to make a giant fractal face as a class portrait! Julie loves fractals! (And also her family, her chickens, and her library.) She has been teaching fractals to audiences of all ages for three years. She can also fly a plane, make ethanol fuel, and fix leaky sink. Ms. Cervantes holds her B.A. in Political Science, and MA in Organizational Management, and hopes to someday finish her PhD in Education.



Tails of a Veterinarian (Gretchen Yost and Michelle Yates)

Participants will discuss medical cases, interpret radiographs (x-rays), learn how to administer injections (to very willing stuffed animals), perform a real heartworm test and even practice suturing. We will also discuss career opportunities with a veterinary degree and the science and math components required to become a veterinarian. Gretchen Yost graduated from Auburn University with a degree in electrical engineering. After working as an engineer in Florida for eight years, she decided to change course and follow her dream of becoming a veterinarian. She received her DVM degree from the University of Florida and then moved to New Mexico to practice small animal medicine. She was an associate veterinarian at Cottonwood Veterinary Clinic in Espanola before becoming the Medical Director at the Espanola Valley Humane Society. She is currently doing part time vet work for the shelter and has recently started a home visit veterinary practice.



Paper Circuits (Barbara Kimbell and Rebecca Koskela)

Girls design cards and posters with light up elements. They will learn to construct simple circuits and switches using copper tape, batteries, and LED's while learning about the flow of electricity, electrical circuits, anodes cathodes, switches as well as conductance and resistance. Barbara has MS in Electrical and Computer Engineering, and wrote the computer operating system and experiment that captured evidence of antimatter on the edge of space. She is now retired and work part time as a librarian at the Santa Fe Institute. Rebecca Koskela is the Executive Director of DataOne at the University of New Mexico. Previously, Rebecca was the Life Sciences Informatics Manager for Alaska INBRE and the Biostatistics and Epidemiology Core Manager for the Center for Alaska Native Health Research at the University of Alaska Fairbanks.

Rebecca has over 25 years of experience in high performance computing including positions at Sandia National Laboratories, Los Alamos National Laboratory, Cray Research and Intel.

Vital Signs: How Science and Technology Save Your Life in an Emergency (Faith Applewhite)

Learn what the fire service does, the different types of calls the SFFD responds to, and the role the fire department plays in the community. Also, check out a lot of cool firefighting equipment: bunker gear, air packs worn into fires, and medical equipment such as a heart monitor and defibrillator, a blood pressure cuff, and a test for oxygen saturation. Faith Applewhite has been working as a paramedic/firefighter with the City of Santa Fe Department for 4 years.

Math & Magic of Card Tricks (Kristin Harriger)

How did you do that? Understand the math behind the magic of card tricks and learn new ways to puzzle your friends and family! See a short story told using playing cards, as well as a trick that sorts the cards. Learn how the trick works through matrices, and then do the trick yourself! Kristin Harriger is a student of applied mathematics at the University of New Mexico. She loves hiking and illustrating.



Exploring Geographic Information Science (GIS) (Clio Andris)

An introduction to computer mapping, spatial data and GIScience! Learn about map visualizations, problem solving and applications such as election outcomes, movie rental popularity, and varying levels of access to hospitals and restaurants. Use Google Earth and Google Maps to look at existing spatial data and create your own spatial data set layers. Clio has a PhD in urban information systems, and studies how we connect over geographic space via the telephone, migration, online social networks, text messages, e-mails and travel. She looks at how friends and professionals talk and visit each other across different neighborhoods in a city and across cities. Day to day, she specializes in Geographic Information Systems, which is used to make maps on the computer and put special data on the map.



Animations in Scratch (Sabrina Cook)

Learn how to make computer based animations using the Scratch programming environment and make an animation or music video of your own! Sabrina is an 11th grader at the Academy for Technology and the Classics. She serves as a student mentor for the GUTS y Girls program and has participated in the New Mexico Supercomputing Challenge. She was in Project GUTS when she was in the middle school prior to becoming a mentor. She has attended the Young Women in Computing Summer Program at New Mexico State University the past two summers.

You Can be a Computer Programmer with StarLogo! (Susan Gibbs)

StarLogo is an easy and fun way to learn computer programming! This workshop will introduce students to this program and show them how to create their own three dimensional world inside the computer. Susan Gibbs is a native Santa Fean, a retired criminal defense lawyer and retired middle school teacher, who loves working with kids and learning about computers and science.



Creating friendly Places for Furry Faces with Google SketchUp (Angela Montoya)

Learn basic operations in Google SketchUp and get an introduction to design. Use your new knowledge in a design challenge. Brainstorm your own design using SketchUp. Design challenges including building a dog house for a very large dog and making a cat feeder that the cat can access, but the dog cannot. Angela Montoya recently received her MS in Structural Engineering from UNM and is pursuing a research career. Her research interests include non-destructive testing, fracture mechanics, and computer programming.

Molecular Gastronomy: Playing with Food (Patricia Meyer)

We will look at Food Science as a career by using Science to create new and interesting foods like white chocolate spaghetti and fruit juice caviar. You will get to taste what you make! Patricia Meyer received her undergraduate and masters degree from the University of Kansas in Audiology. After working as a public school Audiologist, she began working with teachers and students using computers in education. She later went back to school to become a teacher. She taught 5th grade for 21 years and retired from teaching two years ago. She has always been fascinated with looking at things in new ways. Molecular Gastronomy is a hobby of hers and she is here to share how food science can be a viable career.



Donors and supporters:

EYH Santa Fe sponsors:

American Association of University Women – Santa Fe, Association for Computing Machinery, Computer Science Teachers Association, Flow Science, Google, Los Alamos National Laboratory, New Mexico EPSCOR, New Mexico Network for Women in Science & Engineering, Northrop Grumman, Sandia National Laboratories, Santa Fe Institute – GUTS y Girls program, Santa Fe Community College

and partners: ABQ Rocket Society, Algae Growing Systems, Big Sky Learning, Elgeldinger Engineering, Fractal Foundation, New Mexico New Makers, QueLabs.

Thanks to our Sponsors!



and to Trader Joe's for contribution of snacks!

EYH Santa Fe 2013 conference coordinators:

Lina Germann, AAUW-Santa Fe. Conference co-chair
Irene Lee, Santa Fe Institute. Conference co-chair
Shelley Rossbach, AAUW-Santa Fe. – Volunteer coordinator
Aviva Crichton, St. John's College – Intern coordinator
Charel Morris, New Mexico New Makers – Fair coordinator

EYH volunteers:

Gabriela Amaya-Williams, Clio Andris, Barbara A., Faith Applewhite, Phyllis Baca, Sandra Bradley, Indira Cabrera, Kendra Carmona, Melissa Carter, Shannon Casey, Ellen Cerrata, Julie Cervantes, Raylinn Coca, Jade Comellas, Sabrina Cook, Caroline Critchlow, Juliet Critchlow, Roger Critchlow, Mary Jo Daniel, Cynthia Dobson, Sarah Fassett, Bex Ferber, Eva Marie Figueroa, Melissa Fricek, Jan Frigo, Tinka Gammel, Jackie Gerstein, Susan Gibbs, John Paul Gonzales, Emma Goos, Grace Graham, Kirstin Harriger, Celeste Hernandez, Barbara Holzapfel, Nidhi Kanabar, Barbara Kimbell, Rebecca Koskela, David Kratzer, Ellen Levy, Maria Lillie, Ruby Lopez, Angela Malcolm Stucker, Yazlin Maloof, Laurie Marnell, Denette Martinez, Keyla Mostacero, Sue Mathews, Karina Menter, Patty Meyer, Angela Montoya, Luanne Moyer, Fran Nawrocki, Samara Pena, Patricia Price, Colleen Rafferty, Anita Reynolds, Dana Robeson, Kris Rodgers, Amanda Rodriguez, Carole Rutten, Alicia Sandoval, Liandra Skenandore, Ellison Stagaman, Margaret Steadman, Kurt Steinhaus, Amy Tapia, Ia Torres-O'Neal, Kathryn Ugoretz, Ashley Valdez, Matthew Wallace, Eleanor Walther, Joyce Weiser, Belinda Wong, Isabel Winson-Sagan, Michelle Yates, Gretchen Yost.

Outcomes

Number of participants: 149 student participants
 Student participants (based on check in at conference): 149
 Student mentors: 11
 Student evaluation forms received: 142 out of 149 (95.3%)
 Adult participants: (teachers, parents, educational assistants, etc.)
 Adult Volunteers total: 53
 Ratio of student participants to volunteers: 149: 53 (roughly 3:1)

Demographics of student participants:

Demographic data on school of origin and scholarship receipt were gathered from registration materials, and information on grade level and ethnicity of students from was collected from student evaluation materials completed onsite.

Schools:

Table 1: Schools from which participants came: (based on registration)

School		
Answer Options	Response Percent	Response Count
no response	0.0%	0
Academy for Technology and the Classics	8.6%	12
Agua Fria Elementary School	0.7%	1
Amy Biehl Community School	2.2%	3
Aspen Community School	0.7%	1
Capital High School	2.2%	3
Capshaw Middle School	1.4%	2
Carlos Gilbert Elementary School	3.6%	5
Chaparral Elementary School	0.7%	1
De Vargas Middle School	0.7%	1
El Dorado Community School	2.2%	3
Gonzales Community School	2.2%	3
Homeschools	0.0%	0
Kearny Elementary School	0.7%	1
Los Alamos Middle School	0.7%	1
Monte Del Sol Charter School	3.6%	5
Nava Elementary School	0.7%	1
New Mexico School for the Deaf	2.2%	3
Ohkay Owingeh Community School	2.9%	4
Ortiz Middle School	2.9%	4
Pinon Elementary School	5.8%	8
Pinon - Los Alamos	0.0%	0
Ramirez Thomas Elementary School	2.9%	4
Salazar Elementary School	2.2%	3
Santa Fe Girls' School	4.3%	6
Santa Fe Indian School	13.7%	19
Santa Fe School for the Arts and Sciences	1.4%	2
St. Michael's High School	1.4%	2
Sweeney Elementary School	6.5%	9
Tesuque Elementary School	2.2%	3
Tierra Encantada Charter School	0.7%	1
Turquoise Trail Charter School	7.9%	11

Wood Gormley Elementary School	7.2%	10
no response	1.4%	2
Other (please specify)	3.6%	5
answered question		139
skipped question		1

Grade Levels:

The grade range of participants was 5th – 9th grade with more than one third of the students in the 5th grade.

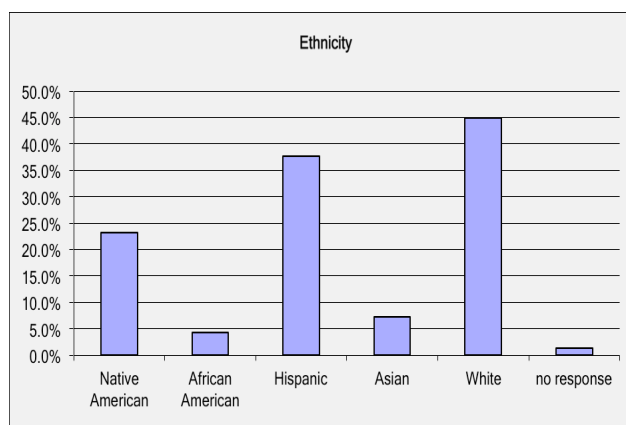
Table 2: Grade level of participants

Grade:		
Answer Options	Response Percent	Response Count
5	33.1%	46
6	23.0%	32
7	27.3%	38
8	13.7%	19
9	2.9%	4
n/a	0.0%	0
answered question		139
skipped question		1

Race/Ethnicity:

65% of respondents were from underrepresented groups in STEM including Native Americans, African Americans, Hispanics and students of mixed ethnicity.

Table 3: Ethnicity reported by student participants



Ethnicity		
Answer Options	Response Percent	Response Count
Native American	23.2%	32
African American	4.3%	6
Hispanic	37.7%	52
Asian	7.2%	10
White	44.9%	62
no response	1.4%	2
answered question		138
skipped question		2

Socio-economic status:

Of the 149 students who attended, 76 individuals or 51% were given full scholarships.

Evaluation of Conference Sessions

Keynote Presenter

Participants were asked to evaluate the content of the Keynote Presentation on a student evaluation form. Responses are summarized in the table below.

Table 4: Keynote Panel content rating.

Keynote Panel							
Answer Options	dull	just ok	mostly good	fantastic	N/A	Rating Average	Response Count
Rate panel content:	0	14	54	70	2	3.41	140
<i>answered question</i>							140
<i>skipped question</i>							0

Workshops:

This year the workshops were increased in duration by 15 minutes. Each session was 75 minutes long. The presenters spent the first 5 minutes of each session describing their field, career path and interests.

Participants were asked to rate the content and difficulty level of the two workshops they attended on a student evaluation form. Responses were grouped by workshop title below. Each workshop was offered twice and the content and pedagogy was similar between two sessions. The responses are summarized in the table below.

Table 5: Workshop Ratings:

Of note most of the responders have found their workshops to be at the right comfort level. In 7 out of 11 workshops at least 90% of participants found it as “just right”. In addition most of the student participants rated their workshop experience as “fantastic” and “mostly good”.

		Workshop Titles											
		Animation in Scratch		Friendly Places for Furry Faces with SketchUp		Designing Lotion Bottle Pumps		Exploring Geographical Information Systems		Math and Magic of Card Tricks		Molecular Gastronomy: Playing with food	
			%		%		%		%		%		%
# responses		16		34		15		28		22		23	
Dull		0	0%	0	0%	0	0%	1	4%	0	0%	0	0%
Just OK		1	6%	3	9%	2	13%	4	14%	2	9%	1	4%
Mostly good		3	19%	7	21%	10	67%	10	36%	10	45%	4	17%
Fantastic		12	75%	24	75%	3	20%	13	46%	10	45%	17	74%
n/a		0	0%	0	0%	0	0%	0	0%	0	0%	1	
Difficulty rating													
too easy		0	0%	1	3%	0	0%	1	4%	3	14%	1	4%
Just right		14	88%	31	91%	10	67%	27	96%	18	82%	21	91%
Too hard		0	0%	2	6%	4	27%	0	0%	0	0%	1	4%
n/a		2	13%	0	0%	1	7%	0	0%	1	5%	0	0%

		Workshop Titles											
		Paper + Electronics		STEM in the Fire Department		Tails of a Veterinarian		The Faces of Fractals		Programming with StarLogo TNG!		no response	
			%		%		%		%		%		%
# responses		23		25		34		29		29		2	
Dull		0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Just OK		0	0%	1	4%	2	6%	0	0%	2	7%	0	0%
Mostly good		6	26%	10	40%	10	30%	10	35%	14	48%	1	50%
Fantastic		16	70%	14	56%	22	65%	14	48%	13	45%	1	50%
n/a		1	4%	0	0%	0	0%	1	4%	0	0%	0	0%
Difficulty rating													
too easy		0	0%	7	28%	1	3%	1	4%	2	7%	1	50%
Just right		22	96%	16	64%	32	94%	28	97%	27	93%	1	50%
Too hard		0	0%	2	8%	1	3%	0	0%	0	0%	0	0%
n/a		1	4%	0	0%	0	0%	0	0%	0	0%	0	0%

Did this conference make you want to take more STEM classes?		
Answer Options	Response Percent	Response Count
Yes	91.4%	128
No	5.0%	7
no response	3.6%	5
answered question		140
skipped question		0

What was your attitude towards STEM before today's conference?		
Answer Options	Response Percent	Response Count
I loved STEM	36.0%	50
I liked STEM	46.8%	65
No opinion	13.7%	19
I disliked STEM	0.7%	1
I hated STEM	0.0%	0
no response	2.9%	4
answered question		139
skipped question		1

Did this conference change your attitude about STEM?		
Answer Options	Response Percent	Response Count
Yes	75.4%	104
No	24.6%	34
no response	0.0%	0
answered question		138
skipped question		2

Did this conference change your view of scientists, engineers, technologists and/or mathematicians?		
Answer Options	Response Percent	Response Count
Yes	84.9%	118
No	14.4%	20
no response	0.7%	1
answered question		139
skipped question		1

Sample of responses to Open-ended questions.

At the bottom of the first page of the evaluation form we asked "Is there anything else you would like to share?"

Most were very positive:

"I liked the concept of Math and Magic of Card Tricks workshop, but I would have liked a little more challenge and creativity. GIS is an amazing program! I learned so much. It was very cool to experiment with maps and what they show! I would really like being able to make my own map and learn how to do that on computers. :)"

"This is a great way for me to learn about things I want to do in the future. Thank you!"

"this makes me want to become a scientist!"

"I liked how you included fun activities in each workshop."

"I have done EYH before and this was the best one!"

"I think I want to do this when I grow up."

"The vet workshop was awesome!"

"I hope that I will get to do it again!"

Responses to Open-ended questions on the Student Evaluation Form. A sample of responses to "What I expected was..."

"boring teaching of science and software"

"that it would be like in school"

"a lot of talking and no hands on sample"

"I expected it to be like you would go to the different places by yourself."

"Sitting and listening to lecture or choosing what you wanted to do."

"I expected lectures and quiet work"

"lectures and only a few hands on activities"

"it to be boring and not at all fun"

A sample of responses to "What I got was..."

"I got a really cool and fun presentation and I had fun activities. We also got to learn that there are not that many girl scientists in the world and that we should try and be like some of them."

"most of what did was completely hands on and very fun!"

"1) a cool card trick to show my friends and family 2) I didn't get anything but now I can go on Google Earth to see the back of my house."

"Things that were much better than what I expected. I got to make a portrait out of faces and I got to work with circuits"

"To learn about really cool things and meet new people."

"lots of hands on activities"

"A chance to be creative with a story and also use mathematics to explain logic of the story."

"A completely new experience from last year, this time learning about circuits and some chemistry about foods."

Sample of responses to “Next, I will...”

“Try making some new recipes, the ones that are out of the ordinary, some that use the science clearly.”

“show the card trick to my family and see how I can expand it. Go home and explore Google maps”

“I will show the fun card trick to my family and possibly teach it to them as well. And I will go on to Google Earth.”

“I will make some chocolate for my mom”

“follow my dream job”

“I will show this card trick to my family and friends and will also show Google earth to my family.”

“Next I will do the trick on my family. Would definitely get onto Google maps more often.”

“want to make more friends and learn more about science”

Concluding Thoughts

Our fifth Santa Fe 2013 Expanding Your Horizons conference event can be viewed as very successful based on several different metrics. The event drew a diverse group of 5th – 8th grade girls; geographic - from all over Santa Fe (public, private, and home schooled) and the surrounding communities. Thirty one different schools were represented. The participants were diverse in terms of race / ethnicity – 65% of respondents were from underrepresented groups in STEM; and socioeconomic status – 51% of the participants requested and received scholarships to attend. The mission of EYH is to encourage young women to pursue STEM careers by providing STEM role models and hands-on activities for 5th -8th grade girls. The activities were appropriate for the girls at this age level, with most of the participants rating their workshop experience as “just right” and “fantastic.” To summarize, there was a major difference between what girls expected, a boring non-interactive lecture, and what they received, a hands on experience that stimulated learning and engagement, with girls desiring to replicate and show friends and family what they have learned immediately after the event. On closer examination, girls’ responses bring to light the greater engagement and deeper learning achieved through active learning. As in previous years, the overwhelming number of volunteers at this event was integral to its success.

The date of this conference was in October, which was earlier in the academic year than in previous years. This change better accommodated the school districts schedule while retaining a large pool of participants.

