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Girls in STEM

Elizabeth Coronado, PhD

Kelsey Neal, BS

What to Expect

By the end of this session, the audience will understand:

- The current status of girls in STEM courses and fields
- Why intervention in the early middle years
- The hypothesis set forth by the study

Background

What did the NSF's *National Science Board Science and Engineering Indicators for 2016* report?

Female bachelor students pursuing STEM

Percentage of men and women STEM workers

Minorities in STEM

Women in Engineering

<https://www.nsf.gov/statistics/2015/nsf15311/>

AP and IB Enrollment Data

Old Mill High School, Baltimore, MD (Urban, Title 1, IB)	Broadneck High School Annapolis, MD (Suburban, Affluent, AP)
Maths HL F=3 M=4 Maths SL F=23 M=8	AP Physics Enrollment: F 39 M 53
Physics F=1 M=4 Chemistry F=16 M=5	AP Physics C F 3 M 24
EES F=5 M=3 Biology F=13 M=25	AP Calc BC F 32 M 45
Year 1 F=49 M=18 Year 2 F=50 M=21	
Total Program F=99 M=39	

NM High School Students STEM Interest

New Mexico STEM Interest by Gender

New Mexico High School
Class of 2017 Interest in
STEM:

Male: 48.8%

Female: 15.3%

Male interest has **increased**
by 9.6% since 2008

Female interest has **dropped**
by 2% since 2008

Hypothesis

How does near peer mentoring and classroom intervention change girls attitudes towards STEM in both the short and long term

- Yearly
 - At the end of each school year:
 - There will be a significant difference in girls' attitudes towards STEM in the treatment group
- Culmination
 - At the end of the study:
 - The number of girls taking STEM courses or expressing an intent to pursue STEM at a higher level will be significantly greater for the girls in the treatment group.

Study Design Set up

Sustained, Longitudinal Study of Treatment and Control

Inclusion/ Exclusion/ N	Recruitment/ Setting
N-20	Board of Education Bases
n-10	Espanola Valley Public School Approval
Dependent on input from Espanola Valley Pubic Schools	Title 1 rural multiethnic elementary school
Exclusion groups not affiliated with LANL STEM curriculum	Grade 6 class
Bradbury Fridays	

Study Time Line

Year 1

Intervention Dates :

Starts: End of February

Ends: June 9th

Intervention Types:

- **Monday: E-mentoring**
- **Wednesday: E-mentoring**
- **Friday: In person mentoring**

Years 2-7

Intervention Dates :

Starts: August

Ends: May

Intervention Types:

- **E-mentoring**
- **Special Events**

The study will end after the girls 2nd year post highs school

After each year a snap shot will be taken

Procedures

What the girls will receive each week:

Mentor Mondays

Mentoring Type:
Virtual Mentoring

Mentors Will:

1. Answer Questions
2. Get to know girls

Ask A Scientist Wednesday

Mentoring Type:
Virtual Mentoring

Mentors Will:

1. Answer classwork and homework questions
2. Provide skills assistance tutorials for their mentees

Science Fridays

Mentoring Type:
In Person Mentoring

Mentors Will:

1. At School: Preform tutorials/ experiments
2. At Bradbury: Preform tutorials/ experiments

Special Events

1. The White Coat Ceremony
2. STEM at UNM
3. Mentor Social

Procedures

Research Procedures:

- Girls interests will be tested through a survey given pre and post intervention

Safety of Subjects:

- The girls will not be tested on their knowledge of the subjects, this will reduce the risk of anxiety due to testing.
- In all events the number of supervisors will be above the federal requirement of 1:8.

Getting Parents involved

White Coat Ceremony

Girls in STEM

Coronado and Neal

Volume 1, Issue 1

Guess what we did this week???

On Thursday, October 20, we met our facilitators from Los Alamos National Laboratory! Miss Kelsey and Miss Elizabeth will be helping to connect us with real scientists from the lab.

We had fun with Anatomy and Physiology with a "Face the Cookie" challenge where we had to use the muscles of our faces to move an Oreo from our forehead to our mouths (YUM)! We got backpacks, pens, stress stars, and even a real **LABORATORY NOTEBOOK!**

Miss Elizabeth set us up on Edmodo so we can chat with scientists and mathematicians on Mondays and Wednesdays while we are at school! You can join us by going to:

1. Edmodo.com
2. Join a group
3. Enter the code flbcs6
4. Follow the directions for creating your account

We also got to practice taking surveys using SurveyMonkey.com. Miss Kelsey helped us with any of our computer problems. She told us all about the different types of science we would be using day in our experiment. We even logged our first **HYPOTHESIS** in our lab notebooks. Did you know that a hypothesis is a prediction or an educated guess? Know what else? We learned two more terms:

- **Null hypothesis:** the hypothesis that there is no significant difference between specified populations, any observed difference being due to sampling or experimental error. Ex: In "Face the Cookie" boys and girls will perform equally.
- **Directional hypothesis:** the experimenter predicts, not only that a specific relationship will exist, but, further, the direction of that relationship. In "Face the Cookie," boys will outperform girls. (Yeah, Fabian won!!)

Miss Kelsey said she will be back before December and that we will have more fun experiments and learn more academic vocabulary.

Please mark your calendars for our official kickoff! On the evening of Friday, December 16, students will receive their official lab coats at school in a "White Coat Ceremony." It will be a formal occasion followed by ice cream and cake! Please plan on joining us. Details to follow.

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Monthly Bulletins

Summer Science Institute for Girls

One Week Long Summer Camp Focused
around
Science Technology Engineering ARTS Math

What the girls will experience:

- Science sessions relating genre and real life
- Helping with the transition to middle school
- Relating science to fun
- Intensive mentoring

Year One Data

*Pre-Test-Post-Test
Comparison for Treatment
Group
Null Hypothesis Rejected
(-6.05, 1.99 = null rejected)*

t-Test: Paired Two Sample for Means

	Variable 1	Variable 2
Mean	0.426160338	0.784810127
Variance	0.295482868	0.42064772
Observations	79	79
Pearson Correlation	0.621543511	
Hypothesized Mean Difference	0	
df	78	
t Stat	-6.047264819	
P(T<=t) one-tail	2.39082E-08	
t Critical one-tail	1.664624645	
P(T<=t) two-tail	4.78165E-08	
t Critical two-tail	1.990847069	

Year One Data

Control Group Data F-Test Two-Sample for Variances

	Variable 1	Variable 2
Mean	0.226265823	0.449367089
Variance	0.744822095	0.503413056
Observations	79	79
df	78	78
F	1.479544653	
P(F<=f) one-tail	0.042819128	
F Critical one-tail	1.454651333	

Unequal Variance

t-Test: Two-Sample Assuming Unequal Variances; Pre-Post Difference

	Variable 1	Variable 2
Mean	0.226265823	0.449367089
Variance	0.744822095	0.503413056
Observations	79	79
Hypothesized Mean Difference	0	
df	150	
t Stat	-1.77487338	
P(T<=t) one-tail	0.038973516	
t Critical one-tail	1.6550755	
P(T<=t) two-tail	0.077947031	
t Critical two-tail	1.975905331	

Did not Reject Null

Edmodo

- <https://www.edmodo.com/home>
- [https://www.edmodo.com/home - /library](https://www.edmodo.com/home-library)