

# FURTHERING Girls' Math Identity

NCTM

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# What is math identity?

- Beliefs, attitudes, emotions and dispositions about mathematics (Martin 2000)
- Resulting motivation and approach to learning and using mathematics knowledge (ibid)
- Ways students think about themselves in relation to mathematics (Cobb, Gresalfi & Hodge, 2009)
- Extent to which they are engaged in and see value in mathematics (ibid)
- Not static – developed through social processes and shared experiences (Boaler & Greeno, 2000)



# Two pillars of a positive math identity

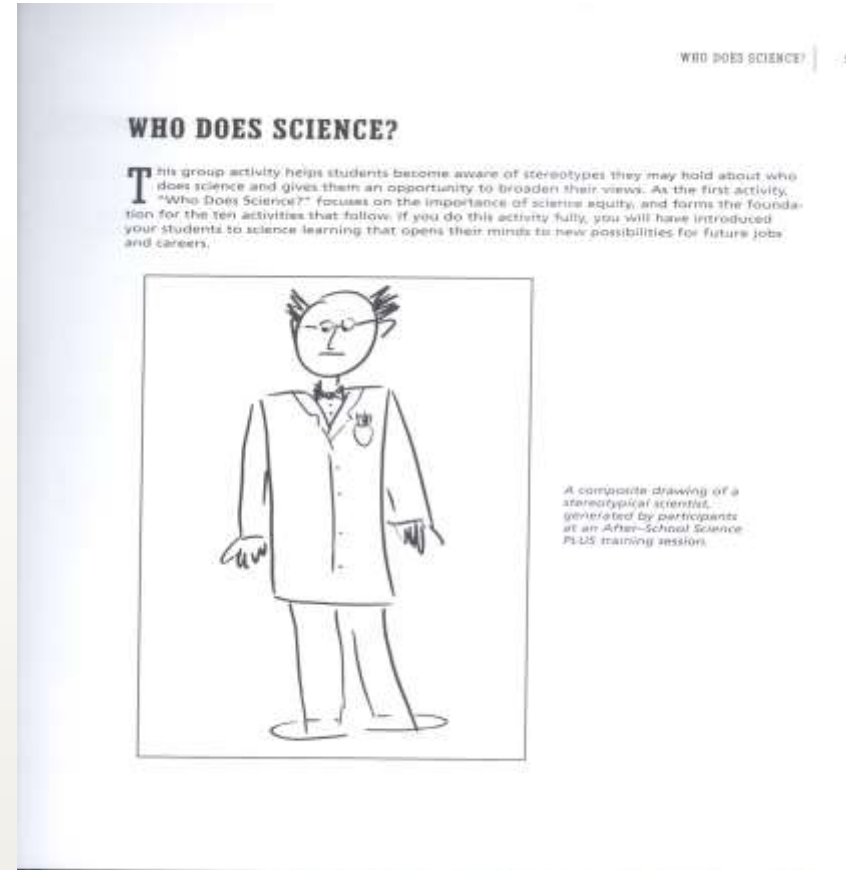
*The belief  
that you  
can do math*

*The belief  
that you  
belong*



# How do we teach in the US?

- Performance
  - Master skills and content
- Engagement
  - Interest and excitement
- Identity
  - Self perception



# What does the research say predicts a STEM future?

- *Identity*
- Engagement
- Performance



Identity is a better predictor than performance  
(Eagan, M. K., Sharkness, J., & Hurtado, S., 2010)



# Why is math identity important?

- More than 50 percent of middle and high school students plan to drop math as soon as they can
- Math is essential to everyday life
- 60 percent of future jobs depend on math
- TIMSS (Trends in International Mathematics and Science Study) found that females remain less likely than males to be attracted to math careers
- Math identity is key



# Furthering Girls' Math Identity

- National Science Foundation (NSF) project to advance research and practice relating to girls' math identity
- FHI 360 in partnership with The New York Academy of Sciences
- Focuses on girls in grades 4-8 – critical years of transition from elementary to middle to high school



# Overall Project Goal

- ***Improve science, technology, engineering and math (STEM) learning for girls and expand their participation in STEM education and future careers.***
- ***Address inequities in girls' and women's participation and persistence in STEM education and careers.***





# Why research/practitioner partnerships?

**research** is  
grounded in the  
reality of practice  
and relevant



**practice** is grounded  
in an evidence base



## R/P Partners:

- stand to gain equally from the work of the partners
- have equal status and authority/jointly negotiate the work of the partnership
- acknowledge, leverage and respect one other's expertise and experience



# Lorraine Howard

President, Women and Mathematics Education (WME)



# REFLECTION AND POSSIBLE NEXT STEPS

Now with a more informed definition and framework for understanding girls' math identity and its importance,

WHAT ARE YOUR FIRST NEXT STEPS IN SUPPORTING GIRLS' MATH IDENTITY?

WHAT DO YOU HOPE TO ACCOMPLISH?

WHO WILL YOU NEED TO COLLABORATE WITH TO ACCOMPLISH THE WORK?

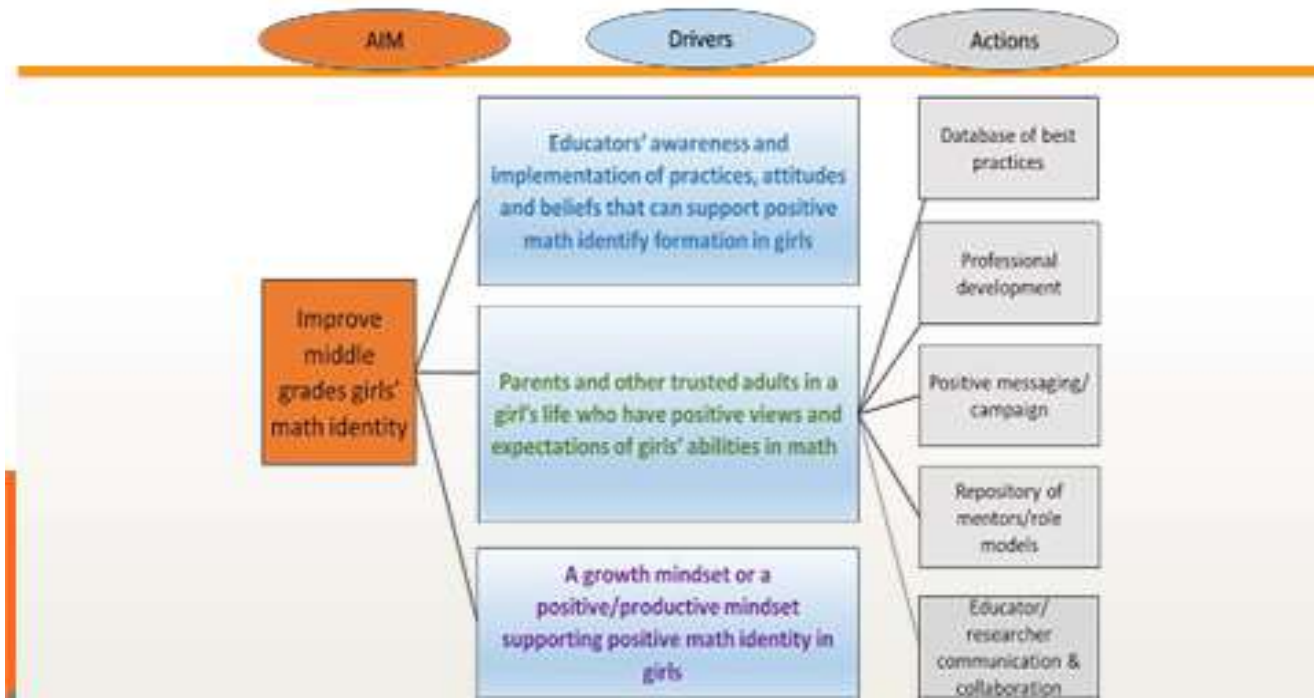
WHAT IS YOUR TIMELINE FOR THIS ACCOMPLISHMENT?

**Fill in the blanks (Refer to the AIM→DRIVER→ACTION FRAMEWORK below):**

**If I want to improve middle-grades girls' math identity, then I need to focus on**

\_\_\_\_\_ (primary driver). **One way to do that is to**

\_\_\_\_\_ (change/action idea).



# **PROJECT ACTIVITIES**

## **PHASE I: March 30, 2017 - On-Site Kick-Off Workshop**

On March 30, 2017, the *“Strengthening Girls’ Mathematics Identity and Achievement Through Project-Based Learning”* Initiative was kicked-off with an On-Site Professional Development Workshop, developed and facilitated by Lorraine Howard, President, Women and Mathematics Education (WME) and the Mini-Grant’s Project Director.

Attendees included: **17** middle school mathematics teachers

**6** academic and support staff members

**5** middle school principals and assistant principals

**1** assistant superintendent

## **About the Neshaminy School District**

The Neshaminy School District covers 27.6 square miles in historic Bucks County, PA (northeast of Philadelphia) serving approximately 70,000 residents. Neshaminy has 10 schools educating over 8,400 students from the boroughs of Hulmeville, Langhorne, Langhorne Manor, Penndel, and the townships of Lower Southampton and Middletown. The first school in the area was established in Langhorne in 1836, and the District as we know it today was formed in 1950.

Neshaminy is an Indian name, a reminder of the Lenape Indians who lived along the Neshaminy Creek, which runs through the center of the District. The area grew rapidly in the 1950's as one of the nation's first the farmland there.

**Neshaminy School District currently operates 6 elementary schools, 3 middle schools and 1 high school in a K-4, 5-8 and 9-12 configuration.**

# CONTACT INFORMATION

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# Leah Oppenheimer

Director of Community Outreach, Children's Museum  
of the East End, Bridgehampton, New York



# Children's Museum of the East End

[nyti.ms/2HdZ49G](https://nyti.ms/2HdZ49G)

[www.cmee.org](http://www.cmee.org)



The New York Times



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Big City Statue of Doctor Who Did Slave Experiments Is Entitled. Its Ideas Are Not.



New York General Bypasses Pardons

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## 'Ciencia' With Other Subjects for Latino Children on the East End

By KAREN LIPSON MAY 9, 2015



Lash Oppenheimer, who started Ciencia en CMEE, with, from left, Brandon Perez, 8; Paula Ortiz Perez, 8; and Dean Perez, 8. Credit M. Grant for The New York Times

As the president of the [Children's Museum of the East End](http://www.cmee.org), Stephen Long has gotten occasional ribbing by fellow museum professionals from outside the region.

They say: 'Why do you need to do any fundraising? You're in the

RELATED COVERAGE

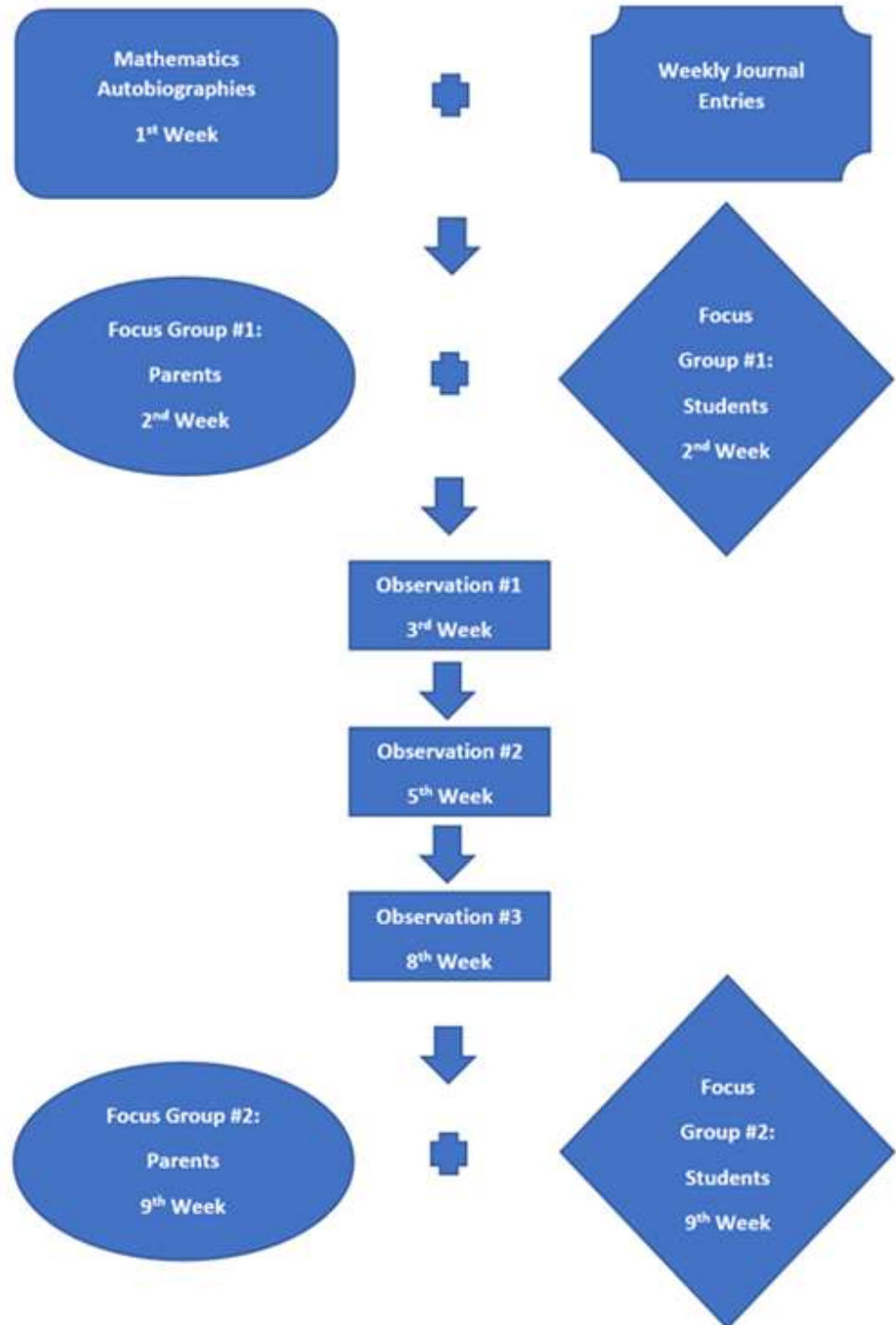


CALENDAR  
Things  
2015

TIMES TOPIC  
Long Island Arts



# Research Flow Chart “Mathemachicas”



# Improving Math Identity for Underrepresented Populations: An Implementation and Impact Study



*National Science Foundation research project to look at the impact of research-based strategies on math identity.*

Maryann Stimmer, FHI 360

# What Is Math Identity?

- A self-perception about ownership and performance in mathematics
- A self-perception about performance and capacity in mathematics



# Research Questions

- What is the **effect of ASM+ on students' math identity**, engagement, and interest? What are the effects for historically underrepresented groups?
- What is the **effect of ASM+ on student achievement** in math as measured by standardized test scores? What are the effects for historically underrepresented groups?
- What is the **relationship between math achievement and math engagement, interest, and identity** in afterschool programs?
- **What elements of ASM+** foster students' math identity, and through what mechanisms is this effect achieved? What are the best practices and lessons learned?



# Project Goals

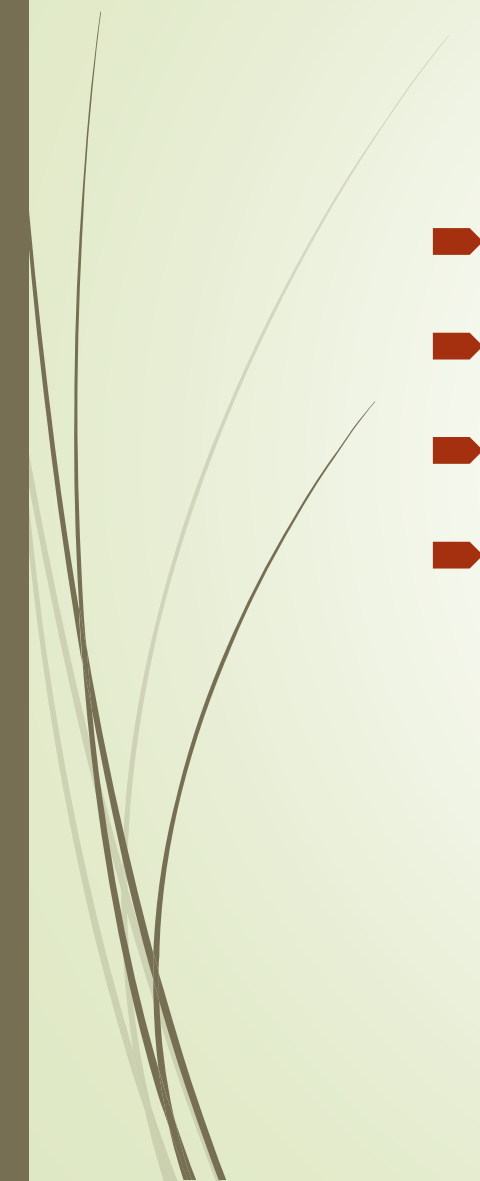
- To understand the impact of research-based strategies on the development of a positive math identity.
- To understand the interaction of a positive math identity on engagement and performance.

# After-School Math Plus (ASM+)

- Fun
- Real-world math
- Inquiry-based
- Builds essential math skills and concepts
- Based on NCTM standards; meets career and college-ready standards
- Strategies for inclusion of all students



## ASM+ Helps Students...

- 
- Find math in everyday experiences
  - Improve math skills
  - Have positive experiences with math
  - Increase engagement and comprehension





# Theme One: Jump Rope Math


- Students learn essential skills while jumping rope, having fun and exercising
- Create bar graphs, line graphs, scatter graphs and Venn diagrams
- Conduct and analyze surveys
- Design a math investigation





## Theme Two: Built Environment Math

- 
- 
- Students learn about scale, measurement, and their built environment

# Theme Three: MusicMath

- 
- Students use combinations and permutations to create music
  - Learn about fractions through whole, half, quarter and eighth notes

# Theme Four: ArtMath

- 
- 
- Students create kaleidoscopes
  - Create art in the style of Escher and Mondrian
  - Use tessellation, symmetry, asymmetry, and measurement

# Math Identity Activities

- Equity Activity: Who Uses Math?
- Literacy Activity
- Career Connections
- Role Models
- Family Connections
- Opportunities to be the “expert” or the teacher

## Activity

# Identity development strategies

- 1. Role models:** Describe why someone is a good role model. Share their backgrounds and passions. Connect directly!
- 2. Literacy:** Write a poem/rap/story/play.
- 3. Careers:** Brainstorm a list of careers that may involve these skills and materials. As above, highlight professionals in the field.
- 4. Family:** Write notes home that suggest ways the parents/families can be involved.
- 5. Students as experts:** Let kids own it and teach it.

## Q&A

# Girls' Math Identity NIC

- Networked Improvement Community (NIC) – interdisciplinary community with a problem-centered approach to improving math learning for girls (Bryk, Gomez, Grunow & LeMahieu, 2015)
- Researchers and practitioners working together to translate research into practice
- Improving practice to develop positive and productive math identity among middle grades girls, with the ultimate goal of broadening girls' participation in STEM





# Join Our NIC!

www.girlsmathidentity.org



HOME MEETING CONVENING **COMMUNITY/NIC** VIEWPOINTS LEARN MORE CONTACT US

## Welcome to our Networked Improvement Community (NIC) page. We invite you to participate!

Members of the online community will have access to the discussion board (Google Group)/email distribution list and be able to:

- Connect and collaborate with like-minded experts
- Share and receive information
- Ask questions of your colleagues in the field
- Receive emails (instantly or as a daily digest) of posts to the group

We strongly encourage you register with a Google/Gmail account as you will gain access to the web interface allowing you to:

- Read and search all online community posts
- Post to the group using the web interface and also by email

You may register a new Google-account that associates with your non-Google email address (e.g. YourName@YourOrganization.com) [here](#). If you still wish to join with a non-Google/non-Gmail email address, you will still be able to read/post to the online community by email, but you will not gain access to the user-friendly web interface.

# Thank you!

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**[www.edequity.org](http://www.edequity.org)**



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<http://www.girlsmathidentity.org/v/howmanydifferentbarbies>