

Women and Mathematics Education (WME)



President's Message

Dear Members and Friends of the Women and Mathematics Education (WME) Community:



I am thrilled to connect with you at this time as WME comes off a Tremendous 2018, culminating in our **40th Year Anniversary Celebration at the 2018 NCTM Annual Meeting and Exhibition in Washington, DC.**

Indeed, WME provided exemplary service to our members and friends in our continuing advocacy commitment of **equity and high-quality teaching and learning of mathematics**, not only for our targeted girls and women populations, but for all students, including our **teacher training, “Girls’ Mathematics Identity” Initiative.** A teaser of what’s shared in this newsletter is WME being **nationally and internationally recognized** for our advocacy work through invited participation in specialized partnership research and on-site workshops and forums.

With this backdrop, we look to continue our “signature” programs of **teacher training and girls’ in-school and out-of-school math camps.** Yet, I think we all can agree

that the world has changed dramatically in recent decades—even in the last few years; and students need not only academic knowledge and skills, but also the 5Cs success skills of critical thinking, communication, collaboration, creativity, cultural relevancy, including project management skills. They need to know how to learn, take responsibility and gain self-confidence. Thus, it is exciting to **transition and transform** WME into its next phase of **needed change in mathematics education and mathematics.** A special thanks to you, our members, for both a commitment and passion for girls and women in mathematics; and I **thank you now** for your patience as the WME Leadership Team spent our 2017-2018 academic year building a stronger foundation for tomorrow’s WME.

The following core features will be the foundation of our success in the future:

- **An even stronger partnership with our hallmark affiliate partner, NCTM;**
- **A strong partnership with our new partner affiliates, NCSM, AMTE and CBMS**
- Working with our **2 WME-sponsored energized and enthusiastic NCTM Student Affiliates Pre-Service teachers** who will have the opportunity to jumpstart their foundational understanding and

skills in carrying out the newly minted **Standards for Preparing Teachers of Mathematics**; (**Our Student Affiliates will be highlighted in Part II of this 40th-Year Newsletter edition**);

- The release of new and enhanced **products, services, and resources** including a Train-the-Trainer Workshop Series, “**Strategies for Strengthening and Sustaining Girls’ Mathematical Identity for High Impact Life and Career Pathways**”;
- Making available well-designed, **authentic real-world mathematically-oriented problems and projects** that can be readily adapted by teachers eager to jumpstart their Project/Problem-Based Learning (P²BL) practice; and
- The launch of our **updated and interactive website** which will more effectively and efficiently provide networking, research, practical strategies and resources that serve our faculty and student clientele

Continuing to approach our work with **equity, access, advocacy and empowerment** lenses, these aforementioned research and evidence –based 2019 WME Initiatives will help ensure the **transformative impact** on girls’ and women’s **sustaining** interest and the deeper learning of the mathematical sciences –the knowledge and skills critically needed for the 21st century civic, life and career-ready global economy.

We welcome your thoughts and ideas as we work to implement our vision for WME and achieve the goals that will ensure that WME will be a positive force for girls and women in mathematics. **We hope you will work with us as we grow WME.** We wish you a productive and rewarding 2019 and look forward to networking in some way with *each and every one of you.*

Much joy and many more smiles in 2019!

Lorraine

Lorraine M. Howard,
President, Women and Mathematics Education
February, 2019

P.S. Please enjoy **PART 1 of WME’s 40th Year Anniversary’s Special Edition eNewsletter** which follows.



Above: WME President, Lorraine Howard, speaks on **Girls’ Mathematic Identity** at the 2nd Annual International Symposium on STEAM, Athens, Greece, July 24, 2018.



Congratulations

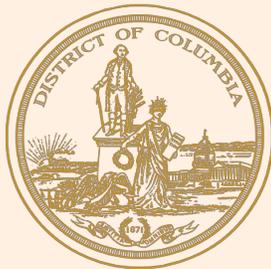
Women and Mathematics Education

April 25, 2018

As Mayor of Washington, DC, it is my pleasure to congratulate Women and Mathematics Education (WME) on your 40th Anniversary and to welcome you to my hometown—and our nation’s capital—for the National Council of Teachers of Mathematics Conference and Exhibition.

Thanks to WME, our girls, women, and minority students, have access to high-quality mathematics education which helps empower them in gaining self-confidence, enthusiasm, and endurance—all of the attributes that are needed to succeed in mathematics. WME accomplishes this by, among others, generating and disseminating knowledge about equitable and high quality mathematics; informing the public and influencing educational policies in ways that enable these young people to become mathematically proficient in order to enhance college, career and citizenry readiness; and informing families about educational policies and learning strategies that will enable their children to become adept in mathematics.

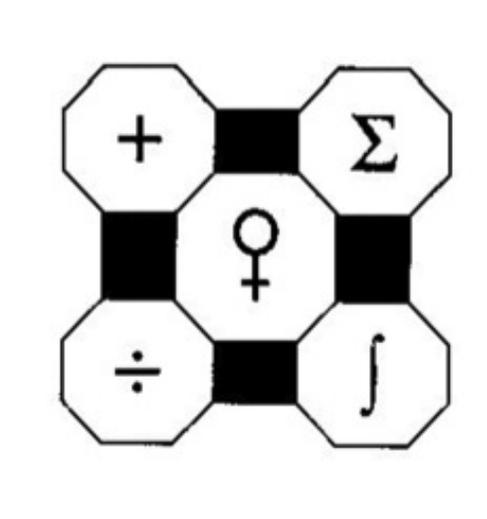
Once again, Happy 40th Anniversary! Thank you for all that you do to further mathematics education for girls, women, and minority students. I hope you will all take the time to explore the many iconic sights, destinations, and diverse neighborhoods that our wonderful city has to offer!



Muriel Bowser
Mayor, Washington, DC



Above: Dr. Robert Berry (left) and Dr. Matt Larson, NCTM incoming and outgoing Presidents, respectively, acknowledge DC Mayor, Muriel Bower's proclamation and congratulate WME and its President, Lorraine Howard on the occasion of WME's 40th Year Anniversary Celebration at the NCTM Annual Conference, April 24, 2018.



Left: Mary Ferris (right), NCTM Affiliate Relations Manager, congratulates WME on its 40th Year Anniversary.

Proclamation

- *Whereas the mission of Women and Mathematics Education in general is to promote mathematics education of girls and women; and*
- *Whereas WME provides leadership in mathematics education and a communications link among all educators concerned with the issues of women in mathematics through its newsletter Women and Mathematics Education and its meetings and the NCTM Annual Meetings and Regional Conferences; and*
- *Whereas WME serves as a clearinghouse for ideas and resources in the area of women and mathematics; and*
- *Whereas WME encourages research in the area of women and mathematics, especially research that identifies factors that contribute to the study of mathematics by women; and*
- *Whereas WME facilitates communications networks for specific interest groups, such as elementary teachers, secondary teachers, teacher educators, and doctoral students, and works cooperatively with other organizations to further a common goal; and*
- *Whereas Women and Mathematics Education is celebrating 40 years of improving the teaching of mathematics throughout the world of mathematics education;*

I, Matt Larson, president of the National Council of Teachers of Mathematics, do hereby acknowledge Women and Mathematics Education with appreciation for 40 years of improving teaching and learning of mathematics education throughout the world.

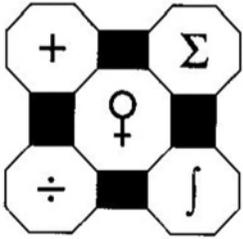
Matt Larson
President
National Council of Teachers of Mathematics



Gina Kilday, NCTM Board Liaison and Affiliates-at-Large Representative, presents 40-Year Congratulatory Proclamation to WME President, Lorraine Howard at the NCTM Annual Conference, April 23, 2018.



WME President, Lorraine Howard, presents (surprise) **Lifetime Achievement Award** to WME and the Association of Mathematics Teacher Educators (AMTE) founder, Dr. Judith Jacobs, after the Judith Jacobs Lecture at AMTE's National Conference in Houston, Texas, February 9, 2018.



EARLY BEGINNINGS of the Women and Mathematics Education

Originally named **Association for the Promotion of the Mathematics Education of Girls and Women (APMEGW)**, the Women and Mathematics Education (WME) grew out of a series of papers at the 56th NCTM Annual Conference in April, 1978 in Washington, DC. The original steering committee of APMEGW were Judith Jacobs, chair; Joanne Rossi Becker, treasurer; Relinda Walker, secretary; Dora Helen Skypek, member-at-large; Alice Schwant, newsletter editor; and Ruth Afflack, Constitution and Bylaws, Chair. Advisory board members were: Lenore Blum, Elizabeth Fennema, Alice Schafer, Joel Schneider, Lucy Sells, and Sheila Tobias. That year, the papers were organized and later published in the volume “Perspectives on Women and Mathematics”, organized and edited by Judith Jacobs.

During the earlier years of WME, the organization’s focus was on reversing girls’ and women’s avoidance of mathematics. One way this focus was accomplished was to have the WME members present at selected mathematics conferences with the summaries of their research projects presented in the newsletter. Descriptions of gender differences in classroom teacher-student interactions including associated mathematics resources which were prominent features in the first WME newsletters.

- Selected Critical Dates in the Early History of WME:**
- 1981** - First Resource List distributed.
 - 1983** - WME becomes an affiliate of NCTM and began renting “Multiplying options-subtracting bias”
 - 1983** - Skypek Award created by WME in honor of Dora Skypek
 - 1985** - WME session included Dorothy Buerk on “Changing the meaning of mathematics,” Phyllis Steinmann on “Characteristics of the Mathematics Learning Styles,” and Connie Widmer on “Sex Differences in Computer Use.”
 - 1987 to 2000** - Charlene and James Morrow served as Executive Directors. At that time there was a move of headquarters to Mt. Holyoke.
An open forum was held on the subject of: “Women’s ways of knowing: Salvation or trap?” by Judith E. Jacobs and Joanne Rossi Becker.
 - 1988** - Tenth anniversary in Chicago. WME presented: “Equal opportunities in mathematics education: 1988” with Jane Hill, Dora Helen Skypek, Olga Ramirez, Edith Robinson and Marilyn Suydam.
A 22-page bibliography was compiled by Judith E. Jacobs.
 - 1989** - WME presentation at NCTM “Gender issues: Views from Around the World” with Joanne Rossi Becker, Kay Giulliland and Pat Rogers.
 - 1991**- The bibliography compiled by Judith Olson and Robin Thorman is now 64 pages.
WME presentation at NCTM “Calculating Gender Differences: Current Concerns” by Gilah Leder of Australia.
 - 1995-1996** - **Think together Sessions** organized by Regina Brunner at TN, MO, TX and SD NCTM Regional Conferences.
 - 1998 – WME Celebrates 20th Anniversary**



WOMEN and MATHEMATICS EDUCATION (WME)

www.wme-usa.org**

(Partner Affiliate with NCTM, NCSM, AMTE and CBMS)

FACT SHEET

ABOUT WME: Founded in 1978, WME is a 501(C)(3) international membership organization whose members hail from each of the 50 states, Canada and Africa and represent Pre-K-20 mathematics teachers and college/university mathematics educators (including pre-service mathematics teachers).

- A. WME's **VISION**: All children – particularly girls, women and underrepresented minority students (URMS) have access to the highest quality mathematics education that empowers them to gain the self-confidence, enthusiasm, and endurance needed to succeed in mathematics and to transform themselves and their communities. We envision a world where everyone is enthused about mathematics, sees the value and beauty of mathematics, and is empowered by the opportunities mathematics affords.
- B. WME's **MISSION**: To advocate for equity and high-quality teaching and learning of mathematics for all students, especially related to girls, women and URMS.
- C. WME's **GOALS**:
1. To advance educators' knowledge and ability that lead to implementing an equitable, rigorous and coherent mathematics program that incorporates the role gender, language and culture play in teaching and learning mathematics;
 2. To develop and support educational leaders committed in carrying out the mission of WME;
 3. To generate and disseminate knowledge about equitable and high quality mathematics for girls, women and URMS;
 4. To inform the public and influence educational policies in ways that particularly enable girls, women and URMS to become mathematically proficient in order to enhance college, career and citizenry readiness; and
 5. To inform families about educational policies and learning strategies that will enable their children to become mathematically proficient.

WME is proud to be an Affiliate Partner of:

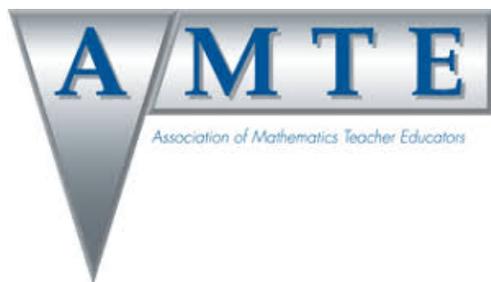
The National Council of Teachers of Mathematics
(NCTM – www.nctm.org)



The National Council of Supervisors of Mathematics
(NCSM – www.mathedleadership.org)



The Association of Mathematics Teacher Educators (AMTE)
– www.amte.net



The Conference Board of the Mathematical Sciences
(CBMS – www.cbmsweb.org).



Along with WME, each of these global leaders and foremost authorities in mathematics education strives to ensure that *each and every student* has access to the highest quality mathematics teaching and learning.

Presidents of Women and Mathematics Education

1979-1981 Judith E. Jacobs

1981-1983 Joanne Rossi Becker

1983-1985 Nancy S. Angle

1985-1986 Rosemary Stastny

1986-1987 Marie Haley

1987-1989 Vera A. Preston

1989-1991 Lyn Taylor

1991-1993 Charlene Morrow

1993-1995 Joan Ferrini-Mundy

1995-1997 Dorothy Buerk

1997-1999 Regina Baron Brunner

1999-2001 Sally Irene Lipsey

2001-2003 Karen Dee Michalewicz

2003-2005 Marty Carr

2005-2007 Elizabeth Yanik

2007 – 2009 Marilyn Evans

2009 – 2011 Judy Werner

2011-2013 Patricia Frey

2013-2016 Melissa Hosten

2016 – Present Lorraine Howard

WME's PD Training and Celebration @ 2018 NCTM

WME kicked off its 40th-Year Anniversary Celebration at its Pre-Conference Professional Development Training (with cake, of course) at the 2018 NCTM Annual Meeting and Exposition, April 23, 2018 in Washington, DC.

Attendees worked on the Pre-Conference's **DRIVING QUESTION: How can parents and educators in the United States encourage girls to sustain academic interest in mathematics, excel in their math, science and technology courses and go on to pursue STEM-related careers?**



WME super volunteers Ashley Townes (left) and Liz Shriver ready registration table for WME Pre-Conference attendees.



Top: Lorraine greets and welcomes WME-sponsored Temple University (TU) Student affiliate Pre-Service students to WME's Pre-Conference @ NCTM and makes final presentation adjustments. **Middle:** Lorraine works with the TU cohort and shares a laugh with TU president, Margaret King. **Bottom:** Lorraine works with K-12/higher education faculty on the Pre-conference theme, "Furthering Girls' Math identity."



Left: Featured Speaker, Merle Froschi of FHI360, presents researched-based findings on effective strategies for “Furthering Girls’ Math Identity.”

Practices that Support Positive Math Identity

- Culturally sensitive materials and teacher sensitivity to the cultural difference between the teacher and the students
- Mixed or heterogenous groups of students
- Student-centered teaching approaches, especially in the instructional pedagogy of Project- and Inquiry-Based Learning
- Avoiding speed drills and activities with time pressure
- Allowing students to work with authority and agency in which they use their own experiences and ideas to learn the concepts
- Activities that promote a growth mindset

Attendees worked collaboratively to confirm these positive math identity strategies for girls.



Lorraine (far right) poses with WME-sponsored Temple University NCTM Affiliate members and Advisor after presenting each of them with individual charter member certificates: (left to right) Dr. Herb Green, Advisor; Gianna Pinardo, Secretary; Sarah Hafer, Vice-President; Ryan Mulville, Treasurer; Louis Fortunato, charter member; and Margaret King, President.



Dr. Gina Foletta (right) receives Penn State University (PSU) WME-Sponsored Student Affiliate Faculty Advisor NCTM charter certificate with WME President, Lorraine Howard.



Dr. Gina Foletta and Lorraine Howard pose with David Falk (PSU) and his charter student member certificate.



Left: WME President Howard addresses the NCTM Delegate Assembly and introduces the two WME-sponsored Temple and Penn State Universities NCTM Student Affiliates.



Above: Temple University and Penn State University receive NCTM Student Affiliate Charter from NCTM President Matt Larson: Temple's cohort members include (from left to right) Louis Fortunato; WME President Howard; Gianna Pinardo, Secretary; Margaret King, President; NCTM President Matt Larson; Ryan Mulville, Treasurer; Sarah Hafer, Vice-President; and Dr. Herb Green, Faculty Advisor. Top right photo: David Falk, 2nd from right, with Penn State University Faculty Advisor, Dr. Gina Foletta (far right), WME President Howard and Matt Larson, NCTM President.



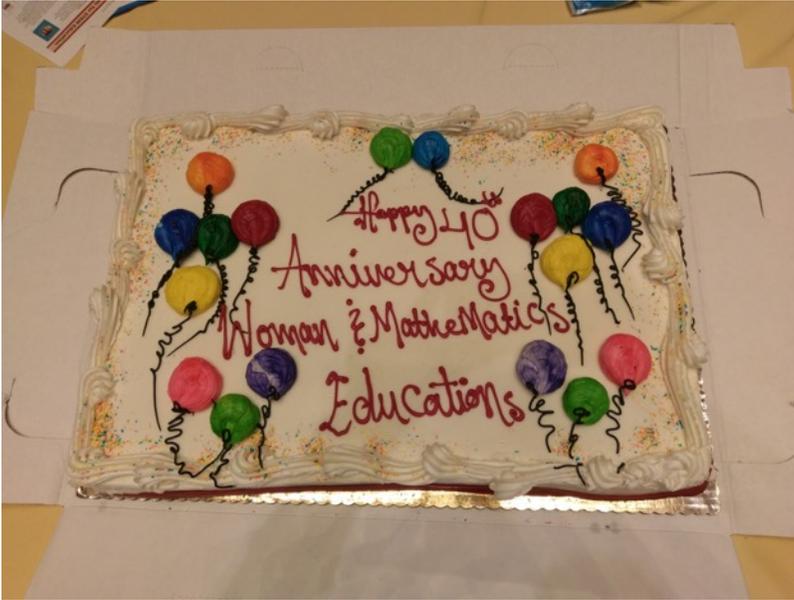
NCTM Delegate Assembly (left) and President Matt Larson congratulate WME President Lorraine Howard for a job well done as the first NCTM Affiliate-at-Large to sponsor a Student Affiliate.



Temple University NCTM student affiliate members (left) and Colleagues Margaret Riso, Helen Miller, and Brooke Asher from the Albemarle County, VA school district (right) visit the WME Booth at NCTM, renew their WME memberships, and sport their newly purchased iconic WME T-Shirts.



Dr. Robert Berry, NCTM President, stops by the WME Booth, renews his WME membership, and poses with Lorraine who shares DC Mayor's Congratulatory Letter.



The birthday cake was a GREAT hit with everyone. Volunteer, Liz Shriver, cuts one of the first slices for Dr. Judith Jacobs, one of WME's founding members and its first president.

SIGNATURE WME PROGRAMS AND ACTIVITIES

STRATEGIC PRIORITIES

Access and Equity: Infused with a culture of equity, through high-quality, peer-reviewed research and evidence-based publications, WME advances knowledge about every aspect of mathematics education through its online, blended and onsite professional development learning and training – striving to ensure that everyone has access to and is empowered by the opportunities mathematics affords.

Advocacy: WME engages in public and political advocacy at the local, state and national levels to focus policymakers and education decision makers on improving the learning and teaching of mathematics.

Classroom Resources: Based on research and focused on increasing student learning, WME members and mathematics researchers and practitioners in gender equity provide strategies, resources and guidance to K-20 Science, Technology, Technology and Mathematics (STEM) teachers for developing and implementing coherent, focused, well-articulated curricula, instruction and assessment.

Math Teacher Grants: WME members who have been members for 2 or more years may apply for a grant of up to \$500.00 to assist in the implementation of a project which supports the WME mission.

Teacher and Professional Development Training: Through our Mathematics Pre- and National Conferences and Professional Training Initiative, WME will bring impactful, effective and practical research and evidence-based strategies, procedures and processes to our mathematics clientele.

Technology: WME promotes strategic use of technology to advance mathematical reasoning, sense-making, problem solving, and communication.

PROJECTS AND ACTIVITIES:

Middle School Girls – Summer Math Camps



WME President, Lorraine Howard, witnesses the **utilization of algebra, geometry and bridge engineering concepts** with middle school girl campers and Cormac McCarthy, mathematician and president of 21st Century Teaching, Seattle, WA, Summer 2018.



WME Advisory Board member Lynda Wiest, a professor at the University of Nevada, Reno, began a Math & Technology Camp for middle school girls in 1998 and has continually directed it

since then. Each summer 60 girls from across Northern Nevada attend the one-week, overnight camp. Evaluation measures show significant increases in confidence and reported knowledge and interest in mathematics. Selected photos from Nevada's Math & Technology Camp follow.



A math camper and her parents **jointly solve** a math problem at the final Math and Technology Summer Camp.

The program's website may be found at:

<https://www.unr.edu/education/centers-student-resources/initiatives/girls-math-camp>



Rising seventh grader **engage** in a data analysis lesson summer camp.



Two rising eighth graders **collaborate** on a geometry problem using a geoboard.



WME President shares a funny moment with aspiring juniors and seniors at the Texas Instruments (TI) Graphing Calculator Institute for enhancing the learning of Calculus.

--Philadelphia, PA.

CONFERENCES & PROFESSIONAL DEVELOPMENT TRAINING



WME provides professional development training (workshops, interactive webinars, etc.) to K-12 teachers to help ensure that each and every student receives the highest quality mathematics education.

Women and Mathematics Education (WME)

40th-YEAR ANNIVERSARY CELEBRATION EQUITY STRAND

Professional Development & Training

at the

2018 NCTM Annual Conference

Marriott Marquis Hotel

Washington, DC

April 25-28, 2018

SPEAKERS	TITLE/DESCRIPTIONS
 <p>Dr. Judith Jacobs JEJMath Ltd., Ann Arbor, Michigan</p>  <p>Dr. Diana Sherman University of Michigan, Ann Arbor</p>	<p><u>"Hidden Figures": Addressing Gender and Racial Biases</u></p> <p>“Hidden Figures” is the story of three black women mathematicians who were an essential part of NASA’s early space missions. Participants analyzed the portrayed gender and racial biases shown. The participants can use the activities presented with their colleagues and/or students from grades six to those in professional development.</p>

SPEAKERS	TITLE/DESCRIPTIONS
 <p> Kenya Wallach Kenya.wallach@educationchat.org First in Math, Philadelphia, Pennsylvania </p>	<p style="text-align: center;"> <u>Encouraging Girls to Study Mathematics (STEM)</u> </p> <p> According to a Microsoft study, girls show an interest in STEM at the age of 11, yet lose interest by age 15. How can educators encourage girls to sustain an interest in STEM? Participants learned how mathematics competitions and hands-on activities can keep girls excited about STEM. </p>
 <p> Dr. Lynn Columba Hlc0@lehigh.edu Lehigh University, Bethlehem, Pennsylvania </p>  <p> Dr. Lorraine Howard Lorraine.howard@wilkes.edu Wilkes, University, Wilkes-Barre, Pennsylvania President, Women and Mathematics Education </p>	<p style="text-align: center;"> <u>Let's Dispel the Myths about Women and Mathematics</u> </p> <p> Now is the time to be aware of the myths surrounding women and mathematics and to address them in the classroom. Working for equitable treatment of all students as we debunk these myths requires gender-specific strategies such as types of questions, contexts of problems, make up of small groups and student-discourse oriented environment. </p>

SPEAKERS	TITLE/DESCRIPTIONS
 <p>(from left to right) Ben Dworken bdworken@fhi360.org Merle Froschl mfroschl@fhi360.org Lorraine Howard Lorraine.howard@wilkes.edu Maryann Stimmer mstimmer@fhi360.org</p> <p>New York, New York</p>	<p><u>Furthering Girls’ Math Identity: Research and Practice</u></p> <p>The development of a positive math identity is key to girls’ success in STEM. This session explored researcher-practitioner partnership specifically designed to foster middle school girls’ identity in math as a means of keeping them in the STEM pipeline, thereby increasing their participation in STEM careers.</p>
 <p>Dr. Suzanne Rose (left) Slippery Rock University, Pennsylvania Dr. Judy Werner Slippery Rock University, Pennsylvania</p>	<p><u>Women’s Role in Mathematics with Connections through the Arts and Literacy</u></p> <p>This presentation focused on the Integration of mathematics, ELA, and arts that will support the development of visual spatial abilities. The session’s activities were organized around the contributions of women mathematicians throughout history. Connections were made to current trends in media such as <i>Hidden Figures</i> and <i>The Glass Universe</i>.</p>

SPEAKERS	TITLE/DESCRIPTIONS
 <p> Dr. Sheryl Sorby University of Cincinnati sorbysa@ucmail.uc.edu </p>	<p style="text-align: center;"> <u>Removing Barriers to STEM Success by Developing 3-D Spatial Skills</u> </p> <p> The ability to visualize in three dimensions is a cognitive skill that has been shown to be important for success in mathematics and other STEM fields. In this workshop, participants interacted with a curriculum designed to rapidly develop spatial skills with a view to improving math performance in girls, who tend to benefit from this type of instruction. </p>
 <p> Dr. Lynda Wiest wiest@unr.edu University of Nevada, Reno </p>  <p> Dr. Heather Crawford-Ferre Nevada Department of Education, Carson City </p>	<p style="text-align: center;"> <u>Supporting Girls' Mathematics Learning Using High-Interest Texts</u> </p> <p> Girls tend to prefer mathematics tasks that have real-world value, as well as particular topics that have been shown to engage them. In this session, participants gained strategies and classroom ideas for supporting girls' mathematics learning through high-interest texts that serve their learning preferences. </p>

THEORETICAL & ACTION RESEARCH

WME strives to ensure sound research is integrated into all activities that promote high quality teaching and learning of mathematics pertaining to girls and women.

Furthering Girls' Math Identity Initiative

PART I: The Women and Mathematics Education Joins Forces with Researchers and Practitioners to Discuss Girls' Math Identity and STEM Education (NFS Grant (2015-2018))



WME President, Lorraine Howard (center), poses with Dr. Meghan Groom (left) of the New York Academy of Sciences and Merle Froschi of FHI 360 at the Furthering Girls' Math Convening in New York City, January, 2018.

WASHINGTON, DC—*How can educators and parents in the United States encourage girls to excel in their math, science and technology classes and go on to pursue STEM-related careers?*

According to experts who organized the Furthering Girls' Math Identity event, the answer lies in the concept of "math identity." The event, part of a National Science Foundation-funded project, Educational Equity, gathered educators, researchers and policymakers from across the country. It

was held on June 9, 2015, in Washington, DC, and was hosted by FHI 360 in partnership with IMPAQ International and the New York Academy of Sciences.

"Women continue to be underrepresented in STEM-related careers, particularly in fields involving higher mathematics," said Merle Froschl, Co-Director, Educational Equity, School and Community Services, FHI 360. "Understanding and encouraging girls' math identity, particularly in elementary and middle grades, can help us to increase their participation and persistence in these fields."

A recent report titled *Student Academic Mindset Interventions: A Critical Review*, by IMPAQ International, demonstrated that students develop and persist in academic behaviors when they have a well-developed sense of academic identity and community. Students who value the power of their minds and are aware of their own personal academic identity also take pride in belonging to a learning community, are comfortable speaking up and actively engaging in the learning that takes place in that community and contribute to the building of the learning community as learners and teachers of each other.

"Given the importance of math skills to a wide variety of 21st century careers, we at the New York Academy of Sciences feel that it is critical to increase our knowledge base around how to retain girls as active participants in math," says Meghan Groome, PhD, Executive Director, Education, the New York Academy of Sciences. "We are proud to be participating in this effort with other organizations whose

missions align with ours when it comes to creating more opportunities for underserved populations to engage with STEM subjects and to become future STEM leaders.”

The event featured panel presentations and working group discussions that aimed to understand what we can learn from existing research about girls’ math identity and to explore the ways this research can be implemented in schools and out-of-school programs across the United States. The conference participants also focused on establishing a network improvement community (NIC) that will allow researchers and practitioners from many disciplines to work together to define common research goals and prioritize math identity for girls in elementary and middle grades.

“Through the NIC, we can harness the power of researcher–practitioner collaboration to generate and test innovative ideas to improving girls’ math identity and ultimately increase their participation in STEM,” said Dr. Cheri Fancsali, Managing Director and Principal Research Scientist, IMPAQ International. “IMPAQ is thrilled to be part of this important work that explores key themes identified in our review of the landscape of student academic mindset interventions.”

Partners at Educational Equity at FHI 360, IMPAQ International and the New York Academy of Sciences are collaborating on this three-year project designed to advance research on girls’ math identity in the United States and link findings directly to classroom practices.

Article retrieved from:

<https://www.fhi360.org/news/researchers-and-educators-gather-discuss-girls-math-identity-and-stem-education>



The parent NSF grant's principal investigator, Merle Froschi, Director, Educational Equity of FHI 360 (www.fhi360.org) presented her findings at **WME's 40th Year Anniversary Celebration Pre-Conference**, April, 2018 at the NCTM Annual Meeting and Exhibition, Washington, DC.

MEMBERS ONLY

View Merle Froschi’s full PowerPoint Presentation and the Video Overview of the *Furthering Girls’ Math Identity Initiative* under the Members Only section of our new website (to be launched in early Spring, 2019).

PART II: WME RECEIVES MINI-GRANT TO APPLY MATH IDENTITY STRATEGIES

WME is thrilled to have been selected as one of six (6) finalists to receive a mini-grant to apply effective strategies for "Furthering Girls' Mathematics Identity." (See Project #6 below)

WME's submission, spearheaded by President, Lorraine Howard, was a collaboration with Pennsylvania middle school math teachers with whom she implemented an authentic Project-Based Learning (PBL) experience. PBL is an instructional strategy which research confirms significantly supports girls' sustaining interest and pursuit in mathematics.

A summary of all six (6) NSF mini-grant projects is shared below:



Furthering Girls' Math Identity Researcher-Practitioner PROJECT SUMMARIES

1. Project: Empowering Latina Girls through Statistical Knowledge

*Leah Oppenheimer, The Children's Museum
of the East End | leah@cmee.org*

The Children's Museum of the East End (CMEE) has been providing mathematics, science, and technology programs for young Latino youth and their families for the past three years. The goal of this project is to foster the development of positive mathematics identities of Latina girls ages 10-13 by strengthening their analytical skills to better share their views inside and outside the mathematics classroom. *Empowering Latina Girls through Statistical Knowledge* will be a ten-session, 2-hour weekly statistics literacy program in which middle school girls read culturally

relevant articles, learn how to read and interpret graphs, articulate their newly acquired knowledge, and learn how to support arguments using statistics. The program will end with a poster or presentation in which they need to address their selected topic with supporting statistics evidence from various resources such as newspaper articles, government agency reports and other online resources. Implementation began on October 2,

2. Project: Establishing a Math Circle for Girls of Color in the Washington, DC Metro Area

*Wamaid Levine-Borges |
Wamaid@gmail.com*

2017 and will end on December 11, 2017. In preparation for establishing the math circle in Washington DC, the project director observed and volunteered at the San Francisco Math Circle Summer Camp in 2017. Her experience in San Francisco helped her understand the challenges and efforts made to include girls and to foster deep and

positive math identities; how the presence of women mathematicians created a critical mass in which the girls could envision themselves; and the importance of a physical environment which featured photos and bios of women mathematicians and their accomplishments. In addition, she has attended the National Math Festival with mothers of three girls of color who are committed to have their daughters participate in the DC circle; purchased books and videos that deepened her knowledge about math circles, mathematical concepts and women and girls in math; made connections with mathematicians who have agreed to participate. She will help to recruit girls to the program which she hopes will launch in fall/winter 2017/2018.

3. Project: Furthering Middle School Black Girls' Math Identity Through Mentorship

*Dr. Nicole Joseph, Assistant Professor
Vanderbilt University |
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The goal of this project is to disrupt the normative “outsider” paradigm and support young African American girls to develop a robust math identity. The project provides 7th grade African American girls with an innovative and interactive experience featuring one-to-one mentoring with African American women mathematicians and mathematics teachers. By focusing on one-to-one mentoring with adult women who share their racial identity, African American girls can see what is possible, hear narratives of promise, experience socialization with mathematics, and increase their social and cultural capital.

The project has adapted an existing math identity survey from the *Girls Who Code* program to fit the study’s population and mentoring interest, with the goal of constructing and distributing a pre-survey that measures perceptions of math identity among African American girls and mentoring interest. Thus far, one round of item construction and review

has been conducted comparing survey items to existing literature about African American girls and mentoring. Another round will likely be conducted in order to receive iterative feedback from Dr. Bozeman, the founder of Enhancing Diversity in Graduate Education (EDGE). An IRB will be written to pilot the survey and once piloted, analysis will be conducted to inform the final product.

It is anticipated that full implementation of this project will influence African American girls’ math identities in positive ways. For example, increased consciousness about how they view themselves as masters of math and critically conscious learners of mathematics. If there is the opportunity to follow these girls through high school, it would be possible to understand the influence of the mentoring on their course-taking patterns.

4. Project: Investigating the Impacts of Supplementary Single-Gender Mathematics Classes

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The “math workshop” intervention of supplementary single-gender math classes was completed during the 2016-2017 school year. The results of this mixed method study at a coeducational middle school will make a contribution to the literature on the gender gap between high-ability boys and girls in mathematics self-efficacy, sense of belonging, and achievement. The study provides insights into the potential challenges and benefits of implementing a supplementary all-girls mathematics class in a coeducational school. The three main findings are: (1) supplementary all-girls mathematics classes may be beneficial for certain populations. In particular, this study provides support for the hypothesis that all-girls classes may improve achievement for girls of high-mathematics ability and identity; (2) mathematics classes or supplemental math activities

that are single-sex may increase middle-school students' sense of belonging regardless of gender; and (3) sense of belonging in girls may have been influenced by the "friend effect," or girls' reported increase in confidence and enjoyment when solving mathematics problems with their friends.

5. Project: Furthering Girls' Math Identity

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Girls Inc. wants to create a crash course in middle school math for program specialists who serve as mentors, role models and even tutors. The theory of change is that math identity of the girls served by the organization can be improved by first enhancing the math identity of the staff who work closest to them. While progress has been made in developing the curriculum, there are still more modules to complete before the training can be piloted with staff. Girls Inc. remains committed to and excited testing the hypothesis, and if proven correct, sharing the curriculum and training with others wishing to further girls' math identity in middle school.

In order to complete the curriculum and prepare it for piloting, the following activities must take place: complete the last four modules; submit the curriculum to the Education Specialist for review and revision; recruit four program specialists (one per middle school program) to train; implement the training with the four program specialists; and develop an evaluation. The evaluation will seek to determine if the training increases the staff's math identity, and if that increase in turn increases the math identity of girls tutored in Girls Inc. after school programs at those four sites. The goal is to complete the curriculum during the fall so that piloting of the training can begin in the spring. The fall semester will serve as a baseline to

examine whether the implementation of the training shows a positive difference in math identity and performance in both staff and girls in the spring. Other activities will include rolling out a training-of-trainers where the staff who took the crash course implement it to their peers, moving away from the lone "STEM specialist" model toward a program where *all* staff not only are capable of tutoring math, but also enjoy doing it.

6. Project: Strengthening Girls' Mathematics Identity and Achievement Through Project-Based Learning

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Strengthening Girls' Mathematics Identity and Achievement Through Project-Based Learning training was designed to equip middle school math teachers with the essential principles, tools, procedures, and processes for designing, developing, implementing and evaluating effective authentic projects that will transform their students' deeper learning, understanding and retention of the mathematics standards aligned curriculum. It is taking place with the Neshaminy School District in PA. For the first online course module, participants included mathematics teachers as well as principals, selected academic support staff, and the Assistant Superintendent. The first e-course module taught the participants how to set the stage for successful PBL. At the end of this module, participants were able to:

- Understand the qualities of an effective Engaging Entry Event, including the role of

novelty (to focus attention), emotional connection (to make learning meaningful), and relevance (to make students care)

- Develop a repertoire of strategies so they can vary Engaging Entry Events based on learner needs, interests, backgrounds
- Know how to introduce the Driving Question for the project so they can activate students' curiosity and encourage them to ask more questions
- Understand how to facilitate a whole-class discussion to find out what students need to know to proceed with the project
- Clearly connect the Engaging Entry Event with the project topic, Driving Question, and students' final products or performances so it all adds up to a high-quality, authentic learning experience.

The timeline for the teachers to identify a PBL Project launch began in summer 2018, providing the mathematics teachers the opportunity to reflect on the tools and procedures learned during the 9-week e-course. With additional funding, the remaining PBL modules will be completed during the Fall, 2018 academic term. These modules will provide the full complement of skills and competencies needed for participant-mathematics teachers to begin the process of creating dynamic, technology-rich projects in which their students will be able to engage in real-world applications of mathematics concepts to be implemented during the Spring 2019 academic term. The remaining modules are: Module 2: How to Create a PBL Project Calendar; Module 3: How to Manage a PBL Project; Module 4: How to Assess Students' PBL Project; and Module 5: How to Showcase Students' PBL Work.

Publications

WME produces a variety of publications for its members. WME's seminal and foundational 2013 publication, *Bibliography of Resources on Gender and Mathematics* provides a list of resources on various topics on gender equity from Journals, Books, Reports, Internet Resources, Policy Briefs, Magazine Articles, etc.

Our **Spring, 2019 Bibliography publication** is edited by University of Nevada, Reno faculty:

Lynda R. Wiest, Ph.D.
Kellie J. Pop, M.S. &
Mike Pacheco, M.Ed.

The **Bibliography** lists selected resources (2014-2018) that focus predominantly or partially on females and mathematics and includes categories: **Books; Journal Articles & Research Reports (from 2014-2018); Conference Papers; Doctoral & Master's Theses (from 2014-2018); Selected Online Articles & Websites.** It will be available for access and review under our new website's **WME MEMBERS ONLY Section.** (New WME website to launch in Spring, 2019).

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WME's new Website will appropriately launch on March 1st, the beginning of Women's History Month!!!!

Special thanks and acknowledgements to our Newsletter Editor, **Sheri Stayton (Pennsylvania)**, and Photographer, **Ashley R. Townes (Washington)**.