



2022: A YEAR IN REVIEW

MERCY
COLLEGE

CENTER FOR 
STEM
EDUCATION

A YEAR IN REVIEW: 2022

2022 was a year of **Reuniting** with participating teachers from various programs, **Reimagining** how we might build on previous work in novel ways, **Reconnecting** with colleagues around the world, and **Reinforcing** the mission and message of the Mercy College Center of STEM Education (MCCSE).

Reuniting



In 2022 MCCSE connected with our growing family of STEM teachers by arranging two reunion events.

In May 2022, we hosted a reunion for our **Mercy College Intensive STEM Teacher Initiative (MISTI)** program, welcoming back MISTI alumni and introducing them to our newest MISTI Scholars. Our new scholars gained perspectives on teaching in local schools and the opportunity to network with practicing teachers. We continue to study best practices for preparing teachers for careers in high-need schools as part of a collaborative NSF Grant with the Education Development Center and the University of Massachusetts Boston, entitled *Preparation for Persistence: Building a Community of Practice to Research and Support Noyce Scholars in High-Need Schools*.



While quite a few of our Wipro Science Education Fellows have retired or moved away since the program's inception, 12 Fellows joined us at a reunion social in Spring 2022. Fellows shared their current science and leadership initiatives and ideas for the future. MCCSE leaders reminded the Fellows of the opportunities to continue their professional relationship with the MCCSE, either as instructors in our Saturday STEM Academy, presenters at our STEM conference, to pursue an Advanced STEM Certificate at Mercy, or to collaborate with colleagues on Wipro Reimagined, the newest funded program of the Wipro Science Education Fellowship.



Reconnecting



AERA Presentation April 2022
San Diego

Following the lockdowns and separation due to the ongoing pandemic, 2022 was a year of reconnecting with colleagues and professional networks, both locally and abroad.

Drs. Gunning and Marrero kicked off the conference season traveling abroad to Vancouver, Canada, presenting their work with Dr. Napolitano at the National Association for Research on Science Teaching (NARST) conference in March 2022. The two shared research on how engineering education supports culturally relevant teaching practices and participated in a paper set with other Wipro-funded sites on teacher leadership. The NARST conference represented the first time in two years that Gunning and Marrero connected in person with their many science and STEM education colleagues to discuss research, collaborate, and support each other's work. In-person conferences remain an integral part of professional growth and learning.

The following month, Gunning and Marrero represented the MCCSE while sharing the Center's research on one of our core programs - FLORES (Family Learning and Outreach for Research in Education and STEM). Their poster presented at the American Educational Research Association Conference (AERA) in San Diego highlighted our research and model as we try to encourage other institutions to consider incorporating family learning as a successful and important piece for developing a STEM-literate society.

Dr. Marrero, in her role as national coordinator for the United States All-Atlantic Blue Schools, was invited to the United Nations Ocean Conference, held in Lisbon, Portugal in June. She also presented at the October Ocean Literacy Dialogues event held in Santos, Brazil, discussing the history of ocean literacy in the United States.



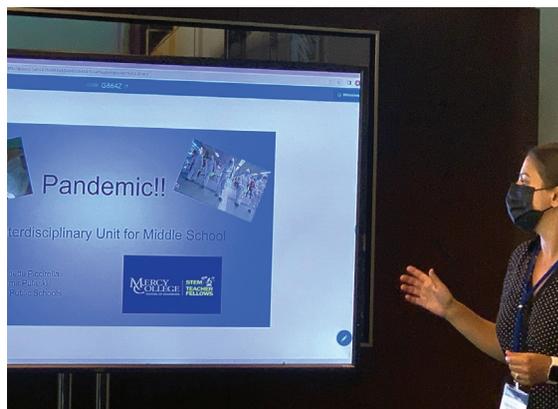
In August, Dr. Amanda Gunning, together with Mercy College School of Business Associate Dean Victor Petenkemani, led the 2022 Pan-African Higher Education Institute (PAHEi) Summer Bridge Program in Cameroon, West Africa. Gunning taught the application of STEM concepts to the students' entrepreneurship projects to 76 local and regional students in person in the capitol city of Yaoundé and online while the course was presented in Douala. Dr. Gunning will return in summer 2023 to continue to support college and career readiness in Cameroon.



Gunning helps students plan out the websites and apps they created during the weeklong program.



Director Victor Petenkemani, Gunning, Catholic University of Central Africa representative Fr. Patrick Mboa and PAHEi Board member Zacharie Petchokomani prepare to distribute certificates to students



Dr. Gunning also represented the MISTI II, STEM Master Teacher Fellows, and Preparation for Persistence grant programs, attending the National Science Foundation (NSF) Noyce Summit in Washington, D.C. One of our STEM Master Teacher Fellows, Dr. Anjinette Piccirella, presented a pandemic-related interdisciplinary unit that she created with her colleagues. The hands-on engineering design workshop engaged participants to create their own redesigned masks while focusing on the importance of interdisciplinary learning and students' social-emotional needs during a difficult time.



On October 1, 2022, we hosted our annual K-12 STEM Teacher Conference in person at the Mercy College, Dobbs Ferry campus. For the first time in three years, we reconnected with 80 teachers, informal educators, professors, and teacher candidates.



Katrina Wiley led a workshop on how to “Stemify” your math classroom

Keynote speaker Dr. Eugenia Etkina, Distinguished Professor of Science Education at Rutgers University, discussed her Investigative Science Learning Environment (ISLE) which engages students and teachers in hands-on, minds-on work in order to develop 21st century competencies. The conference included six interactive workshops on diverse topics in STEM Education, and an Exhibitor Hall with local STEM education providers such as the Bronx Zoo, Science Teachers Association of NYS, Empire State Building does STEAM, Long Island Sound Study, and the Sarah Lawrence Center for the Urban River at Beczak.



STEM Master Teacher Fellows presented several workshops at our K-12 STEM Teacher Conference. Michelyn Goodin led *Story Play: A STEM-inspired Child-centered Writing Curriculum*, and Anny Vanegas discussed *Why FLORES is Engaging for Bilingual Elementary Families*. MISTI I Scholar Kimberly Whyte shared her work on *Using a School Garden for Culturally Relevant, Cross Curricular Teaching* demonstrating how teachers can use urban gardening to support learning for all students.

“Our professional communities matter, you all staying the course for this work matters in times when science is very much under attack...The sharing of work is for me the true essence of teacher education and professional development.”

Maia Starcevic, Wipro Fellow



We held a virtual "Sip n Share" event, in which teachers shared best practices and lessons learned on creating, maintaining, and using school gardens for interdisciplinary learning.



Three of our STEM Master Teacher Fellows presented their teacher leadership projects at the National Marine Educators Association (NMEA) Conference held at Hofstra University in July. Elementary teachers Terri Agravat and Johanna Vasquez presented *Marine Clean-up/Trashion Fashion*, sharing how they combined ocean education with engineering.





SPEAKER OF THE MONTH
-First Thursday-



**Connecting Students to the Oceans:
Supporting Ocean Literacy
A STEM Action Lesson for the
Middle Grades with
Kiowa Garcia**

7:00PM Thursday November 3rd
Zoom - Free - but you must register at
<https://forms.gle/aB7P4Mv6Uscv9WfL6>



Ms. Kiowa Garcia is an 8th Grade Living Environment educator in Yonkers. As a member of the NOYCE STEM Master teacher leader program, she strives to develop lessons that can solve the problem of excluding ocean literacy in our districts. Knowing this she acknowledges the urgency to provide students a rich and engaging NGSS aligned STEM curriculum, equitable access to technology, and the need to teach ocean literacy.

The 5-E Activity and resources she will share fuses Science and Engineering Practices, Computer Literacy and Ocean Literacy principles. The activity first has students research how ocean trash created by humans affects other organisms and then discusses the historical, economic and cultural impacts marine debris has had on society, our planet and marine life. Students then research and learn about the ocean gyres and the human interventions and technologies that are in process. Using science and engineering practices, students then collaborate to engineer a device to help clean up ocean trash using recycled materials that they "purchase" from her using ocean currency. To help make their floating trash collecting devices mobile, students learn to code and use a Sphero programmable robot. The session will be a walk-through of the 5-E Lesson, a demonstration sharing some student iterations, guidance on differentiation of the lesson, and an introduction and information on the sphero programmable robot. This engaging lesson will hopefully inspire other teachers to integrate STEM, computer science, and ocean literacy into their classrooms!

Kiowa Garcia presented on *Planeta Oceano's Connecting School Ocean Literacy Program* which partnered her Yonkers middle school students with learners in Peru. Her 8th graders participated in cross cultural webinars in which they learned about environmental projects and shared their work on using robotics for an engineering design project. Kiowa also presented this work in November, as a featured speaker in the NYS Marine Education Association monthly speaker series.

Reimagining

In 2022 Wipro Ltd. awarded \$480,000 to MCCSE for a new program, Wipro Reimagined, for continued support of teacher leadership, inspired by the foundational Wipro Science Education Fellowship.

Wipro Reimagined supports STEM education leadership projects led by original **Wipro Science Education Fellows** that include their colleagues to effect district change. This initiative continues for the next four years, and hopefully beyond. At our annual K-12 STEM Teacher conference in October, Wipro Reimagined Director Dr. Kristen Napolitano, Wipro National Coordinator Dr. Arthur Eisenkraft and Dr. Gunning facilitated an informational workshop. Potential grantees brainstormed on leadership projects connected to their specific district priorities working with original Wipro Science Education Fellows as mentors and leaders. In December, after an application process, seven teams comprised of 31 teachers and teaching assistants were funded to collaborate and implement their programs in 2023. Projects include: fostering a professional learning community for computer science education; developing curriculum to support student engagement with materials engineering; and creating elementary ecology lessons to promote students' scientific literacy as they build and explore their school's community garden.



Congratulations to our new Wipro Reimagined Fellows!



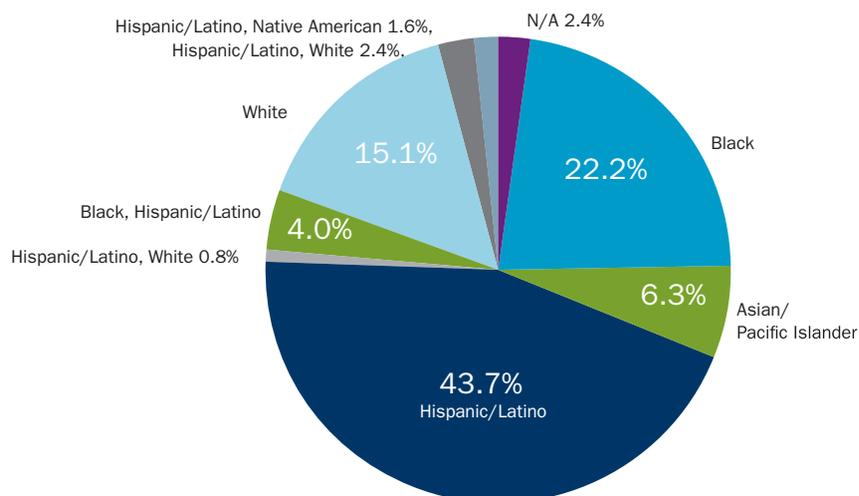
Reinforcing Our Mission in STEM

MCCSE's mission is to create opportunities for historically marginalized groups by providing hands-on STEM enrichment activities for learning, career readiness, enjoyment and personal and community growth. We achieve this mission through student, teacher and family programming.

Saturday STEM Academy (SSA)

In 2022, for the fourth consecutive year Con Edison generously supported Saturday STEM, enabling MCCSE to offer spring (virtual) and fall (in-person) sessions to high-need scholarship students. In addition, the City School District of New Rochelle leveraged Title IV funding to support students to attend. Thanks to these two funding sources, 101 scholarship students of low socio-economic status attended SSA and during the virtual session students received STEM kits to make their home learning experience more fun. Students came from a total of 8 school districts, the majority of which are considered high-needs.

SSA 2022 Self-Reported Ethnicity



SPRING 2022 SSA VIRTUAL OFFERINGS:

Our Amazing Lungs (gr. 1-2); Exploring Play, like a Scientist! (gr. 3-4); Chemistreats: Food Fun through Home Chemistry (gr. 5-6); Bioengineering and STEM (gr. 7-8); What a Reaction! Rube Goldberg Style (gr. 9)

What would you like to share about Saturday STEM (parents)?:

We would love to participate in future STEM programs, this was such a wonderful, organized and engaging session for children.

My child's pride in having done a "college" class. He loves learning how things work, building things using various materials, Lego and monitoring the outcomes of things.



Creating working lung model



Exploring Play



Chemistreats

Chemistreats: Food Fun through Home Chemistry (student):

These last three Saturdays have blown my mind. I love how Mercy College makes science fun and easy for beginners.

Exploring Play, like a Scientist! (student):

I loved STEM because we got to make amazing things.

FALL 2022 SSA IN-PERSON OFFERINGS:

Engineer it! Navigate it! Program it! (gr. 1-2); Zoo Rescue with Not-so-Simple Machines (gr. 3-4); Command your Gaming with Python! (gr. 5-6); Everyday STEM Hero: Health Basics in the Nursing Lab (gr. 7-8); The Physics of Music and Sound (gr. 9-12)



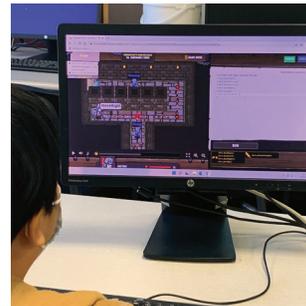
Bandaging in the Nursing Lab



Working to get a tiger rescued!



In the Mercy College music industry technology lab



Command your Gaming with Python

Saturday STEM is a program where we are truly able to put this STEM concept to use and understand its significance in the real world. As this world is becoming more and more technology dependent, it is only beneficial to learn and expand your knowledge on STEM, even if you are not interested in the STEM field. I 100% recommend it!

- From The Physics of Music and Sound (gr. 9-12)

It's great. I definitely recommend going if you get selected. It's such a great opportunity to learn new things outside of school and learn new skills for example I learned how to take a pulse and how to bandage a wrist, ankle, and a stump.

- From Everyday STEM Hero (gr. 7-8)

In the beginning I was scared but STEM helped me not to be scared and thank you.

- From Zoo Rescue (gr.3-4)

Water Literacy for Lower New York Students

Thanks to funding from the Cornell University Water Resources Institute and NYS Department of Environmental Conservation, Dr. Marrero led groups of middle and high school students on two environmentally-focused field trips. At the first, "It's My Estuary Day" on Coney Island, students participated in community stewardship of a local waterfront park. Another group of students attended the National Marine Educators Association Student Conference held at Hofstra University, where they participated in workshops and career exploration activities.



Reinforcing through Grant-Funded Teacher Professional Learning

MCCSE leads several National Science Foundation (NSF), New York State, and private foundation grant programs, supporting teachers as they build their skills in STEM pedagogy. These teachers then nurture the next generation of STEM learners in engaging, research-supported ways.



Yonkers Math teacher and department chair, Christian Esposito shows off the poster given to each STEM Master Teacher Fellow.

Preparing STEM Master Teacher Fellows in the Greater NYC Area

The STEM Master Teacher Fellows program supports 14 K-12 teachers to become STEM teacher leaders in their districts. Each Fellow conducts a leadership project every year to involve colleagues and turnkey STEM teaching practices, expanding access to STEM for all students. For example, STEM Master Teachers Anny Vanegas, Johanna Vasquez and Terri Agravat, all elementary teachers in New Rochelle, spearheaded implementations of FLORES (Family Learning and Outreach for Research and Education in STEM), hosting bilingual STEM nights for parents and children, reaching 55 district families. These nights empower parents to be partners in their child's STEM learning.



Mercy College Intensive STEM Teacher Initiative (MISTI II)

In September 2022, we added our second cohort of MISTI II Scholars. Over the course of 5 years, 16 Mercy students will become teachers of science and math in high-needs schools. MISTI II will also offer these pre-service teachers opportunities for professional development through conferences, workshops and book clubs.



MISTI has supported me in ways family supports one another. I'm grateful to be a part of a team of radical educators that focus on using hard data as the foundation of our learning,

– Luisa Castro Vizcarra

Wipro Science Education Fellowship, led by UMass Boston and funded by Wipro Ltd.

MCCSE continues to support our 60 original Wipro Science Education Fellows, who, through the support of the Fellowship, became teacher leaders in five local school districts from 2014-2018. Mary Cincotta, Wipro Fellow from the Tarrytown Schools, used her Wipro Phase II mini-grant funding for a multi-disciplinary project entitled *Storytelling with Light: Using Circuits to Illustrate Text*. High schoolers used Chibitronics LED stickers and Chibi Chip and Clip microcontroller to program circuits and illuminate their poetry and artwork.

Smart Start Professional Development

In 2022 **MCCSE continued its work as the professional development provider for two New York State Department of Education Smart Start grants, each funded for five years.** The MCCSE is pleased to partner with the Clarkstown Central School District and with a consortium of Westchester school districts.

The Westchester consortium is led by Ossining School District and includes five additional partner districts: New Rochelle, White Plains, Tarrytown, Port Chester, and Elmsford. Forty Cohort 2 K-8 Westchester STEM Ambassadors are participating in the professional learning during the 2022-23 academic year. Clarkstown Central School District has fourteen participants. This work will continue for three more years with three additional cohorts of up to 50 teachers for each site.



Amanda Gunning teaching Finch robots



Makey Makey Invention kits

In the year-long program, Smart Start educators participate in 40 hours of professional development on student-centered instruction that leverages computer science, engineering and educational technology tools, this year introducing a greater variety of classroom robots and green screens. Sessions take place virtually and at Mercy College and are led by MCCSE facilitators and Wipro Fellows. The teachers are also eligible to request grant-funded technology and engineering materials for their classrooms to bring the practices they learn into reality. The STEM Ambassadors are a diverse group, representing a range of educational backgrounds. Participants include librarians, ENL teachers, STEM coordinators, elementary generalists, special educators, and teaching assistants. According to New York State requirements, the teachers will create STEM-based lessons that will be freely available online for other teachers to use in their own classrooms.

Three of our Cohort I STEM Ambassadors served as instructors in the Saturday STEM Academy this fall, expanding on the lessons they developed to provide STEM enrichment opportunities. Additionally, two Clarkstown Smart Start teachers presented a workshop on *Biomimicry and Mission to Mars* in our STEM Teacher conference.

Cohort 1 Smart Start Educators Share Their Thoughts About the Program:

Collaborative learning provides me with opportunities to grow new ideas from partners. It also helps me identify possible pitfalls my students may encounter.

The information that was shared was powerful and working with other teachers from different districts reaffirmed our work as teachers.

I have really enjoyed the classes, as well as, very honored to be a STEM Ambassador.

The resources you have given us and pairing us up with members of other school districts has really made a big difference on how I teach STEM.



Creating lessons on a green screen



Drone adventures



Engineering breakout room with Clarkstown Smart Start teachers



Clarkstown Smart Start teachers with their Biomimicry workshop at the MCCSE STEM Conference

By the Numbers in 2022

School Administrators participating in Wipro Reimagined:

11

Teachers funded by NYS Smart Start for Computer Science and Engineering Education:

141

School Districts served in professional learning opportunities:

12

K-12 teachers reached in professional learning opportunities:

286

Wipro Science Education Fellows:

94

100%

of MISTI I Scholars who completed the program remain as teachers in high-needs schools

90%

of students reported that Saturday STEM Academy helped them become better in STEM education.

STEM Master Teacher Fellows:

14

MISTI I and II Scholars:

25

Students served in Saturday STEM Academy:

101

K-12 students reached indirectly:

8,580

100

certificates for 8th grade girls for Excellence in STEM by AAUW, facilitated by the MCCSE

80%

of MISTI Scholars are first generation college students

90%

of students responded that they like STEM more now because of Saturday STEM Academy



Publications

Marrero, M. E., Brandon, L. T., Gunning, A. M., & Riccio, J. F. (2022). Supporting first-generation college students to become teachers in high-needs schools. *The Teacher Educator*, 1-23. <https://doi.org/10.1080/08878730.2022.2107128>

Napolitano, K. V., Marrero, M. E., Gunning, A. M., Brandon, L. T., & Riccio, J. F. (2022). What happens after edTPA?. *Education Policy Analysis Archives*, 30, (80). <https://doi.org/10.14507/epaa.30.6988>

Payne, D. L., Marrero, M. E., Schoedinger, S. E., & Halversen, C. (2022). The Rise and Fall of the Tide: Ocean Literacy in the United States. *Mediterranean Marine Science*, 23(2), 270-276.

Marrero, M., & Crawford, K. (2022). How Do Seaweeds Meet their Needs? A Kindergarten Investigation. Current: *The Journal of Marine Education*, 36(1).

Conference Presentations

Vasquez, J., Agravat, T., Gunning, A., & Marrero, M. (2022, February). FLORES: Engaging Families in STEM Learning via Zoom. Midwest Annual Robert Noyce Teacher Scholarship Program Conference. Louisville and Cave City, KY.

Piccirella, A., & Gunning, A. (2022, February). Pandemic! An Interdisciplinary Unit for Middle School. Midwest Annual Robert Noyce Teacher Scholarship Program Conference. Louisville and Cave City, KY.

Gunning, A. M., Napolitano, K. V., & Marrero, M. E. (2022, March). Exploring How Engineering Instruction Supports Culturally Relevant Teaching Practices. NARST Annual International Conference, Vancouver, BC, CA.

Marrero, M. E., Napolitano, K. V., & Gunning, A. M. (2022, April). Increasing Access to STEM Learning by Building Caregivers' Self-Efficacy. AERA Annual Meeting, San Diego, CA.

Crawford, K., and Marrero, M.E., (2022, Apr). Promoting Positive Ocean Behaviors. Paper presented at the Annual meeting of the American Educational Research Association, San Diego, CA.

Marrero, M.E., (2022, July). Becoming a Part of the All-Atlantic Blue Schools Network. National Marine Educators Association (NMEA) National Conference. Hempstead, NY.



FOR THOSE WITH A PASSION TO GET AHEAD

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