

2021: A YEAR IN REVIEW

MERCY
COLLEGE

CENTER FOR
STEM
EDUCATION



A YEAR IN REVIEW: 2021

The **Mercy College Center for STEM Education (MCCSE)** was founded in 2016 by two Mercy Science Education Professors, Dr. Amanda Gunning and Dr. Meghan Marrero. The mission is to create opportunities for groups typically underrepresented in STEM to engage in enrichment activities for learning, career readiness, enjoyment, and personal and community growth, which may not be available through school districts. The MCCSE is the only such academic center in the Westchester and Rockland region that hosts events, organizes activities, and conducts research related to STEM education. In an increasingly technology-oriented society, the importance of STEM education is paramount. Through the Center for STEM Education, Mercy College is situated to address these challenges and meet STEM education needs of underserved groups through research-based work with our own students and community.



Jennifer compiling
STEM kits

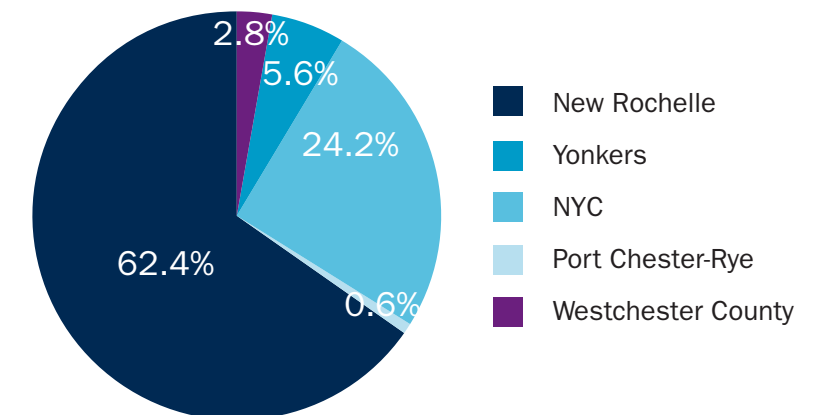
New Team Member

This fall we welcomed Jennifer San Diego as the Junior Programs Facilitator on our team. Jennifer provides administrative support for our operations and the programming offered by the MCCSE. A Mercy College alumna, Jennifer plans to begin her graduate studies at Mercy in Summer 2022 to become an elementary teacher.

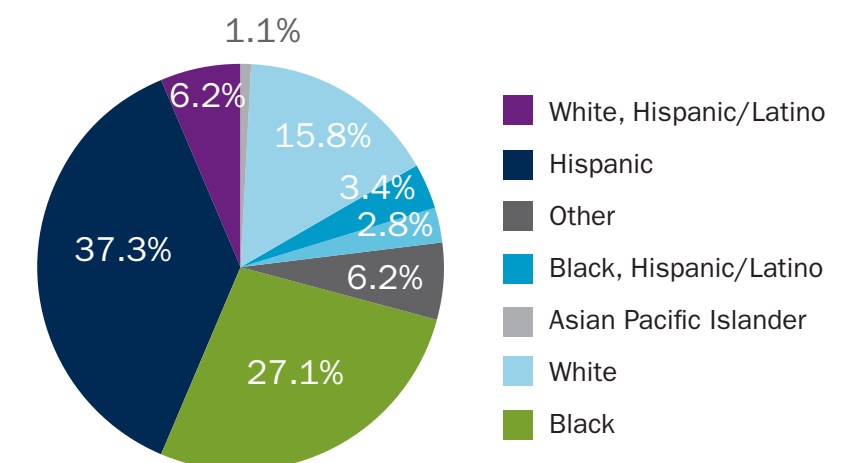
Saturday STEM Academy

One of the primary goals of the MCCSE is to provide hands-on STEM engagement opportunities for historically marginalized groups of K-12 students. Our Saturday STEM Academy (SSA) offers enrichment classes in STEM for grades 1-12 each fall and spring semester and has been running since 2016. In 2021, Con Edison generously supported Saturday STEM, enabling MCCSE to offer fall and spring virtual sessions to high-need scholarship students. In addition, New Rochelle City School District funded students to attend through Title IV. This funding allowed 155 scholarship students (of low socio-economic status) to attend SSA and receive supply kits to make their home STEM experience more fun. Students came from a total of 9 districts, the majority of which were high-need. To connect local high school students with Mercy College, we typically offer one course taught by a Mercy College faculty member.

Saturday STEM Academy 2021 School Districts Served



Saturday STEM Academy Students in 2021 Self-Identified Race/Ethnicity



SPRING 2021 OFFERINGS:

From *Splashin' to Fashion: Plastic Pollution and How We Can Help* (gr. 1-2); *Chemistreats: Food Fun through Home Chemistry* (gr. 3-4); *Makey Makey Invention Workshop* (gr. 5-6); *Designing Mobile Apps* (gr. 7-8); *Telling True STEM Stories* (gr. 7-9); *Human Biology Modeling* (gr. 10-12)

Parent Survey Responses:

What were the best things about your child's experience in SSA?

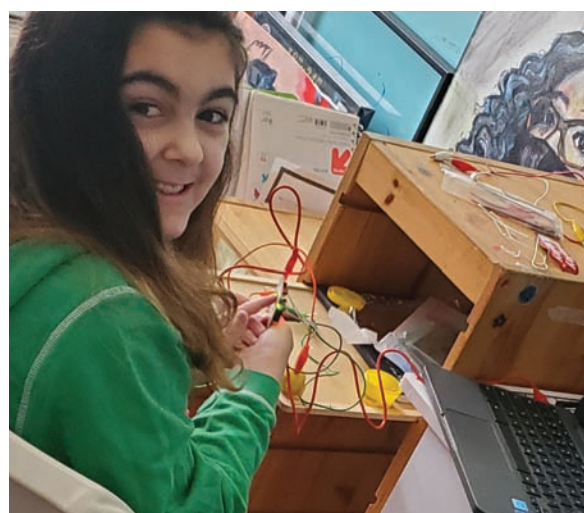
“ Being selected for the opportunity and hearing other individuals' stories. Being able to share his own experiences. (Telling True STEM Stories)

She liked the manipulatives (wires, play doh) and that she now feels confident to do Scratch. She's been playing on the program since. (Makey Makey)

Paciencia con el proyecto a realizar.
Patience with the project ”



Creating ocean clean-up tool



Making connections with Makey Makey

“ From a college volunteer:
I think that Saturday STEM is a great way to get students interested in science through activities they otherwise would not have access to. I did these activities in my freshman year of college and this was a nice refresher and throwback to an enjoyable experience. Saturday STEM could also give students a chance to gain an advantage or competitive edge which may influence their opinion of STEM. ”

FALL 2021 OFFERINGS:

Animals and their Habitats (gr. 1-2); *Fun and Games with Math!* (gr. 3-4); *Bioengineering and STEM* (gr. 5-6); *What a Reaction! – Rube Goldberg Style* (gr. 7-8); *Can you see Plant DNA?* (gr. 9-11)

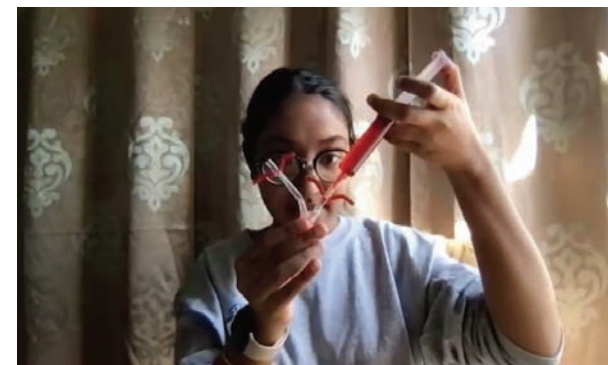
Student Survey Responses:

From **Chemistreats:**

“My perspective is that science can be done by anyone and that science is always around you. Whatever you do, it can be science! Also, this fun program made me want to love science even more than I already do!”

From **Human Biology Modeling:**

“Saturday STEM challenges you to think outside the box and requires tons of creativity”



Model heart valve

From **Rube Goldberg Machines:**

“It was fun, it wasn't easy, you had to put your mind to it to actually have fun. It gave you a challenge, something to do. So I would suggest doing some STEM at home, because it gave you something to do and it will be fun. Plus I would tell them to look up Rube Goldberg and look at his simple machines.”



Rube Goldberg machine using home items

From **Can You See Plant DNA?:**

“Something I would tell other students about the Saturday STEM Academy is that it is very engaging. It allows us to gain more insight in Biochemistry, as well as other sciences.” ”

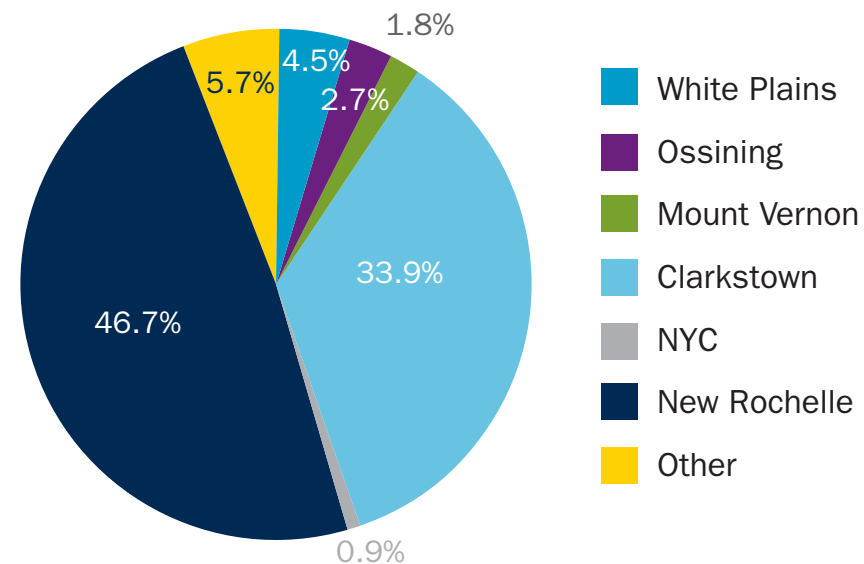


Visible strands of plant DNA

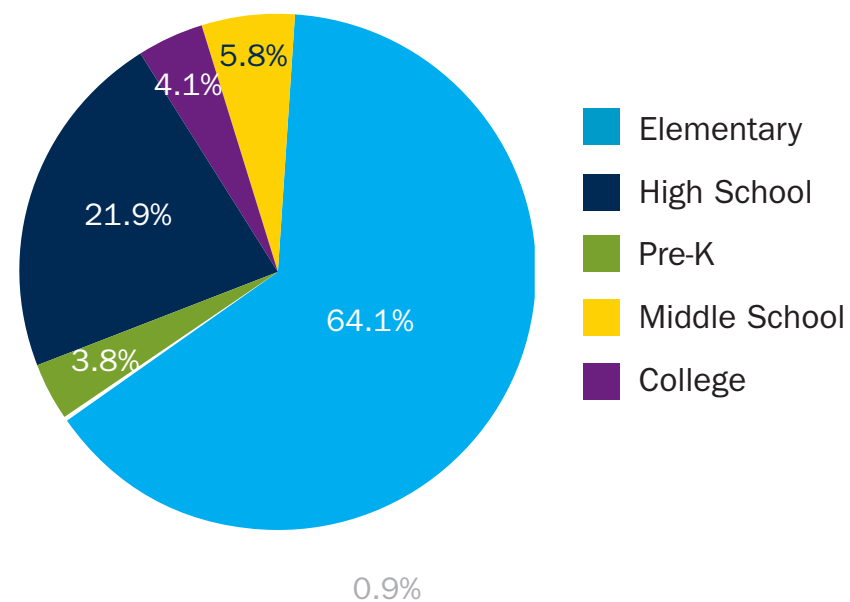
STEM Professional Development

MCCSE has always offered affordable NYS Continuing Teacher and Leader Education Hours through our STEM professional development opportunities. We are a local leader in STEM Teacher Education and provide opportunities for teachers to individually enroll in professional development and for districts to use our services for in-district teacher education. In 2021 we served 367 teachers as follows:

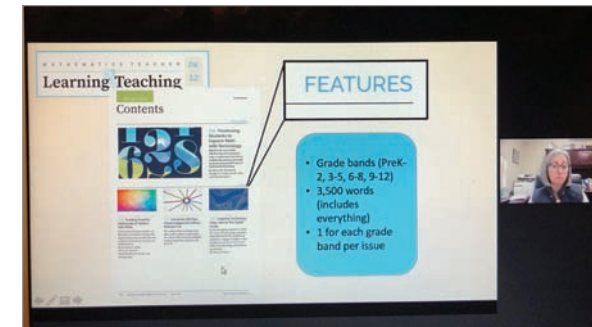
School Districts of Teachers in our PD 2021



Grade Level of Teachers in our PD 2021



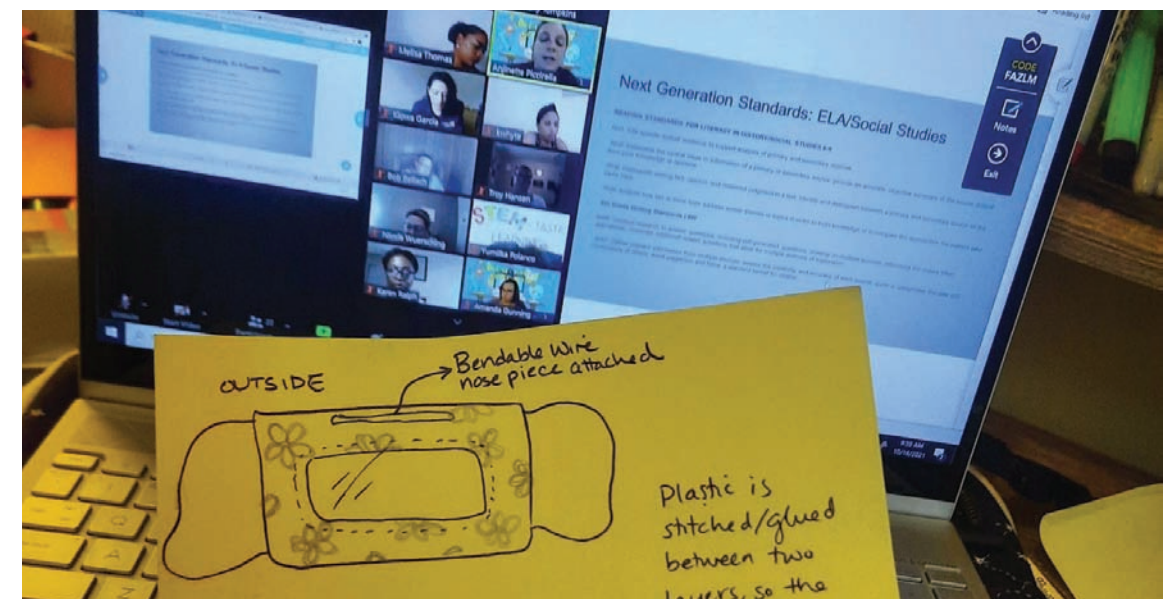
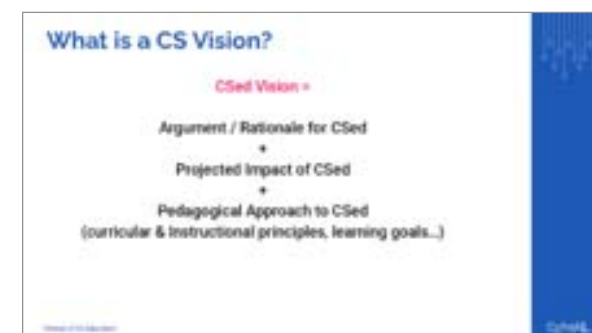
Virtual K-12 STEM Teacher Conference



On October 16, 2021, presented as a half-day, virtual event, more than 50 teachers, professors, and teacher candidates attended our annual K-12 STEM Teacher Conference.



The conference programming focused on how much the pandemic has taught us as educators and effective strategies for virtual, hybrid, and in-person instruction. Following the disturbing events of 2020, 2021 provided us an opportunity to focus on equity and diversity in the classroom, and the increased use of computer science by students. For this reason we invited Leigh Ann DeLyser, co-founder of Computer Science for All (CSforAll.org) who spoke on Building Capacity for Implementing Equitable CS Education. Dr. DeLyser discussed the many reasons that all learners should have access to computer science education, and provided some entry points for teachers to begin engaging their students.



Grant-Funded Initiatives

The Mercy College Center for STEM Education (MCCSE) had a very busy year in 2021, continuing the education of STEM teachers through the National Science Foundation (NSF) grants and private foundations:

Fourteen in-service teachers continued their participation in the six-year **Preparing STEM Master Teacher Fellows in the Greater NYC Area** program. Through this program the teachers receive professional development in STEM teaching and leadership. This year, Fellows are working on leadership projects to increase STEM learning in their K-12 classrooms and becoming teacher leaders in STEM in their districts (New Rochelle, Elmsford, Port Chester and Yonkers). Dr. Gunning and four of the STEM Fellows participated in the National Science Foundation STEM for All Video Showcase, with the topic: Covid, Equity and Social Justice. Fellows also made presentations to their school boards about their work and several presented workshops and posters at the MCCSE STEM Teacher Conference.



In Spring 2021, the NSF approved funding for a new iteration of the **Mercy College Intensive STEM Teacher Initiative (MISTI II)**. Over the course of 5 years, 16 Mercy students will become teachers of science and math in high-needs schools in New York City and Westchester County. MISTI II will also offer these pre-service



teachers professional development opportunities, intensive mentoring, and induction support once they are in the classroom. Welcome to Cohort 1 pictured here (left to right): Jaiprakash Shiwprasad (math); Luisa Castro Vizcarra (biology), Yumilka Polanco (math), Shannon Van Loan (physics), Gianna Maffei (math), and Sabrina Gonzalez (biology- not pictured).

The MCCSE is also part of two NSF-funded collaborative research projects on teacher education, in partnership with Florida State University and the Education Development Center. Both research projects are examining persistence of STEM teachers in high-need schools. The findings will inform our work in teacher education.

MCCSE continues to participate in the **Wipro Science Education Fellowship**, led by UMass Boston and funded by Wipro Ltd., which facilitated professional learning for 60 teachers to become teacher leaders in five local school districts from 2014-2018. A Wipro Fellow from the Tarrytown Schools, Anthony Patierno, used his Wipro Phase II mini-grant funding to buy equipment to fill a food-science laboratory for his middle school students. His *Hungry for*



Science project further expands a project that is using food science and gardening to bridge communities, create knowledge of cultures, and provide context for students to learn systems thinking models associated with equity and American food systems.

Two Wipro SEF 6th grade teachers in New Rochelle, Patricia McCue and Scott Misner, were invited to use an enrichment block to run a 5-week Mars Rover unit for every 6th grade class this academic year. In addition, Wipro Fellows continue to be active with the MCCSE through participating in and leading professional development and conference sessions, as well as teaching SSA courses. ▼

STEM Corps for undergraduates:

In Fall 2021, together with MCCSE Affiliated Faculty members Drs. Renee Haskew-Layton and Marion Ben-Jacob, we were awarded a Mercy College Faculty Senate Micro-grant to involve students in our STEM Corps. STEM Corps is a program for undergraduates that connects them with opportunities to work with K-12 students in school settings to encourage STEM engagement. Mercy undergraduate students can volunteer to help at SSA or in schools for STEM events. While the pandemic has severely restricted school activities such as STEM nights or fairs, we were able to still involve these students in the hopes of them volunteering in the future. In December we did a Robotics training meeting with STEM Corps, showing them Spheros and Ozobots, and three more sessions are planned for spring. STEM Corps students attended our Virtual Saturday STEM Academy in October and assisted with a breakout group for a Bioengineering course. We expect that STEM Corps members will present a session at a STEM conference in Spring 2022 for middle school girls.



Smart Start Professional Development

Some of the most exciting news for 2021 is that **MCCSE was designated as the Professional Development provider for two New York State Department of Education Smart Start grants, which will be funded for five years.** The MCCSE is pleased to partner with the Clarkstown Union Free 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. This year, there are 48 K-8 Westchester STEM Ambassadors participating in the professional learning. Clarkstown UFSD will train 34 K-8 teachers in year 1. This work will continue for four more years with four additional cohorts of up to 50 teachers for each site.

In the year-long program, STEM Ambassadors participate in 50 hours of professional development on student-centered instruction that leverages computer science, engineering and educational technology tools. Sessions take place virtually and at Mercy College and led by MCCSE faculty and Wipro Fellows. The teachers are also eligible to request grant-funded technology and engineering materials for their classrooms to bring the practices 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.

Teachers Share Their Thoughts About the Program:

I am learning so much at the STEM Mercy Program and excited to see what else is to come! The presenters are providing us with valuable resources, explanations of the STEM content in clear ways no matter our ability level, and support in the implementation of the content into our own classrooms. I can't wait to share my new knowledge with my students to make my classroom more relevant to real-world concepts.

- Lauren Ryder, Port Chester

My knowledge has grown in Computer Science through fruitful conversations and engaging hands-on activities. This has made my teaching of new ideas smooth and fun. I am proud to be a STEM Ambassador and look forward to learning more at Mercy College!

- Aimee Ferguson, New Rochelle

It is a true honor to be part of the Mercy College STEM Ambassadors Program. Having the opportunity to partner with educators from surrounding districts to expand our knowledge of STEM and learn together has been priceless. The hands-on experience along with exposure to available STEM resources this program offers has helped me feel equipped to provide innovative experiences in my classroom. I'm so excited and look forward to providing these foundational skills to my students.

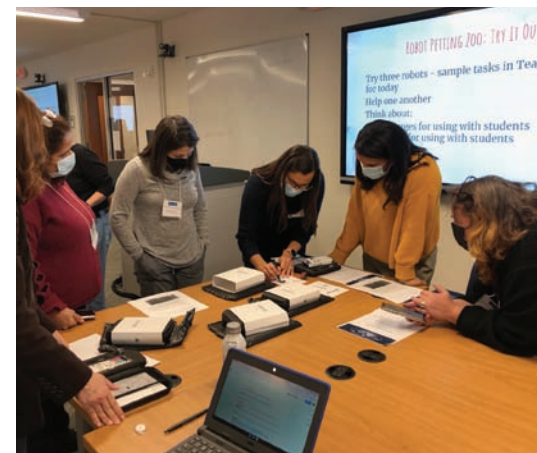
- Odalys Cedenio, White Plains



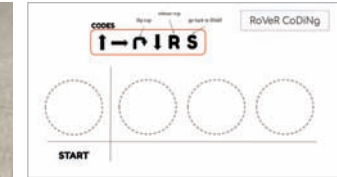
Dr. Amanda Gunning, Christopher DeMattia of Ossining, Dr. Meghan Marrero



Engineering Windmills with strength to lift pennies



right and above: Thinking of classroom applications with a variety of computers and robots – Vex, Bee-bots, Finches, Ozobots and Makey Makey



Clarkstown 5th Grade Rover Coding

Clarkstown elementary student making Bee-bot move forward to add and back to subtract.



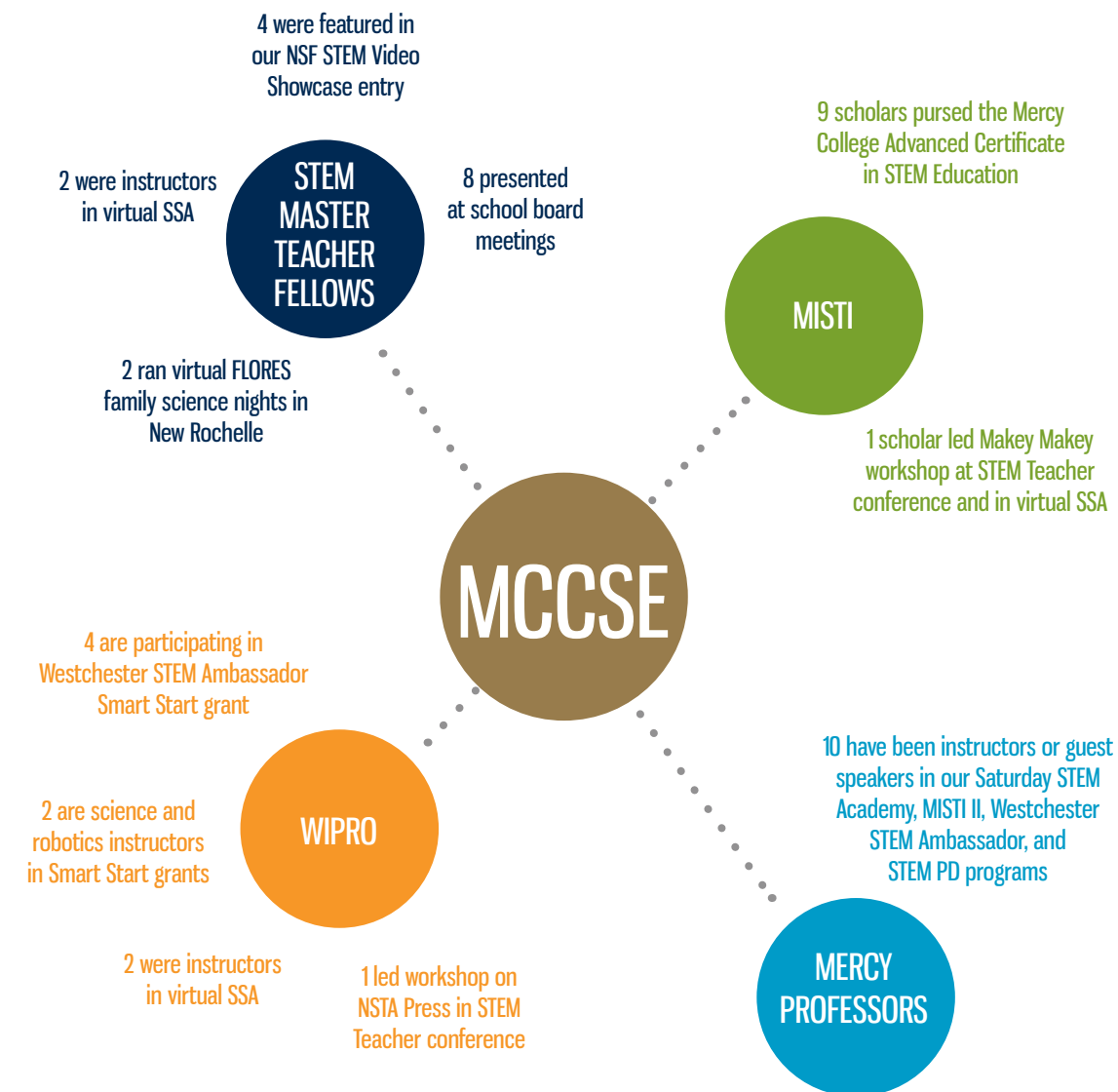
Cup coding



Growing and Leading

The range of STEM opportunities at Mercy College has produced much cross-pollination of STEM activities:

367 Teachers and 155 Students reached directly by MCCSE programs



American Association of University Women, Westchester Branch:

We coordinated the nominations and distribution of Certificates of Achievement in STEM for 8th grade students in local Westchester school districts. This task involved reaching out to more than 125 Westchester middle schools, obtaining their student nominations, creating award certificates and mailing them out. It was a large community service project that we were proud to partner with AAUW to support girls' achievement in STEM.

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Community Partners

American Association of University Women, Westchester Chapter

Center for the Urban River, Beczak, Sarah Lawrence College

Children's Environmental Literacy Foundation

Cognizant.com

Computer Science for All (CSforAll.org)

Empire State Building Does STEAM: An Immersive Educational Field Trip

Endeavor STEM Teaching Certificate Project

NASA Solar Systems Ambassadors

National Council of Teachers of Mathematics

National Science Teaching Association Press

Regeneron DNA Learning Center, Cold Spring Harbor, NY

TechGirlz

Conference Presentations and Research Publications

The MCCSE is primarily an outreach organization, but our co-directors, researcher and affiliated faculty perform educational research that is supported by grant funding related to the MCCSE. We are pleased to share these accomplishments as we share our work with not only the community, but also the academic field of STEM education. Please find some of our 2021 publications and presentations listed below.

Publications

Larsen, K. V., Marrero, M. E., Gunning, A. M., & Riccio, J. F. (in press), What happens after edTPA? Education Policy Analysis Archives.

Gunning, A. M., Marrero, M. E., & Larson, K. V. (2021, July). Studying In-service Teacher Professional Development on Purposeful Integration of Engineering into K-12 STEM Teaching (Research to Practice). In 2021 ASEE Virtual Annual Conference Content Access. <https://peer.asee.org/37778>

Marrero, M.E., Gunning, A.M., Agravat, T.S., Vasquez, J. (2021). STEM Accessibility is a Family Affair. ASCD Express Newsletter.

Payne, D.L., and Marrero, M.E., (2021) Ocean Literacy: from a Ripple to a Wave. In Koutsopoulos & Stel (Eds). *Ocean Literacy: Understanding the Ocean*. Cham, Switzerland: Springer.

Payne, D.L., Marrero, M E., Schoedinger, S. E., & Halversen, C. (2021). The Rise and Fall of the Tide: Ocean Literacy in the United States. *Mediterranean Marine Science Journal*.

Conference Presentations

Gunning, A. M., & Marrero, M. E., & Larson, K. V. (2021, July), *Studying In-service Teacher Professional Development on Purposeful Integration of Engineering into K-12 STEM Teaching* (Research to Practice). Paper presented at 2021 ASEE Virtual Annual Conference Content Access, Virtual Conference.

Gunning, A., Marrero, M., Nitecki, E., Brandon, L., Larson, K., & Baldwin, B. (2021, April). *Supporting Elementary Teachers in High-need Schools to Teach STEM*. NARST Annual International Conference, virtual.

Marrero, M., Brandon, L., Gunning, A. M., Larson, K. V., & Riccio, J. F. (2021, April). *What Happens After edTPA?* AERA Annual Meeting, virtual.

Gunning, A. M. & Larsen, K. V. (2021, February). *Examining the Integration of Robotics in a STEM Teacher Certificate Program*. Poster presented at 2021 On-line Conference of International Organization for Science and Technology Education, Virtual Conference.

Gunning, A. M., Marrero, M. E., Brandon, L. T., & Larson, K. V. (2021, January). *Supporting Elementary Teachers' Growth as Teachers of STEM*. ASTE International Conference, virtual.

Gunning, A. M., Nitecki, E., Marrero, M. E., Baldwin, B. T., & Larson, K. (2021, January). *Integrating STEM into Elementary Education: A Case Study of a Professor's Journey*. Poster presentation. ASTE International Conference, virtual.





FOR THOSE WITH A PASSION TO GET AHEAD

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