

STEMester in Review

Kaput Center Newsletter

Welcome

Welcome to our wrap-up newsletter focused on Fall 2022. Fall was a lot of fun. We held our first STEM4Girls since the pandemic and welcomed new Executive Board members. We also have some new grant-funding!

As always, you can email us at kaputcenter@umassd.edu or check us out at our website <http://kaputcenter.org>. We also have Facebook and Twitter accounts: <http://facebook.com/kaputcenter> and <https://twitter.com/kaputcenter>



New 3-year NSF Award: Connecting Undergraduates to Biodiversity Instruction through Citizen Science (CUBICS)

Stephen B. Witzig, Ph.D. (Principal Investigator, PI), Associate Professor of STEM Education & Teacher Development and Research Associate at the Kaput Center for Research & Innovation in STEM Education (UMassD), along with **Kathryn Kavanagh, Ph.D. (Co-PI)**, Associate Professor of Biology (UMassD), and **Robert Gegear, Ph.D. (Co-PI)**, Assistant Professor of Biology (UMassD) were awarded a new three-year National Science Foundation (NSF) grant in the amount of \$599,926 titled *Connecting Undergraduates to Biodiversity Instruction through Citizen Science* (CUBICS). The grant includes support for two graduate research assistants, includes The Lloyd Center for the Environment (LCE) as an informal environmental education partner, and includes science faculty from Massasoit Community College, Massachusetts Maritime Academy, and Bridgewater State University as recruiting partners.

The CUBICS project aims to serve the national interest by establishing teaching practices that support active engagement with real-world scientific research to increase student retention in the sciences. Community participation in formal scientific research, or citizen science, has tremendous potential to be a transformative social innovation for undergraduate science education and learning. Students engaged with citizen science projects are active partners in

their learning, providing them with a deeper understanding of the importance of science to the community and increasing the likelihood that they will maintain a career path in the sciences. One major obstacle to bringing citizen science-related curriculum to undergraduates is that faculty lack the educational training needed to translate their scientific expertise into classroom activities that fully engage students. This work will remove this obstacle by creating a community of faculty among diverse institutions in the South Coast region of Massachusetts that will work together to develop citizen science projects through a socioscientific issues-based instructional approach, monitor how they execute their projects, and assess the impacts on their students. Using citizen science projects related to biodiversity and climate change, this project will test a model for how to shift faculty participants from traditional lecture to active involvement of students in real-world data collection and analysis, resulting in the development of a blueprint for expanding citizen science-based undergraduate curriculum to other regions of the country and to other scientific subject areas. Thus, in addition to making a quantum leap in improving retention in undergraduate science at a regional scale, this project's novel educational approach will make a significant contribution to scientific research efforts aimed at conserving and restoring native biodiversity threatened by human-induced environmental change.

The CUBICS project has the following three aims for our research:

- AIM 1.** Engage college science faculty in CUBICS professional development program centered on a socioscientific issues-based instructional framework to incorporate and develop citizen science projects for their students.
- AIM 2.** Develop faculty content expertise and commitment to include biodiversity and climate change as a central theme of instruction.
- AIM 3.** Support faculty to transform their practice to increase student engagement and retention in science.

Research has shown that teaching innovations that involve active participation in real-world science exploration improves undergraduate student attitudes, achievement, and retention. Yet, most science faculty, while content experts in their discipline, often lack pedagogical training needed to translate their scientific expertise into curriculum that fully engages their students. The goal of this project is to provide this type of support for college science faculty through the incorporation of community-based or 'citizen' science into their undergraduate classrooms. The means to accomplish this goal will be a series of professional development workshops (Summer Institutes) where faculty from the South Coast region of Massachusetts will gather to learn how to create, contribute to, and maintain biodiversity- and climate-focused citizen science projects in their undergraduate courses. This project will be thoroughly documented by a research plan that investigates the transformational nature of the project through a mixed methods design. It includes rigorous assessment and an experienced advisory board. Educational data collected in this project will be used to elucidate the best methods to develop socioscientific issues-based citizen science projects and demonstrate a means to improve retention in science. The projects will be coordinated and supported by the PI team through the Kaput Center for Research & Innovation in STEM Education which has the infrastructure and expertise needed for widespread coordination and dissemination to connect the public with scientists.

The NSF IUSE: EDU Program supports research and development projects to improve the effectiveness of STEM education for all students. Through the Engaged Student Learning track, the program supports the creation, exploration, and implementation of promising practices and tools. This is a Level 2, Engaged Student Learning, Improving Undergraduate STEM Education (IUSE) project.

For questions, or to become involved in the project, contact Stephen Witzig at switzig@umassd.edu

STEM4Girls

By Kym Welty, Kaput Center Grants Support Specialist



On Saturday, October 1, 2022, the Kaput Center for Research & Innovation in STEM Education held its 10th annual community outreach event called "STEM4Girls Day" at the University of Massachusetts Dartmouth, which was the first time it had been hosted since the pandemic. This free event was open to all girls in grades 3-8 who want to learn more about and engage in Science, Technology, Engineering and Mathematics (STEM). This year, nearly 200 girls registered and just under 100 girls attended from the SouthCoast area, including students from Our Sister School and Global Learning Charter School in New Bedford, Fall River Public Schools, Atlantis and Argosy Collegiate Charter Schools in Fall River, as well as

several girls from a local Girl Scout troop. Another first: our keynote speaker was introduced by an alumnae of STEM4Girls who is now a UMassD student!

This year's keynote speaker was Megan Winton. Megan currently works as a Great White Shark researcher at the Atlantic Great White Shark Conservancy. She is also a current UMassD School of Marine Science & Technology (SMAST) Ph.D. student. She shared her journey to becoming a researcher with the girls, using many Harry Potter analogies paired with incredible photos from her work with Great White sharks. The keynote



address was followed by a STEM skit performed by students from Our Sisters School in New Bedford. The girls then attended two STEM workshops each, followed by lunch at the new cafeteria, The Grove, along with STEM demonstrations including Photon robots, Ozobots, and Norbert, an Eastern Box turtle from the Lloyd Center for the Environment. The day was capped off with a rousing performance from STEAM the Streets.

We hosted 15 STEM workshops, led by experts who volunteered their time. Some examples included "Ice Cream Thermodynamics", "Scales in Astronomy", "How do Seals Track their Prey Underwater?" and "Design, Engineer, and Make!: Makey Makey, Bristle Bot Challenge & Digital Bling". Presenters included UMassD faculty and graduate students from the College of Engineering, the College of Arts & Sciences, the School of Nursing, and the STEM Education & Teacher Development department. In addition, workshops were led by faculty from Tufts University, as well as local teachers from Fairhaven, Somerset and Our Sisters School. The success of our STEM4Girls day was made possible by the additional support of over 40



volunteers from UMass Dartmouth faculty, staff and students, as well as others from the local communities who wanted to help.



Chandra Orrill, Director of the Kaput Center for Research and Innovation in STEM Education was quoted as saying "I would love to see these girls go into STEM careers, but more than that, I want them to love STEM."

Quick Notes:

- The Kaput Center Executive Board is delighted to welcome Robert Gegear, Michael Goodman, and Trina Kershaw as its newest members. All members serve 3 year, renewable terms.
- The Kaput Center is under periodic review. This is a required process for all UMass Centers. We hope to get our report back in the Spring. If you are contacted to complete a survey as one of our stakeholders, PLEASE take a moment to do that for us!
- Save the dates for our upcoming colloquia. All will be live on Zoom from 4:00-6:00pm eastern time. We will also post them on the Kaput Center Youtube channel for later viewing. For more information, watch your inbox or follow us on Facebook.
 - February 24, 2023: Dr. Dionne Cross Francis “Holistic Individualized Coaching: Advancing the Professional Wellbeing of Elementary Mathematics Teachers” (Research Series)
 - March 24, 2023: Dr. Yasemin Kafai “Computational Thinking 2.0: Directions for the Future of Computing Education” (Inaugural talk in the Big Ideas series)
 - March 31, 2023: Dr. Travis Weiland “I Realized I Had No Idea What Statistics Was or How to Teach It Well: A Journey from School Classroom to Academia” (Inaugural talk in the Student to Scholar series)
 - April 5, 2023: Dr. David Williamson Shaffer “Quantitative Ethnography: Human Science in the Age of Big Data” (Big Ideas Series)

