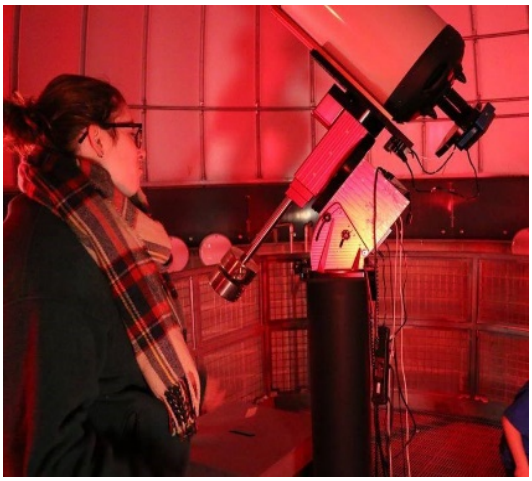
2019 Annual Report

The Center for the Advancement of STEM Education (CASE)



BRIDGEWATER STATE UNIVERSITY

International Impact

The Center for the Advancement of STEM Education (CASE) programs reached 21,528 people in 2019. As the Center has grown, we have expanded the reach of our programs to an international audience. CASE provided a grant to the JADEF foundation, a non-profit organization that supports the education and health of vulnerable groups, particularly young women and children, in Uganda. This award, which provided students with computers, notebooks and sanitary supplies was made to honor the memory of BSU student Sackie Nyanquoi, who was committed to supporting STEM education of students in Africa. CASE also awarded a grant to Andrea Cayson, Assistant Professor of Elementary and Early Childhood Education to provide STEM professional development to teachers and to work directly with students in Barranquilla and Cartagena, Colombia. CASE is also a partner on the National Science Foundation-funded Shiraki International Multidisciplinary Undergraduate Research (SIMuR) Project, led by Polina Sabinin, Associate Professor of Mathematics. CASE is working with SIMuR students to support their STEM outreach activities both in the country of Georgia and at BSU. International opportunities encourage BSU students to think globally, which is an essential component of addressing environmental challenges and achieving sustainable development.

-Dr. Jennie Aizenman, Director

By the Numbers

21,528 Total Participants

17,467 K-12 Students

2,118 Community Members

1,098 K-12 Teachers

743 Undergraduate & Graduate Students

111 Faculty & Staff

CASE Grant Program

CASE offers grants to BSU faculty and staff who develop projects that further CASE's mission to build and support a diverse community of educators and students that promotes STEM interest and literacy both regionally and internationally. The following three projects received funding and administrative support.

CASE awarded a $5,000 grant to Dr. Robert Hellström, Geography and Dr. Thilina Surasinghe, Biological Sciences for their project, *Challenges and Opportunities in Building Community Resilience Through*

Environmental Literacy and Global Change Education in Public Secondary Schools of Southeastern Massachusetts. Funds are being used to help local teachers infuse global change and environmental resiliency training into curriculum of secondary schools in Southeastern Massachusetts.

Dr. Andrea Cayson, College of Education and Health Sciences, received a $5,000 grant for her project, *Supporting STEM Education in Columbia: Sharing the 5E Inquiry Model for Science Instruction*. Dr. Cayson and her students offered hands-on professional development workshops to elementary educators, both at the pre-service and in-service levels, in Barranquilla and Cartagena, Columbia on the 5E Inquiry model, a best practice for science instruction. BSU undergraduate students led activities on growth mindset to over 60 children from one of the highest need areas of Barranquilla. Dr. Cayson also met with educational stakeholders to assess their needs and determine how BSU may assist in meeting those needs. Dr. Cayson is working to maintain a long-lasting partnership between BSU and Columbian educators.

In partnership with the Office of University Advancement, CASE provided a grant of $3,450 to the JADEF foundation, a non-profit organization that supports the education and health of vulnerable groups, particularly young women and children in Uganda. This award which provides students with computers, notebooks and sanitary supplies was made to honor the memory of BSU student Sackie Nyanquoi, who was committed to supporting STEM education of students in Africa.

Grant Funded Programs

CASE partners with BSU Biology faculty and the Tufts University School of Medicine on an NIH-funded Science Education Partnership Award-funded program ($112,500 to BSU over 5 years) to train in-service and pre-service teachers on an inquiry-based high school biology curriculum called *The Great Diseases*, which is focused on the science behind real-world experiences in health and disease. This year, 10 graduate students and 4 undergraduate students participated in the *Advances in Biomedical Biology–Teaching Metabolic Diseases* course that was co-taught by Dr. Joseph Seggio, Biological Sciences, and faculty from Tufts University.

Through collaboration with STEM faculty on the NSF-funded SEISMIC and SIMuR programs, CASE supports undergraduate student opportunities to participate in STEM service learning and outreach experiences. In FY19, 8 SEISMIC and 5 SIMuR students participated in outreach through CASE programs.

Stormwater Stewards: Protecting and Restoring Fisheries through Watershed Stewardship is a National Oceanic and Atmospheric Administration-funded program that partners the Watershed Access Lab with Taunton Public Schools, Global Learning Charter Public School, the Buzzards Bay Coalition, and the MA Division of Marine Fisheries. The program provides middle and high school teachers and students training to protect and restore fisheries through watershed stewardship. BSU's funding is $217,813 over three years. In FY19, a total of 327 K-12 students and 9 teachers participated in NOAA-funded *Meaningful Watershed Educational Experiences*, *Stormwater Stewards Professional Development* and a *Watershed Explorers* summer program.

The Paula Shea Children's Endowment awarded CASE $7,200 to sponsor Bridgewater Raynham students to attend the Summer and Winter Science Academy. Additionally, in collaboration with Nicole Glen, Elementary & Early Childhood Education, CASE received Shea funding ($2,100) to offer a week-long class for thirty-two 4th and 5th grade students from Bridgewater and Raynham schools. The course, *Nature's Engineers*, was taught by graduate students. A total of 15 BSU students and 1 faculty member participated in the program.

Community Events

CASE provides members of our regional community the opportunity to experience the excitement and relevance of science to everyday life, allows undergraduate students to assume leadership roles in communicating scientific concepts to the general public, and increases the community's awareness of the excellent science and mathematics education and resources available at BSU.

Open Lab Night invites BSU community members to explore the Science and Mathematics Center's labs and conduct hands-on STEM activities led by undergraduate students, faculty and staff. In FY19, 526 members of the community attended Open Lab Night at which over 100 BSU students and 24 faculty led activities.

Greenlight for Girls Day engaged 150 middle school girls in hands-on activities led by 14 undergraduate students, 1 graduate student, 11 faculty/staff, and 4 community members. This event was run in partnership with Sarah Thomas, College of Education and Health Sciences and Greenlight for Girls, an international non-profit STEM organization that aims to inspire girls of all ages and backgrounds to pursue STEM studies.

Massachusetts Region V High School Science & Engineering Fair

CASE partnered with the Massachusetts Science & Engineering Fair leadership to recruit a new Region V committee, comprised of 23 local teachers. The fair hosted 139 high school students and 45 judges, including 4 BSU faculty. Visiting students presented their posters, attended an awards ceremony and toured the Science and Mathematics Center.

Darwin Day

CASE partnered with Biology faculty and staff to offer a Darwin Day community event, designed to "inspire people to reflect and act on the principles of intellectual bravery, perpetual curiosity, scientific thinking, and hunger for truth as embodied in Charles Darwin." Four faculty and staff and 40 undergraduate students led the event that was attended by 125 local high school students, 6 high school teachers, 50 members from the community and 145 BSU students.

Gilmore After School Program

In partnership with the SEISMIC program, CASE hosted an after-school program for 4th and 5th grade students from the Gilmore Elementary School in Brockton. 19 BSU students who were enrolled in *Cultural Psychology: The Culture of STEM* developed and led activities for 80 elementary school students and 10 teachers. Three BSU faculty were involved.

Courses Integrating Outreach

The following undergraduate courses integrated STEM outreach projects into their curricula.

- The Art of Physics Outreach (PHYS298)
- Hands-on Environmental Education (NSCI140)
- Cultural Psychology (PSY230)

Students developed and led STEM outreach activities at the CASE Open Lab Night and during an after-school programs for Gilmore Elementary students. A total of 39 undergraduate students participated.

Watershed Access Lab

The Watershed Access Lab provides science education outreach programs and preK-12 teacher professional development focused on land use, water quality assessment, global water issues, conservation, and environmental education. The Watershed Access Lab received a three-year grant from the National Oceanic and Atmospheric Administration to fund a Stormwater Stewards program, which was completed in FY19. A total of 2,036 K-12 students, 222 K-12 in-service and pre-service teachers, 15 BSU undergraduate students, and 10 BSU faculty and staff participated in Watershed Access Lab visits, use of lending labs and professional development.

BSU CityLab

BSU CityLab is a biotechnology outreach program for middle and high school teachers and their students. The program provides hands-on, inquiry-based laboratory activities using current equipment and technology. Approximately 2,517 K-12 students, 102 in-service and pre-service teachers, 15 BSU undergraduate students, and 10 BSU faculty and staff participated in CityLab visits, use of lending labs and professional development.

Science Academy

CASE offers Science Academy classes for high school and middle school students. Nineteen undergraduate students, including two NSF-funded Noyce Scholars, and eight BSU faculty and staff taught 116 students in Science Academy classes.

EarthView

Project EarthView has expanded to include a second 22-foot satellite- imaged globe and giant floor maps. The program serves to energize geography education throughout the region. The majority of student participants engage in EarthView within the context of their school curriculum. EarthView also participates in Geography Family Nights and is used in school-based programs and other educational organizations. EarthView is also used in public events, such as professional conferences and legislative visits, including at the Massachusetts State House. A total of 10,950 K-12 students, 52 undergraduates and 469 teachers participated in EarthView programs.

MACS

The Mathematics and Computer Science Collaborative (MACS) provides opportunities for teachers to see the "big picture" of improved mathematics teaching and learning through experiences that broaden and deepen

their own understanding of mathematic concepts and effective pedagogy. In FY19, MACS hosted 116 participants in its programs.

Project GreenLab

Project GreenLab aims to educate the BSU and regional communities about green chemistry and the impacts of chemicals on human and environmental health. The 17th Annual Symposium on Sustainability and the Environment was held in November. There were 29 poster presentations and 7 panel/oral presentations from 52 undergraduate and 7 high school students. Also, in attendance were student mentors that included 19 college and university faculty and 2 high school educators.

Engage in Math

Engage in Math is an outreach program for teachers, students and parents which unlocks the world of engaging mathematics through creative problem solving, puzzles and games. Programs reached 200 community members and 14 K-12 teachers through community STEAM nights and professional development. Engage in Math is now reaching an international audience of teachers and community members through work in the country of Georgia, where 84 K-12 teachers participated in professional development and 25 high school students and 80 community members participated in STEM programming.

Engage in Math also partners with Math Kangaroo, an organization that hosts international competitions in mathematics and encourages students to master their mathematical knowledge. In FY19, sixty-five K-12 students participated in the Math Kangaroo competition, which was supported by 12 undergraduate students and 4 faculty.

Observatory

The Observatory at Bridgewater State University, which is run through the Physics Department, hosts public and private viewing events, offers K-12 workshops, and provides resources for student research, astronomy courses and service-learning. Although more than half of the viewing nights were cancelled due to weather, the Observatory still hosted 1,258 community members, 708 K-12 students, 164 BSU undergraduates, 15 K-12 teachers and 8 BSU faculty and staff.

STEM Career Exploration Event

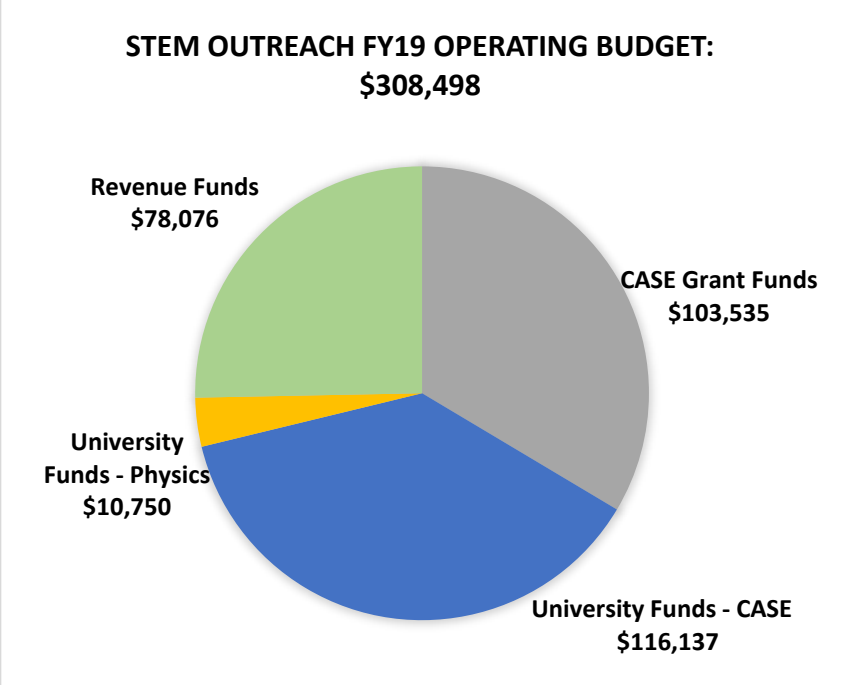
CASE partnered with the Mass Hire Greater Brockton Workforce Board to host a STEM Career Exploration event for local high school students. Approximately 120 visiting students met with 22 representatives from STEM industries and 8 BSU STEM majors and toured the DMF Science and Mathematics Center. They were accompanied by 16 teachers.

STEM2 Schools

The STEM 2 Schools after school group from Sharon High school toured the Science and Mathematics Center and visited the Single Molecule Biophysics Laboratory of Physics professor, Thaya Paramanathan. Ten high school students, 1 teacher, 4 undergraduate students and 1 faculty member participated in the event.

Financial Information

CASE operating costs in FY19 were $308,498. Funding was provided by the University, the National Institutes of Health, the National Science Foundation, the National Oceanic and Atmospheric Administration, the Paula Shea Children's Endowment and revenue generated through CASE programs.



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Edward Brush, Project GreenLab
Kevin Curry, Watershed Access Lab
Vernon Domingo, EarthView
Caitlin Fisher-Reid, Darwin Day
Nicole Glen, STEM Education Leadership

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Jamie Kern, Observatory
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Rebecca Metcalf, MACS
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Sarah Thomas, Greenlight for Girls
Maura Whittemore, Administrative Assistant

CASE Advisory Committee

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