STEM

Science • Technology
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Center for the Advancement of STEM Education
Dana Mohler-Faria Science and Mathematics Center
Room 220, Bridgewater, MA 02325
http://microsites.bridgew.edu/case

BRIDGEWATER STATE UNIVERSITY

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2018 Annual Report

The Center for the Advancement of STEM Education (CASE)

Expanding Our Mission

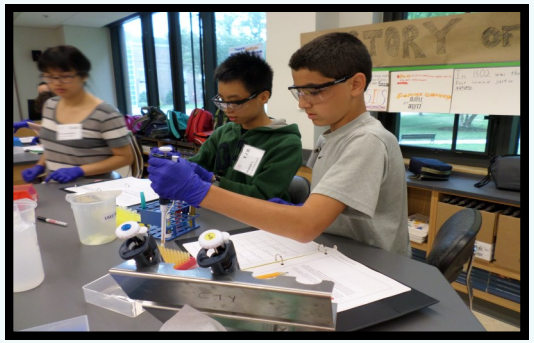
The Center for the Advancement of STEM Education (CASE) programs have grown significantly since its establishment in 2013. In 2013, CASE reached 756 teachers and 6,992 K-12 students though five programs. In 2018, CASE reached more than 22,000 participants through 20 programs. In addition to broadening our reach within the community, the mission of the Center has grown and now focuses on increasing awareness of opportunities to study STEM at BSU and on providing undergraduate students with opportunities to participate in STEM service learning experiences. The revised mission statement below reflects our expanded scope and the Center's clear alignment with the strategic goals of the University.

-Jennifer Aizenman, Director

Mission: The Center for the Advancement of STEM Education leverages the physical and intellectual resources of BSU to build and support a community of faculty, staff and students that promotes and increases interest and literacy in science and mathematics among preK-16 students, pre-service and in-service teachers, and members of the community both regionally and internationally.

Vision: The Center for the Advancement of STEM Education strives to serve as an outstanding resource in which:

- Community members have equal access to science and math education resources.
- BSU students gain confidence and develop leadership skills by sharing STEM knowledge through service learning experiences,
- Faculty and staff develop professionally as they engage BSU students and community members in STEM outreach,

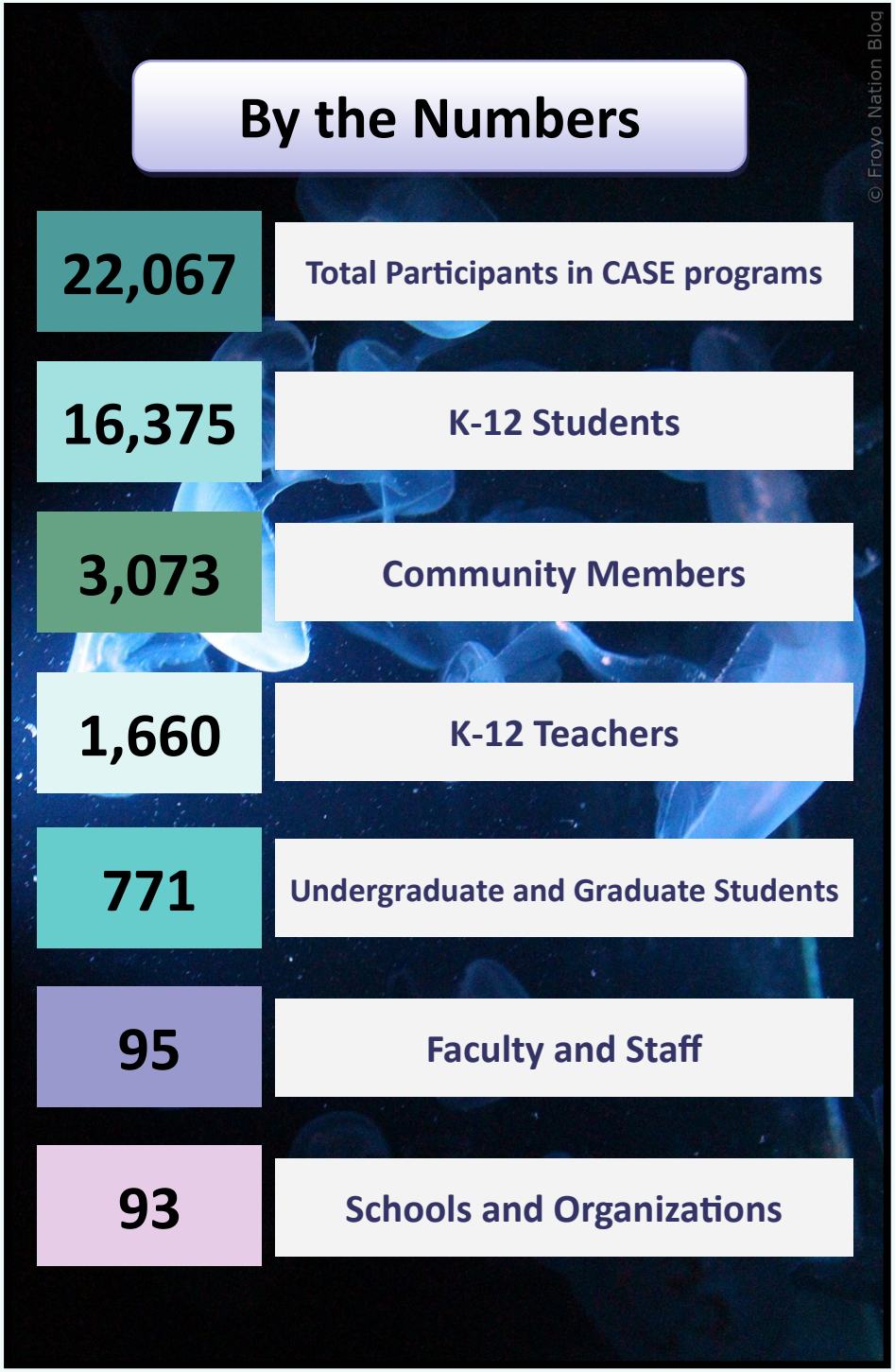


CASE Faculty and Staff

Jennifer Aizenman, Director
Maria Armour, Darwin Day
Martina Arndt, Observatory
Edward Brush, Project GreenLab
Kevin Curry, Watershed Access Lab
Vernon Domingo, EarthView
Caitlin Fisher-Reid, Darwin Day
Nicole Glen, STEM Education Leadership
James Hayes-Bohanan, EarthView
Jamie Kern, Observatory
Kim McCoy, Associate Director, CityLab and Watershed Coordinator
Rebecca Metcalf, MACS
Polina Sabinin, Engage in Math
Sarah Thomas, Greenlight for Girls
Maura Whittemore, Administrative Assistant

2018 Advisory Committee

Martina Arndt, Professor of Physics
Edward Brush, Professor of Chemical Sciences
Kevin Curry, Professor of Biological Sciences
Caitlin Fisher-Reid, Assistant Professor of Biological Sciences
Nicole Glen, Associate Professor of Elementary and Early Childhood Education
James Hayes-Bohanan, Professor of Geography
Stephen Krajeski, Assistant Professor, Secondary Education and Professional Programs
Jamie Kern, Observatory Manager
Rebecca Metcalf, Associate Professor of Mathematics
Polina Sabinin, Associate Professor of Mathematics



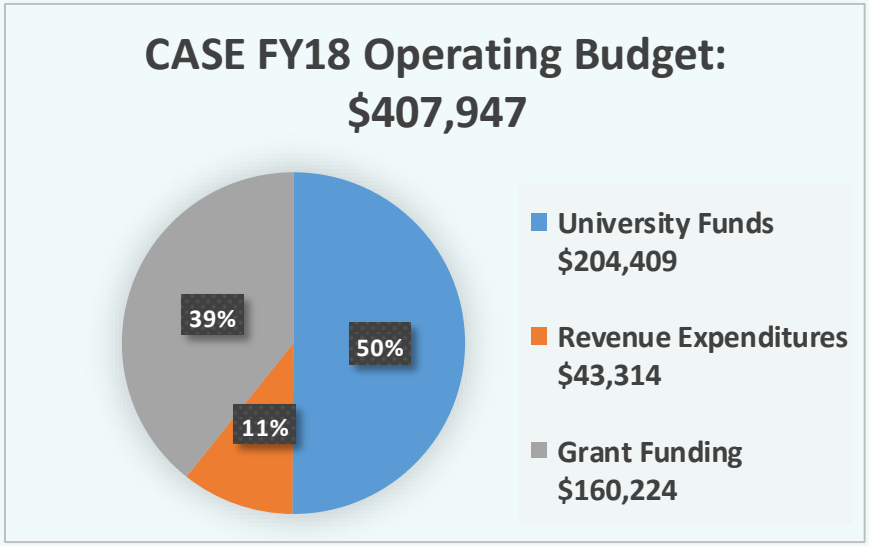
Grant Funded Programs

CASE partnerships expand our ability to promote interest and literacy in science and mathematics across the region.

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, 17 graduate students and 3 undergraduate students participated in a grant-funded *Teaching Cancer Biology* course.

Financial Information

CASE operating costs in FY18 were $407,947. Funding was provided through our University budget, the National Institutes of Health, the National Oceanic and Atmospheric Administration, the Massachusetts Math and Science Partnership Program, the Paula Shea Endowment and revenue generated through CASE programs.



Partnering Organizations

In FY18, CASE partnered with more than 200 K-12 schools, colleges, universities and organizations.

STEM Education Leadership

CASE partnered with the College of Education to promote STEM Education Leadership among both pre-service and in-service teachers. Thirty pre-service BSU undergraduate students participated in *Future Teacher STEM Workshops* designed to generate excitement and positive attitudes toward science and engineering. Additionally, Geology faculty partnered with faculty from the College of Education to refine a Geology course, GEOL194, which is offered exclusively to pre-service teachers.

Scientist of the Month

CASE staff presented to third-grade classes at the Huntington Elementary School in Brockton. Students participated in hands-on science activities and analyzed data they collected.

Grant Funded Programs *continued*

The Randolph and Braintree school districts were granted a Massachusetts Math and Science Partnership Award with BSU to develop and offer six new graduate courses for middle school science teachers ($125,780 to BSU over 3 years). Sixty teachers participated in the following three courses: *Integrating the "Practices" into Science Instruction Using Science Notebooks, Evolution: The Unifying Concept of Biology,* and *Special Topics in Physical Science: Astronomy.*

Through collaboration with STEM faculty on the NSF-funded SEISMIC program ($1,000,000 over 5 years), CASE supports undergraduate student opportunities to participate in STEM service learning and outreach experiences.

Grant Funded Programs *continued*

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. A total of 297 K-12 students and 12 teachers participated in NOAA-funded Meaningful Watershed Educational Experiences, Stormwater Stewards Professional Development and a Watershed Explorers Summer.

The Paula Shea Children's Endowment awarded CASE with $7,400 to sponsor Bridgewater Raynham students to attend the Summer and Winter Science Academy.

Observatory

The Observatory at Bridgewater State University hosts public and private viewing events, offers K-12 workshops, and provides resources for student research, astronomy courses, and service-learning. The Observatory hosted a Solar Eclipse event that was attended by 1,050 participants, who received solar glasses to safely view this amazing occurrence.

Although more than half of the viewing nights were cancelled due to weather, the Observatory still hosted 1,777 community members, 1,213 K-12 students, 192 BSU undergraduates, 122 K-12 teachers, and 15 BSU faculty and staff.

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 include parent workshops and professional development programs for preK-12 teachers. Engage in Math is now reaching an international audience of teachers and community members through work in the country of Georgia, where 440 K-12 teachers participated in professional development.

270 community members, 330 K-12 students, and 485 preK-12 teachers participated in *Engage in Math* programs.

Engage in Math also partners with Math Kangaroo, an international competition in mathematics that encourages students to master their mathematical knowledge and gain confidence in their ability to comprehend mathematics. In FY18, 375 students participated in the Math Kangaroo competition and awards ceremony.

CASE Grant Program

CASE offers grants to BSU faculty and staff who develop projects that further CASE's mission to increase interest and literacy in STEM topics. The following three projects received funding and administrative support.

Greenlight for Girls: CASE awarded a $1,360 grant to faculty in the College of Education to sponsor a Greenlight for Girls STEM event at BSU. The event engaged 110 middle school girls in hands-on STEM activities led by undergraduate students, faculty, staff and volunteers. Partners included Cisco, Waters Corporation and the Naval Undersea Warfare Center.

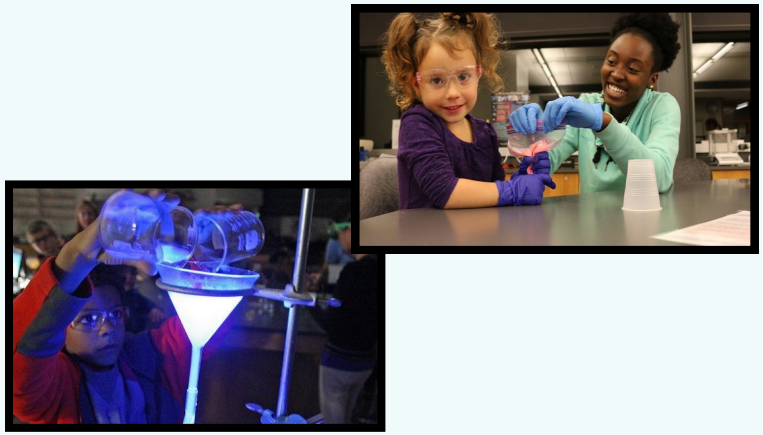
Davis Grows: CASE awarded a $5,000 grant to the College of Education and the Davis Elementary School in Brockton to build a greenhouse and raised planting beds. Funds were also used to develop a plant science curriculum. The program allows students to plant, grow, care for and harvest a wide variety of plants, both outside in raised beds and inside the greenhouse. The program reaches over 1,000 students and teachers at the Davis School.

Bizarbots: CASE awarded a $5,000 grant to the College of Science and Mathematics Analytical Instrumentation Engineer to mentor the Holbrook School Bizarbots Robotics Club at BSU. Students learned about engineering and multiple STEM fields and prepared for robotics competitions.

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 invited BSU community members to explore the Science and Mathematics Center's labs and conduct hands-on STEM activities led by undergraduate students. In FY18, 764 members of the community attended Open Lab Night at which 76 BSU students led activities.



Greenlight for Girls Day engaged 110 middle school girls in hands-on activities led by undergraduate students, faculty, staff, and volunteers from Cisco and Waters Corporations and the Naval Undersea Warfare Center. This event was run in partnership with the College of Education and Allied Studies and Greenlight for Girls, an international non-profit STEM organization that aims to inspire girls of all ages and backgrounds to pursue STEM studies.

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 annual Undergraduate Symposium on Sustainability and the Environment featured Linda Booth Sweeney Ed.D., who presented *Connect the Dots, Change the Game: Systems Design for Sustainable Futures*.

GreenLab also partnered with Beyond Benign, a nationally recognized nonprofit organization dedicated to green chemistry education, to offer professional development workshops to K-12 teachers.

Approximately 280 undergraduate students, faculty, community members, K-12 students and teachers participated in Project GreenLab programs.

EarthView

EarthView is a twenty-foot hand-painted globe that serves as a portable classroom energizing geography programs 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.

In FY18 Earthview acquired a second 22-foot satellite imaged globe.

A total of 8,363 K-12 students and 607 teachers and community members 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 FY18, MACS hosted 77 participants in its programs.

Community Events *continued*

The South Shore Regional Science Fair provided 140 high school students the opportunity to present their research and receive feedback from judges who participated in the event. There were 56 members of the community who served as judges at this event.

Darwin Day was offered in partnership with the Department of Biology and provided undergraduate students the opportunity to lead presentations on evolution, the life and studies of Charles Darwin, and BSU’s Natural History Collection. The keynote speaker was Dr. Scott Edwards from Harvard University. This event was attended by 80 high school students, 4 teachers, and more than 200 BSU undergraduate students.

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 will be completed in FY19.

A total of 2,427 K-12 students, 167 teachers, 14 BSU students, and 8 BSU faculty and staff participated in Watershed Access Lab programming.

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 1,970 K-12 students, 73 teachers, and 13 BSU undergraduate students participated in CityLab programs.

Science Academy

CASE offers Science Academy classes for high school and middle school students. Ten undergraduate students, including two NSF-funded Noyce Scholars, and eight BSU faculty and staff taught 124 students in Science Academy classes.