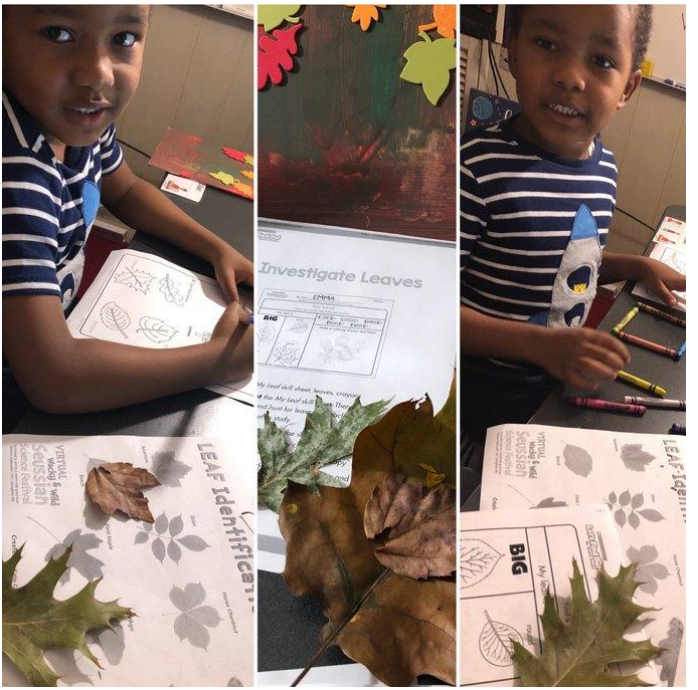


2021 Annual Report

The Center for the Advancement of STEM Education (CASE)

BRIDGEWATER
STATE UNIVERSITY

Impact of CASE Programs

All CASE programs took place in a virtual format in 2021. Although we definitely missed hosting K-12 students and teachers on campus, the interactive nature of our online programs allowed us to see participants' smiling faces as students engaged in hands-on STEM activities in their kitchens, backyards, and nearby green spaces. While the overall number of participants in CASE programs was lower than in previous years, each virtual program reached a broader audience, both in terms of geographic location of participants and access by students with learning differences. With this in mind, we plan to maintain online components of programs even after the pandemic winds down.

Over the course of this year, we have also focused on assessing the impact that participation in CASE programs as K-12 students has on BSU students' interest in attending and studying science and math at the University. We have also partnered with the Geology department to develop an exciting new outreach program, called GeoExplorers. We look forward to launching new programs and resuming outreach activities both on campus and in K-12 schools when it is safe to do so.

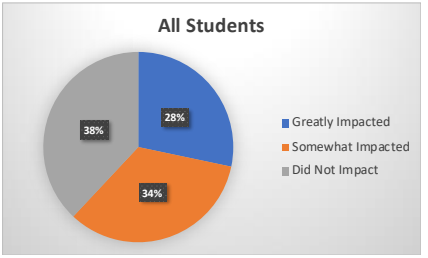
-Dr. Jennie Aizenman, Director

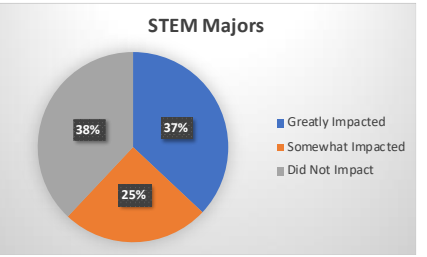
Assessing the Impact of CASE Programs

We have continued to study the impact that participation in CASE programs as elementary, middle or high school students has on interest in applying to or attending BSU. At the start of the spring semester, we sent a survey to all BSU undergraduate students. A total of 1,495 students responded, which represents a 19% response rate. Responses indicated that 30% of BSU students had participated in a CASE program prior to coming to BSU. Participants indicated they had participated in the following programs. Please note that students could select more than one program in their response.

- BSU Observatory – 156
- High School Science and Engineering Fair – 147
- STEM Career Day – 91
- Solar Eclipse Viewing – 57
- CityLab/Watershed – 57
- EarthView – 44
- Summer/Spring Science Academy – 44
- Open Lab Night – 37
- Darwin Day – 36
- Whale of a Family Night – 13
- Greenlight for Girls – 12

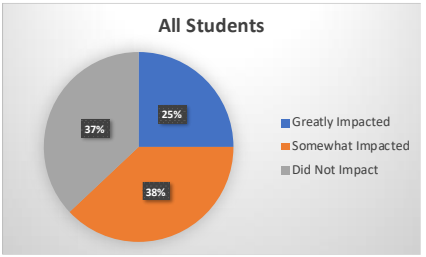
Students were asked to indicate the impact that participation in CASE programs had on their decision to **apply to** BSU. The charts below represent responses for all students, as well as for those student who identified as STEM majors.

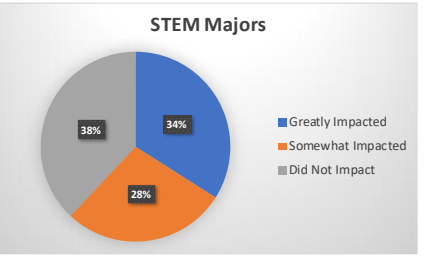




Overall, 62% of all students and 62% of STEM majors indicated that their decision to apply to BSU was either somewhat or greatly impacted by their experience in CASE programs as K-12 students.

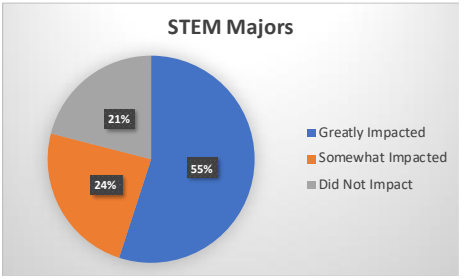
Students were then asked to indicate the impact that participation in CASE programs had on their decision to **attend** BSU.





Overall, 63% of all students and 62% of STEM majors indicated that their participation in CASE programs as K-12 students either somewhat or greatly impacted their decision to attend BSU.

Students who identified as STEM majors were asked to indicate the impact that participation in CASE programs as K-12 students had on their decision to study science or math at BSU.



Overall, 79% of STEM majors indicated that participation in CASE programs as K-12 students either somewhat or greatly impacted their decisions to study science or math at BSU.

The results from this survey strongly suggest that participation in CASE programs positively influences students' decisions to apply, attend and study science at BSU. Thus, CASE programs not only serve to improve scientific literacy in the community, but also to increase awareness of BSU as a university where students can pursue their undergraduate studies.

By the Numbers

The pandemic greatly limited the number and types of programs we could offer. As such, participant numbers dropped significantly. There was a total of 4,231 participants across all CASE programs, including 1,791 K-12 students, 2,151 community members, 113 K-12 teachers, 136 undergraduate students, and 40 BSU faculty and staff. Despite the decrease in numbers, we have remained connected with teachers and administrators and strengthened partnerships with several schools.

Summer Science Academy: Outdoor Environmental Adventures

For the Summer Science Academy program, we offered a virtual one-week environmental science class for middle school students. Parents collected supply kits from BSU and helped students explore a local water body and determine how land use can impact water quality. During their exploration, students identified wetland organisms, tested water quality parameters, investigated best management practices and identified how they can positively impact their community. Fifteen middle school students and 2 staff members participated in this program. Pre- to post-class assessment scores jumped from 57% to 81%, which demonstrated an improvement in content knowledge.

Parental feedback on the program was extremely positive.

“A nice mix of information presented in the colorful booklets, sway presentations, and videos. My kids learned a lot and enjoyed the different activities. I liked that it involved site work in the local community and all of the supplies were provided and neatly organized.”

“Thank you for hosting this class! At a time when there is so much going on in the world, this class allowed my child to continue learning instead of spending more time playing video games. It didn’t take much away from my “work from home” time and allowed us to learn and explore together.”

Open Lab Week Fall 2020

Open Lab Week was a week-long virtual event scheduled to coincide with Massachusetts STEM week. A total of 1,051 participants from 310 families; 72 classroom students; 1 K-12 teacher (from St. Michaels Elementary School); 24 BSU students; 6 faculty and 6 staff participated in the program. Presentations were made interactive through the use of Padlet, an online resource that allowed participants to share pictures, data, and comments. A total of 27 online activities were created using Microsoft Sway. Presentations received 1,572 views, and 52% of people who accessed a module read through it entirely. We provided 200 supply kits, which

contained supplies for some activities; other activities only required items commonly found at home.

Post program surveys indicated that 49% of families participated in the Open Lab program for the first time. 100% of respondents agreed or strongly agreed they had fun learning science. Additionally, feedback indicated that students were able to engage in activities at their own pace and that the format allowed children with learning differences to participate. When offering future Open Lab programs, we will include both on-campus and virtual components.

"*We have enjoyed doing these projects with our girls and the information on the website is easy to follow and understand. You all deserve recognition for pulling this off during a pandemic and making it so much fun for families."*

"We liked the ability to photograph a project, leave comments and questions, and learn from peers' responses."

"*Many of the labs were longer and had more in-depth explanations. They took longer to do, but we really enjoyed the process and learning more."*

"*My son is autistic so we could go at his pace."*

"We liked the virtual format because it gave us a chance to do it at our own pace and really dive into topics."

Open Lab Week Spring 2021

Based on the success of the fall event, a second virtual Open Lab Week took place in the spring. A total of 1,025 participants from 327 families; 583 classroom students; 1 K-12 teacher (Carney Elementary); 6 faculty or staff; and 4 graduate students participated in the program. A total of 11 online activities were created using Microsoft Sway. Presentations received 782 views. We again provided 200 supply kits to participating families. Post program surveys indicated that 73% of families were participating in the Open Lab program for the first time. 100% of respondents agreed or strongly agreed they had fun learning science. Parental feedback indicated that students appreciated the hands-on engaging activities.

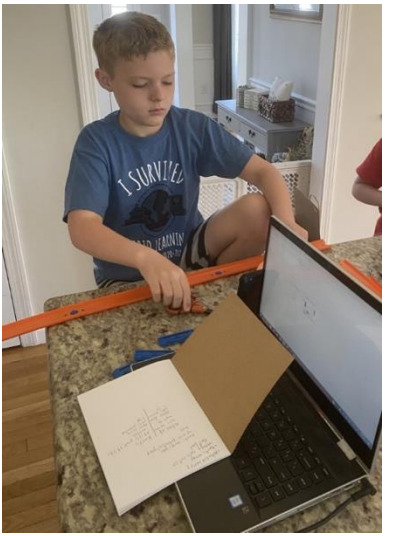
"They loved different topics and ideas that they do not see at school. They were so excited and engaged."

"The hands-on activities. We are a family that has been remote since March 2020. My son loved being able to do hands-on science again."

"My children were able to complete the labs together at a time that was convenient for our family. And they had fun together and I was able to get pictures of them completing the labs."

"She especially liked the assignment on the human eye. She just got glasses and was fascinated to understand what changed in her eyes to require this."

Learning Science Through Play



CASE collaborated with the Elementary & Early Childhood Education Department to offer a virtual Spring Science Academy for 4th and 5th grade students. During this class, play was incorporated into problem solving, with the goal of increasing interest in science and engineering. The week-long class was funded, in part, by a grant from the Office of University and Community Partnerships. The class was taught by BSU graduate students, who gained experience teaching hands-on science. Thirty elementary school students; 1 faculty member; 5 graduate and 1 undergraduate student participated in the program.

"My son really enjoyed the program! The teachers did a fabulous job! I have been in the public school system for 14 years and there is something about the energy and enthusiasm of new teachers! The task they had of conducting this on an online platform with hands-on tasks has not been easy for educators with years of experience, so I applaud them! They were kind, caring, supportive, engaging, organized, knew the content, and provided positive feedback to the children... all key things to successful teaching!"

Project EarthView

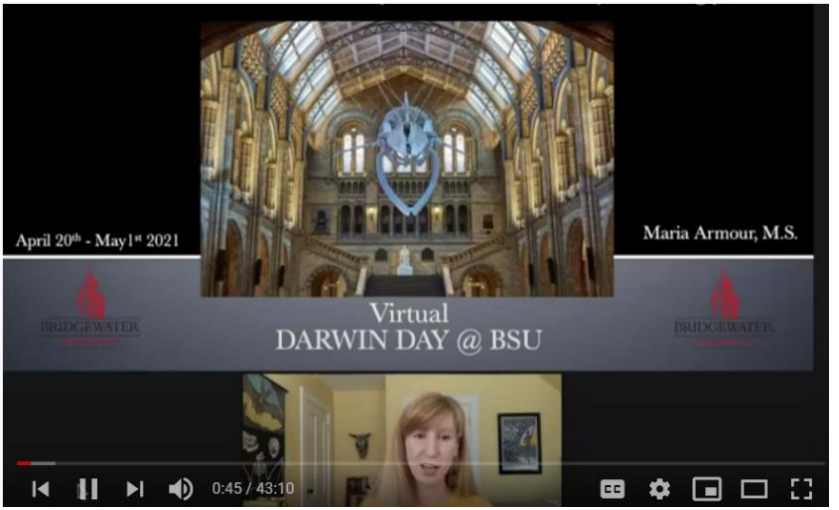
Project EarthView hosted a synchronous virtual family night for the North Andover Middle School. The theme of the program, entitled *Rolling on the Rivers,* was the geography of rivers, both local and global. The event was attended by 75 participants, and their online presentation received 56 views.

Project EarthView also presented at the 2020 Northeast Regional Virtual Conference for the Social Studies. Their 2-hour workshop was attended by 59 K-12 teachers.

EarthView also loaned National Geographic giant floor maps to teachers previously trained through EarthView Institute workshops. Maps were borrowed by the Howard School in West Bridgewater and the Pinecroft School in Rehoboth. A total of 118 K-6 grade students, 4 K-12 teachers and 1 BSU faculty member participated in the floor map program.

Darwin Day

The virtual Darwin Day celebration included asynchronous lectures led by 3 faculty and staff and synchronous workshops with both Taunton and Bridgewater Raynham High School students. Asynchronous presentations received 116 views, and 124 high school students and 2 high school teachers participated in the workshops.



"Maria, Caitlin, and Ellen have such fascinating stories about their lives and the work that they currently do. They were all incredibly candid about themselves and their presentations provided a surprisingly personal and intimate conversation for a Zoom call. I am not able to put my students on camera, but each presenter spoke to my class in a way that felt very authentic and sincere. Most of my students are preparing for the future in science and I would describe yesterday's presentation as inspirational to a group of aspiring biologists. Thank you for everything that you did to help make this happen. Darwin Day gets 5 stars, perfect 10/10, and my highest thumbs-up rating of 2 thumbs."

Arnone Partnership

During this year, we have strengthened our partnership with the Arnone Elementary School in Brockton. CASE staff led virtual hands-on activities for all K-5 students. Each activity was aligned to appropriate grade level standards. A total of 700 students, 36 K-5 teachers and 3 BSU staff participated.

Our Sisters School Partnership

CASE has established a partnership with Our Sisters School (OSS), a tuition-free independent school for girls located in New Bedford. OSS students are in grades 5-8 and come from low-income families. CASE provided lab kits which were used by 54 students and 3 teachers. Lab topics included water quality, forensics and examining owl pellets.

Physics Outreach

Outreach through the Observatory included a virtual presentation to elementary students participating in the New Bedford Parks and Recreation April break program. Participants did hands-on activities that allowed them to learn about Martian ice and soil and the search for life on Mars. The presentation was done synchronously with 8 elementary students, 2 elementary school teachers and 1 BSU faculty/staff.

Project Invention Convention.

CASE partnered with the College of Education to re-envision Project Invention Convention. This year, students were asked to develop inventions focused on the United Nations Sustainability Goal #3: Good Health and Well-Being or Goal #10: Reduced Inequalities in response to COVID-19 and Black Lives Matters, respectively. The Arnone School (Brockton) and the Carlos Pacheco Elementary Schools (New Bedford) designed inventions. A total of 11 students, 3 teachers and 6 BSU faculty/staff participated. Students presented their work and pre-recorded videos via a Zoom conference.

Virtual Mentoring Program

In partnership with the NSF-funded SEISMIC program, CASE led a mentoring program for Brockton High School freshmen enrolled in a Biotechnology Careers program at their school. BSU students, who were participating in service-learning experiences as part of the course, *Cultural Psychology: The Culture of STEM*, served as mentors. There were 18 BSU students, 76 BHS students, 2 BHS teachers and 2 BSU faculty and staff who participated in this virtual mentoring program.

Getting Little Feet WET

CASE partnered with the College of Education to provide training to certify 83 BSU students to teach hands-on curriculum from *"Getting Little Feet WET,"* a pre-K through elementary curriculum focused on the properties of water.

GeoExplorers

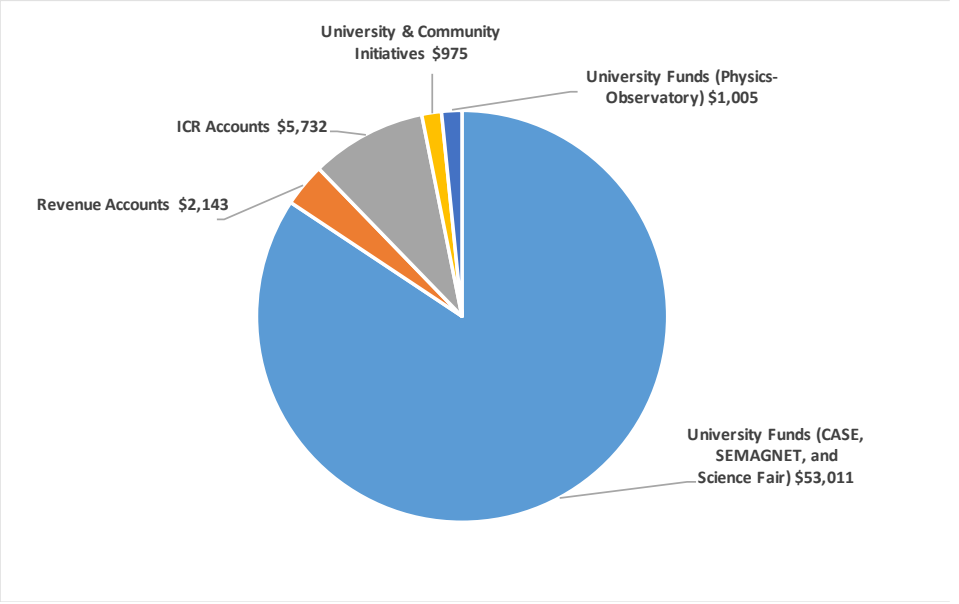
The Geoscience Department partnered with CASE to develop GeoExplorers, a new outreach program that includes online curriculum and a lending program, called GeoBox. Each GeoBox includes lessons and geologic specimens on loan through the department. Teachers can check out a box for a period of time, complete the lesson with their classes, and then return materials so others can enjoy these resources. Standards-aligned lesson plans are included with each GeoBox, along with materials needed to complete the lesson. The program will be launched in FY22.

Engineering a Better Future

CASE partnered with Our Sisters' School (OSS) and the Boston chapter of the National Society of Black Engineers (NSBE) on a Community Action Grant application to the American Association of University Women. The proposal, entitled *Engineering a Better Future*, was selected for funding in the amount of $10,000. The program will involve 8 BSU STEM faculty, 5 NSBE mentors, 2 BSU staff, 2 OSS staff, and 36 7th and 8th grade students, who will be challenged to develop strategies and inventions to help save lives after natural disasters or in response to climate change.

Financial Information

CASE operating costs in FY21 were $62,567. Funding was provided by the University, Community Partners, revenue and indirect costs generated through CASE.



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