

NC STATE UNIVERSITY

The Science House

Annual Report

July 1, 2018 – June 30, 2019

The Science House is vital in NC State's strategic efforts to recruit and retain a critical mass of diversity representation in students, faculty and staff so the campus community better represents the people served by NC State. All five university strategic goals are addressed by the university's commitment to outreach and service and specifically to monitoring and improving efforts to increase the recruitment, application and yield of underrepresented undergraduate students.

The Science House reached over 4,000 teachers and administrators and 230,000 students directly through its many teacher and student programs. Additionally, over 7,000 undergraduate and graduate students and 4,500 K-12 students were involved in K-12 engagement through volunteering with The Science House. The Science House staff had over 3,000 contact hours with administrators, teachers, and students throughout North Carolina during the 2018-2019 school year.

Highlights from this year for The Science House include:

- The **Northwest Satellite Office** conducted a teacher professional development program called Filling the Gap to connect local teachers and students with STEM careers and industries. During the 2018-19 year 17 teachers connected with 12 STEM businesses in Alexander, Burke, Caldwell, McDowell, Polk, and Rutherford counties. Since its inception this program has worked with over 45 local teachers and 25 businesses and engaged over 1,200 students. This opportunity was funded by Duke Energy Foundation and the Appalachian Regional Commission.
- The **Northwest Satellite Office** continued to impact the number of female students interested in STEM careers with the Girls Excelling in Math and Sciences (GEMS) Club Coaches Training. This past year GEMS helped establish 30 more STEM Clubs while training 33 teachers who impacted over 900 elementary students. Overall over 70 Clubs have been established by this program funded by the Duke Energy Foundation and the Appalachian Regional Commission.
- The **Northwest Satellite Office** extended its reach with the Rural Schools Equipment Loan program. This office worked directly with 137 administrators and 468 teachers, and indirectly with 130,929 students. The equipment loan program and TPD impacted 17 administrators, 253 teachers, and 13,897 students in the following counties: Alexander, Burke, Caldwell, Catawba (including Hickory

Public Schools and Newton-Conover City Schools), Cleveland, Davie, Gaston, Iredell-Statesville, Lincoln, Surry (including Mt. Airy City Schools), Rutherford, Guilford, McDowell, New Hanover, Union, Wake, Chatham, Pitt, Cumberland, Cabarrus and multiple private and charter schools.

- The **Mountain Satellite Office's** Professional Development Outreach worked with rural and underserved school systems in western North Carolina to improve their job-ready STEM skills and connect them with local STEM opportunities. This office provided professional development services for 975 teachers and administrators during the 2018-19 school year, which impacted over 38,750 students. Evaluation data reveals 98% of the teachers strongly agree or agree they are satisfied with the workshops, 96% strongly agree or agree to implement what they learned in the classroom, and 95% recommend the professional development to their colleagues.
- The Equipment Loan Outreach provided by the **Mountain Satellite Office** is much needed, as 15 of the 18 school systems served are designated as high needs districts. This office provided outreach and STEM equipment to all 18 school systems in the service area, serving over 7,000 students and 165 teachers and administrators during the 2018-19 school year. Students developed workforce ready STEM skills using technology they would not have had without the support of this office.
- The **Southeast Satellite Office** is the host of the only MATE ROV (underwater robots) competition in North Carolina. The third annual competition that focuses on marine and aviation technologies included 32 teams from across NC and impacted over 200 students and coaches. A new partner this year included the Fleet Readiness Center, a helicopter repair facility which is one of the area's larger employers.
- NC Green STEM is an initiative focused on green industries such as agriculture, forestry, mariculture, aquaculture and environmental quality that are major employers in the state. The **Southeast Satellite Office** partnered with Sea Grant, the Albemarle Pamlico National Estuary Reserve Program, and the NC Division of Environmental Quality to host the inaugural conference for 87 high school students and reached 87 students from Carteret, Wake, Washington and Columbus counties. The fifty eight students from Washington and Columbus Counties were of African American or Hispanic ethnicity from high need schools.
- Two of the longest running programs serving underrepresented students are the **Imhotep Academy** and the **Kyran Anderson Academy**. A low number of African-American, Latinx, and female students have access to quality STEM learning experiences in their schools. These academies encourage middle and elementary aged children to take advanced mathematics and science courses in their schools, and have an awareness of science, technology, engineering, and mathematics college programs and careers. These initiatives provided 180 hours

of innovative STEM programming to 240 elementary and middle school students in North Carolina and out of state. In 2018-19, students explored biomedical engineering, neuroscience, aerospace simulation, and ophthalmology. Student demographics included: Female, 47%, Male 53%, 1% Hispanic/Latino; 1% American Indian/Alaska Native, 2% Asian, 79% Black or African American, 2% Native Hawaiian/Other Pacific Islander, 5% White, and 10% Multi-Racial. Students were from the following NC counties: Chatham, Durham, Halifax, Hoke, Johnston, Robeson, Vance, Wake, Wayne. Findings from the elementary student evaluation survey (N=169) indicated an increase in three of the four constructs (science, mathematics, and 21st century skills). Students expressed an interest in pursuing careers in the fields of computer science, chemistry, and engineering. Findings from the middle student survey (N=240) indicated an increase in three of the four constructs (science, math, engineering & technology) with middle school students. Students expressed an interest in pursuing careers in the fields of computer science, medicine, medical science, chemistry, and engineering fields. The programs major impact is exposure to STEM careers that many students do not see as viable.

- The Science House completed our tenth year of offering **Modeling Institutes** for secondary science teachers and offered our eleventh session of workshops this past summer, all funded by US Department of Education MSP funds. In 2018-19 we offered courses in Biology, Chemistry, Physics and Middle School Science that were 60-90 hours in length. The courses served 79 total teachers in the and included 58 females and 21 males; 9 African Americans, 60 Caucasians, 6 of multiple ethnicities, 2 Hispanic/Latino, 1 Native American, and 1 unknown. The teachers were from 34 NC counties or school districts including the following: Alamance/Burlington, Asheville City, Brunswick, Cabarrus, Catawba, Charlotte-Mecklenburg, Columbus, Craven, Cumberland, Durham, Guilford, Harnett, Hickory City, Hoke, Iredell-Statesville, Johnston, Lee, Lincoln, Madison, Martin, Moore, Nash-Rocky Mount, Northampton, Onslow, Orange, Person, Pitt, Randolph, Scotland, Tyrell, Wake, Weldon City, Winston-Salem/Forsyth, and Yancey. Evaluation data for Modeling Instruction revealed participants in four of the five content groups demonstrated statistically-significant gains in their knowledge of the targeted science content. Participating teachers began the project reporting using a mix of “traditional” and “standards-based” instructional strategies in their science teaching, with some variety of assessment strategies and use of technology. Their reported use in these areas showed significant shifts. Student results of pre/post student testing show significant growth in student understanding of the targeted concepts. Sixty percent of students in targeted courses demonstrated significant pre/post gains on project-administered assessments.
- The Science House’s program for high school students with disabilities, **Catalyst**, was awarded a \$15,000 Powerful Communities grant from the Duke Energy Foundation. Funds will support a comprehensive energy-focused curriculum in which students complete seminars, research projects, internships and

presentations for public audiences. Entering just its fourth year of operation, Catalyst has quickly emerged as a leading STEM education provider. The program won the prestigious Massachusetts Institute of Technology Lemelson-MIT InvenTeams National Competition and Technical Award honors, becoming the first team whose members all had disabilities to receive these distinguished honors. The win generated invitations to the U.S. Patent Office, a commendation from President Barack Obama, and meetings with high-ranking public officials, including Governor Roy Cooper, Governor Pat McCrory and U.S. Senator Thom Tillis. All graduating seniors are currently pursuing STEM careers.

- Hosted the second annual workshop on physics for High School Girls called **LEAP (Launch Your Excellent Adventure with Physics)** with Karen Daniels where girls interacted with graduate students, researchers, and faculty from the Physics Department and learned about optics, atmospheric hadron collider, supernova mysteries, arduinos, cutting cellular skeletons with lasers, colliders and colors, mini-ligo, and seeing their own DNA!
- Continued the second year of a partnership with NCABR to make Citizen Science a major theme of its **Bridging the Gap Conference** in October of 2018. 85 teachers (Citizen Science Scholars) attended the conference and we are working on new opportunities for next year.
- The **North Carolina Science Olympiad (NCSO)** completed its 45th year of operation reaching approximately 18,000 students and 800 teachers during the Spring of 2019. A new initiative, the Rural Participation Project, helped NCSO expand to 75 counties, an increase of 8% in new teams over the previous year. In 2020, the **National Science Olympiad tournament** will be hosted by NC State University with The Science House and NC Science Olympiad Director, Kim Gervase, leading the tournament.
- The Science House was very aggressive in going after foundation grants during the 2018-2019 fiscal year. 10 grants totaling \$250,000 were submitted to foundations to fund many of our programs including Catalyst, Imhotep and Kyran Anderson Academies, and our Satellite Offices. Submissions were made to Georgia Pacific, Wells Fargo, Shell Oil Foundation, Duke Energy, Sony, Clif Bar Family Foundation, Costco, Bank of America. Out of the 10 grants, one was funded and two were declined. The other grants are pending decisions.
- The Science House published a 90-page curriculum guide on Discover Ants: A Guide to Citizen Science with differentiated activities for K-1, K-5, and 6-12. This guide has received amazing reviews and we are already working on a 2nd addition.
- The thirteenth annual **AgDiscovery Camp**, a project sponsored by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ), and facilitated by The

Science House, a learning outreach project of the College of Sciences at North Carolina State University (NCSU), took place from June 18, 2018 through June 29, 2018. Sixteen high school students, nine female and seven male, participated in this two-week residential summer program designed to increase student interest and promote future involvement in the agricultural sciences of plant pathology, botany, entomology, and agronomy.

- The Science House hosted **two FIRST Tech Challenge teams** during the 2018-2019 school year. Both teams were very successful including NC FTC Qualifier Connect and Judges Awards as well as one of our teams being part of the NC Championship Tournament Finalist Alliance!