Promoting Academic and Career Success for Raleigh Future Scholars at NC State University

Prof. Leda Lunardi, North Carolina State University

Leda Lunardi received the BS and MS from University of São Paulo (USP), São Paulo, Brazil, and Ph.D. degree from Cornell University. Currently she is a professor in the Electrical and Computer Engineering Department at North Carolina State University in Raleigh. Her teaching and research interests include electronics, optoelectronics, and engineering undergraduate student retention and graduation improvement. Her research has been mainly sponsored by the National Science Foundation (NSF). She is a Fellow of the IEEE, member of the SWE and the ASEE, and active in the engineering education community, including serving as volunteer for panels and scholarships reviews. From 2005 to 2007 Dr. Lunardi served as Program Director for the Electrical, Communications and Cyber Systems (ECCS) Division in the Engineering Directorate of the National Science Foundation in Arlington, VA.

Dr. Cheryl Cass, North Carolina State University

Cheryl Cass is a teaching assistant professor in the Department of Materials Science and Engineering at North Carolina State University where she has served as the Director of Undergraduate Programs since 2011. Her research focuses on the intersection of science and engineering identity in post-secondary and graduate level programs.

Ms. Katherine Cimorelli, North Carolina State University

Katherine Cimorelli is an undergraduate student at North Carolina State University studying Chemical Engineering with a concentration in Biomanufacturing Sciences. She has aided the program since April 2017 to manage the administration and serve as a liaison between the program directors and the students. Katherine also holds an officer position in Alpha Chi Sigma, a Professional Chemistry Fraternity, where she assists the chapter in organizing its professional activities.

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Abstract

The NC State University STEM Scholarship Program, sponsored by the National Science Foundation since September, 2013, is designed to give economically disadvantaged undergraduate students located in the Raleigh area the financial support, mentoring, and career skills necessary to graduate from NC State University. These resources and aid lead students to be more successful in their engineering and/or statistics careers. The program provides a financial aid package equaling 75% of in-state tuition costs each semester. Several career development activities, such as laboratory visits, mock interviews, and industry panels are also offered by this program. It provides networking opportunities with professionals in industry and academia to further develop connections leading to internships, co-ops, or research experiences. Additionally, the program promotes outreach events to encourage STEM as a career path and to mentor youth in the local Raleigh community. The goal is to give scholars the tools and confidence needed to succeed after graduating from NC State University.

Surveys are conducted before and after each semester, in order to collect data on each student's academic progress and involvement in both academic activities and community service. At the start and end of every semester, the students' long-term and short-term career goals are also updated. From the Fall 2016 to Spring 2017 academic years, 75% of scholars received higher than a 3.35 grade point average. All scholars are actively involved in extracurricular activities on campus. Eleven out of twenty scholars have participated in community service, such as the Society of Women in Engineering's event, "Be that Engineer" helping to inspire young females to consider engineering as a career path. Sixty percent of scholars have participated in academic and/or professional development events including research seminars, the NC State Engineering Career Fair, tech talks, and involvement in academic student organizations. Thirteen out of twenty scholars have participated in at least one internship, co-op, or research position within the academic year. The cumulative involvement in events highlights the effectiveness of the program in connecting scholars with high impact activities.

Major Goals

The major goal of this program is to offer an academic support system for economically disadvantaged undergraduate students located in the Raleigh area. The program aims to provide a pathway to success by issuing financial support, mentoring, and career skills to undergraduate students studying engineering and/or statistics. The program gives each student 75% of in-state tuition costs each semester and helps develop career-readiness skills through mock job interviews, professional development workshops, and industry visits with mock companies. Participating in these opportunities gives scholars the practice and confidence to better prepare

them for the workforce. Additionally, the program helps scholars network with industry professionals and faculty on campus. This connection has lead scholars to receive undergraduate engineering research opportunities. Through undergraduate research, scholars have the opportunity to explore and promote innovation in their field of interest. In addition, it further develops their critical thinking skills, independence, and oral/written communication skills. Undergraduate research can also provide one-on-one mentoring for the scholar. Overall, the numerous opportunities from the STEM Scholars program have been shown to increase the participation in internships, co-ops, and undergraduate research.

The vision for the future of the program is to continue gathering data to submit a final report and to consider how the program can be self-sustaining beyond this funding mechanism.. STEM Scholars have been used as an example for other successful submissions on NC State's campus, and the hope is that STEM Scholars will continue to produce high-achieving students.

Application and Selection

Students in this program receive $6,500 (equalting 75% of in-state tuition costs) each semester with no specific allocations within academic disciplines. This is to ensure that each student selected is of the highest academic quality with a demonstrated need for financial aid. Students admitted to NC State University are invited to apply online if they meet the following requirements:

- Demonstrated financial need through FAFSA
- Matriculated into engineering or statistics
- Full-time undergraduate enrollment in engineering or statistics
- Demonstrated academic merit, with a GPA of 3.0 or higher
- Raleigh permanent address
- U.S citizen, national, or alien admitted as a refugee at time of consideration

After the online application period closes, a group of applicants is invited for a face-to-face interview. The students that are highly qualified are then selected to join the STEM Scholars program beginning in the Fall semester.

A majority of STEM Scholars are first-year engineering/statistics students at NC State University. However, some scholars are transfer students from local Raleigh community colleges. Regardless of academic standing upon entering the program, each scholar is set to the same standards and is expected to fulfill all requirements each semester.

Requirements for Renewal

At the end of each semester, scholars are reviewed for renewal consideration. Each scholar is asked to complete an online survey documenting his/her academic and professional progress throughout the semester. To be eligible for renewal, students must:

- Maintain a minimum GPA of 3.0

- Complete at least 30 credit hours each academic year (university minimum is 24)
- Change to next higher student classification each year
- Make demonstrated progress towards engineering or statistics degree
- Maintain positive student image consistent with academic scholars
- Continue demonstrated financial need (i.e., FAFSA eligible)
- Maintain Raleigh permanent address
- Continue full-time enrollment in engineering or statistics
- Continue involvement in campus student or professional organizations, or remain an active participant in STEM Scholar-related activities (e.g., serving as an ambassador for the STEM program to recruit new students and updating e-portfolio)

A scholar can stay in the program and be renewed until graduation. If a scholar participates in a co-op for a semester, he/she will not have the scholarship renewed while away during that semester, but he/she will be eligible for renewal upon return to the university. A scholar may remain in the program while on academic probation for up to one academic semester. Once a scholar has graduated from NCSU, he/she does not need to repay any of the financial aid back to the program, nor does he/she need to submit any progress reports back to the STEM Scholars program after graduation.

Program Activities

Along with maintaining a high academic merit, each scholar is expected to participate in at least one extracurricular activity. This includes industry internships, undergraduate research, study abroad, writing/tutoring services, faculty seminars and workshops, and academic/service on-campus organizations. Participation in such activities enhances students' academic maturation and professional skills. It helps develop professionalism, teamwork, and time-management skills, which will benefit students in their future careers.

At the beginning of each Fall semester, scholars are invited to attend an orientation session. This social event allows scholars to meet each other face-to-face for the first time and receive an overview of the program. During the fall 2017 semester, scholars were asked to create a list of events and/or opportunities that they would like to participate in during the academic year. The most requested opportunities among the scholars were research seminars, networking events with alumni, laboratory visits, and mentoring opportunities.

Taking the scholars' requests into consideration, STEM Scholars offered two outreach events in which scholars could participate. The first event was volunteering at NC State University's annual Engineering Open House, offered in the spring of 2017. During this event, scholars presented a poster and answered questions from prospective NCSU College of Engineering students and families. The second outreach event during the academic school year was Society of Women Engineers: Be that Engineer! During this event, scholars attended a local Raleigh middle school to connect with young women and serve as a STEM role model. The event aims to

empower women and discusses STEM as a highly desirable and achievable career aspiration for women. Eighty percent of scholars participated in at least one of these outreach events. Scholars who participated in outreach reported that they gained satisfaction and confidence by serving as high-achieving mentors to peers and younger generations in their community.

Findings

Since the program began in Fall 2013, there has been an increase in the number of students participating in at least one internship, co-op, or undergraduate research experience (see Figure 1). During the Fall 2013- Spring 2014 academic year (Year 1), 33% of students participated in an internship, co-op, or research experience. For the Fall 2016- Spring 2017 academic year (Year 4), 65% of scholars participated in an internship, co-op or undergraduate research experience. The rise in industry and/or research experience provides more students with a stronger career-readiness foundation necessary to be successful upon graduation. It gives scholars valuable work experience while allowing them to explore their career interests and further develop professional skills.

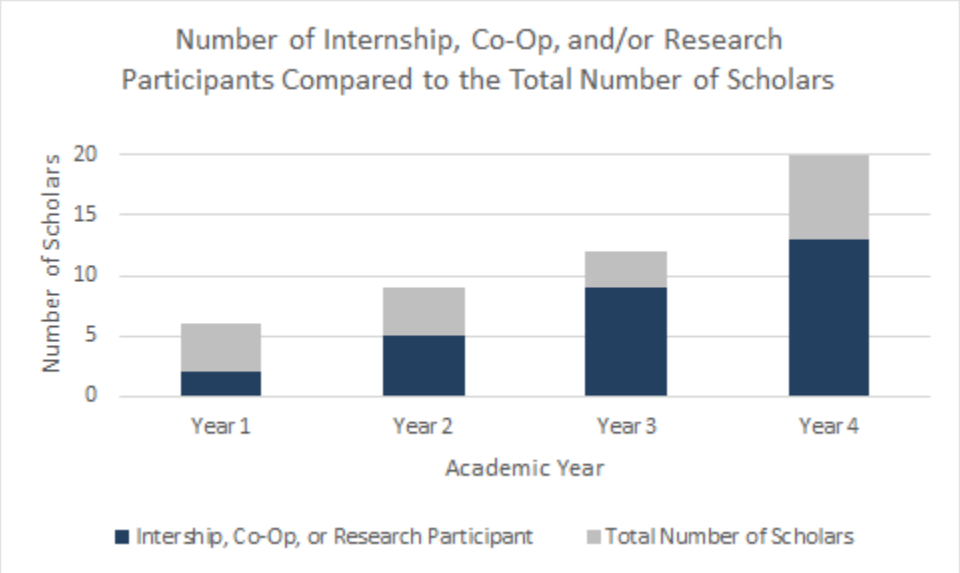

Figure 1: Number of Scholars Participating in an Internship, Co-Op, or Undergraduate Research

Figure 2 depicts the increasing number of total participating students since the program began in 2013. In Fall 2013 (Year 1), there was a total of six scholars, four male (66%) and two female (33%). In Spring 2017 (Year 4), there was a total of twenty STEM Scholars. Eleven male (55%) and nine female (44%). The Fall 2016- Spring 2017 academic year (Year 4) had the closest male to female ratio compared to past years. Additionally, the size of the program has grown by 70% since it began. Of the twenty participating scholars for the Fall 2016- Spring 2017 academic year, four have graduated in Spring 2017. Three of these students have chosen to seek permanent employment, and one will continue formal education and obtain a Master of Science in Textile

Engineering. All four of these students have graduated within four years or less from the admission of NC State University and/or transferred from a Community College.

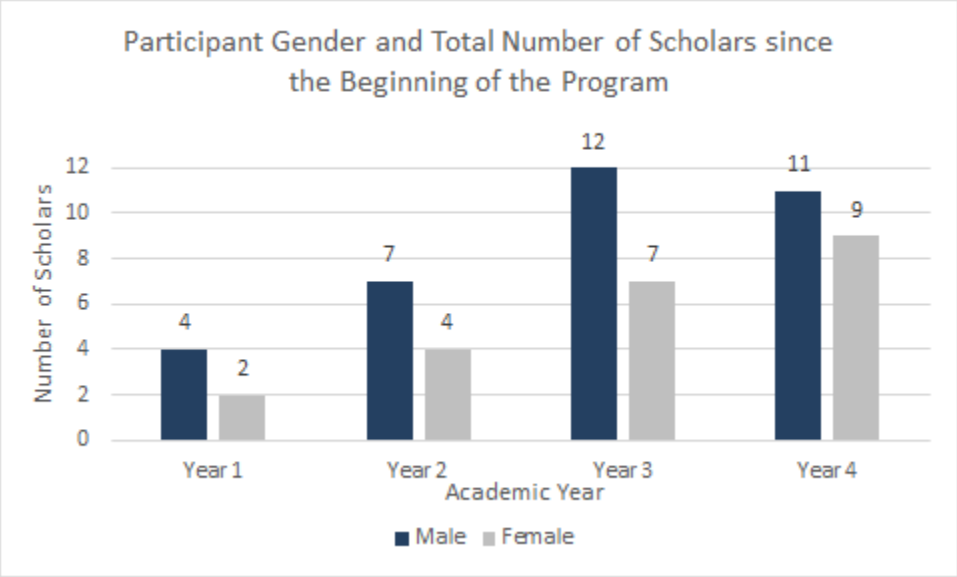

Figure 2: Participant Gender and Total Number of Scholars since the Beginning of the Program

Conclusions

The fourth year of the STEM Scholarship program for undergraduate students in engineering and statistics has demonstrated a high academic success rate among its participants. Graduating students have reported a sense of confidence and career-readiness due to participation in the four year program. In addition to benefits derived from the financial aid package, scholars have reported that the interactions with like-minded peers helped them achieve success in their undergraduate career at NC State University.

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