

RESEARCH IN SCIENCES AND MATHEMATICS AT THE COLLEGE OF CHARLESTON

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The Mission of Research

The mission of the College of Charleston stipulates that we provide " ...students a community in which to engage in original inquiry and creative expression...The community ...provides students the opportunity to realize their intellectual and personal potential..." The School of Sciences and Mathematics realizes this mission most effectively through research.

Research as a Tool for Undergraduate Learning

The importance of research in the professional development of faculty at colleges and universities has long been known. Much more recently it has been realized that research by students is one of the most effective forms of student learning. Much of the research by faculty is not within the capability of undergraduate students. Nevertheless, independent study, student- research, and capstone experiences, which have been integral in graduate education, are now widely regarded as important methods at the undergraduate level for developing intellectual independence and creativity as well as for teaching appreciation and understanding of science and mathematics. Critical thinking requires practice; creativity requires development. Whereas learning can be efficiently produced by classroom lecturing and traditional assignments, research provides students the valuable opportunity to learn that inquiry is difficult, that research requires the development of technique and patience, and that experiments, equipment, and ideas do not always work. Through original research, students learn how to design and conduct experiments that will provide valid, unambiguous answers. Undergraduate research experiences provide mathematics and science majors the exposure to modern software and technology that employers and graduate schools value and expect. Experience with modern instrumentation and the development of oral and written communication skills that results from presentations at professional meetings position our students well as they apply for jobs and for entrance to graduate and professional schools. Research is how students apply their respective disciplines.

Using research as an instructional tool has the additional advantage of offering one-on-one interaction between student and professor that provides much of the essence of a liberal arts college. There is no better way to teach science and mathematics majors how to think like scientists and mathematicians than to engage them in research in their respective disciplines. There is no better way to teach non-majors what science and mathematics is than to immerse them in doing it. It has already been seen that moving research into the introductory curriculum causes upper-division enrollments to rise.

The School of Sciences and Mathematics encourages research not only as a desirable pursuit of faculty for their own professional development, but we urge faculty to guide students in research activities whenever possible. Because student-learning is our first goal and because student- research is perhaps the most effective single instructional technique, student-faculty research, which embraces the terms "independent study" and "capstone experience," is of primary importance to all departments in the School of Sciences and Mathematics. As student-learning is our single most important goal, the School of Sciences and Mathematics considers the most important research to be that in which students are directly involved under the supervision of faculty. In this research, students not only benefit from association with scholarly faculty on the forefront of their fields, but they learn to think creatively and critically. In this context the importance of research is clear: *Research is Teaching*. It is fundamental to a liberal-arts education.

Research as Professional Development

The School of Sciences and Mathematics supports the expectation that all tenure-track faculty at the College of Charleston engage in scholarly activities. Scholarly activities by faculty are essential for maintaining the intellectual environment that characterizes an excellent institution of higher learning. In addition, research contributes to the common body of knowledge and enhances a faculty member's capacity for creative thought. Finally, faculty cannot be expected to convey passion and excitement for learning if they are not involved in the process. Good teaching springs from passion that comes from intellectual engagement in the process of inquiry. Consequently, widespread and diverse research programs are critical to the undergraduate learning experience.

Resources for Research

We face several limitations in our efforts to provide the best possible education to all students at the College. Although student-research is a highly effective instructional technique, it is not inexpensive, nor is it efficient. To be effective as an instructional tool, research requires intimate one-on-one interactions between faculty and student collaborators. Furthermore, that interaction frequently requires space and sophisticated equipment. Students differ in their level of development and in their capability. Consequently, it is necessary to develop a wide variety of research opportunities, which places great demands on the time of faculty. Departments in Sciences and Mathematics have succeeded in extending opportunities for research to both majors and non-majors and continue to try to involve students in research early in their college careers. The College has made space available for this form of instruction, and the SSM faculty has been successful in attracting external funds to purchase the requisite modern equipment and technology and to provide student stipends. Nevertheless, limitations remain.

Time invested by the faculty in writing proposals does not detract from instruction nor compete with it. On the contrary the attraction of external funds significantly enhances the excellence of our undergraduate and graduate programs. In the past few years, our departments have added instrumentation worth hundreds of thousands of dollars to their teaching laboratories by submitting proposals to external agencies. The instrumentation obtained by each grant not only helps to modernize the curriculum, but makes the College more competitive for subsequent grants. College funds for matching commitments for proposals, money for renovation of space for research, and start-up costs for new faculty are investments in teaching.

Summary

In summary, in the School of Sciences and Mathematics, research is teaching at its best. Research requires facilities. Its use in educating students raises philosophical, fiscal, and personnel issues, which must be explicitly acknowledged and addressed. Although the quality of our programs is already established, our continuation down the road of excellence requires that research be further enhanced as a vital part of the College-of -Charleston experience. Our current level of excellence is no a place to stop and rest.

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