

Engaging biology undergraduates in authentic, collaborative research throughout the curriculum

Tessa Durham Brooks

Assistant Professor of Biology

Doane College

Crete, NE

tessa.durhambrooks@doane.edu

<http://www.doane.edu/tessa-durham-brooks>

The biology curriculum at Doane College has recently been restructured to provide a more integrative concept and skill-focused experience closely aligned with Vision and Change recommendations. These changes among others have helped foster an energetic research environment at the college. The core curriculum engages students in research as a mechanism for learning fundamental biological concepts and to gain skills in teamwork, scientific reading and writing, data analysis and interpretation, troubleshooting, and oral and written communication. In their electives, application of knowledge is a major focus, which often occurs via small research projects. By their junior year, students develop a proposal for their senior research project, which is presented at an on-campus symposium and in the form of a thesis paper their senior year. This infrastructure has facilitated implementation of large-scale, collaborative research projects. For example, students developed a flatbed scanner based system for imaging seedling phenotypes that has been used to collect a data set of over 24,000 individual responses to a gravity stimulus varying in genotype, seed size, and developmental age. We and our collaborators will use these data to investigate interactions of genotype and environment in mediating a dynamic phenotype. Students generally put high value on the benefits of their experiential learning, but implementation can be costly. Finding time for faculty to develop undergraduate research projects and foster collaborations is another challenge. More specific to large-scale studies, barriers in workflow that have occurred between collaborating institutions have had to continuously be addressed. Despite these bottlenecks, connecting undergraduates to content through authentic, collaborative research experience can have a major impact on student ability and interest in tackling the scientific challenges of tomorrow.