

How Authentic Science Experiences Impact Student Learning

The undergraduate science education landscape is constantly changing, with calls from Vision and Change and the National Academies to continue shifting education toward inclusive practices that emphasize transferable skills. While these calls were initiated in 2011, they are equally important today. In 2024, the National Science Board (NSB) found that even though individuals with a bachelor's degree have higher lifetime earning potential, only 36.2% of Americans have any form of post-secondary degree. Additionally, women only represent 18% of the STEM workforce despite making up 50.5% of the total U.S. population (NSB, 2024). This, along with a predicted 7% growth in STEM occupations, presents an opportunity for science education researchers to investigate different ways to encourage students not only to pursue a bachelor's degree but also to support them during their undergraduate program. My research program advocates for a biology education model that incorporates authentic science experiences in multiple ways, at all academic levels. Participating in authentic science experiences can slow attrition rates by increasing a sense of ownership, and students begin to see themselves as capable of contributing to and being part of scientific communities. Additionally, authentic science experiences emphasizes the development of technical skills alongside content knowledge, aiming to make students career-ready and increase their participation and persistence in STEM fields. Using a mix of quantitative and qualitative approaches, I investigate the influence of Course-based Undergraduate Research Experiences (CUREs), a pedagogical practice that engages students in the same active process of scientific discovery as a research lab group within a course, on student learning, technical skills development, and changes in science identity to understand how to increase participation and persistence in STEM.