6 World Conference on EDUCATION and TEACHING
20 – 22 June 2024 | Vienna, Austria
Education and Teaching Conferences

Cultivating Meaningful Undergraduate Science Research Experiences

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ABSTRACT

Research experiences are a critical component of all undergraduate experiences, and in many science fields these experiences pair the undergraduates with graduate student or post doc mentors. This mixed-methods investigation into the authentic experiences of graduate students working with undergraduate researchers in laboratories revealed several important themes. Common experiences and challenges graduate students encounter while mentoring undergraduates in their laboratory research were probed via qualitative analysis of weekly audiologs recorded throughout an academic semester. The graduate students who were mentors recorded audiologs every week during the semester with 119 audiologs being collected, transcribed, and coded during the study. A reflection guide was provided as a template for mentors to follow when recording their experiences. Further data collection included mentor focus groups for comparing and aggregating experiences. Overall, qualitative coding and analysis of the audiologs revealed that most mentors' experiences were net positive, but key challenges emerged: balancing authority with approachability, balancing mentoring with other responsibilities, managing cognitive load, establishing and enforcing expectations, and providing support while also encouraging mentee independence. These outcomes are contrasted to findings from separate undergraduate mentees surveys and focus groups, which revealed themes in the lab affiliation process, student motivations, authority versus approachability of their mentors, communication skills, and time management. Combined, these findings led to development of evidence-based best practices recommendations for overcoming challenges experienced in mentoring undergraduates in their laboratory research experiences.

Keywords: cognition, laboratory, mentoring, research, undergraduates