

# Introduction

Lisa Gates, *SPUR* issue editor

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The articles in the fall 2020 issue of *SPUR* explore a variety of topics related to strengthening and assessing student learning outcomes for undergraduate researchers. Whether it is through implementing innovative changes in the practice of research, exploring the impacts of a single or multi-site research program, or shifting the assessment paradigm to uncover new insights into student contributions to research, these articles contribute to understanding undergraduate research as a dynamic and evolving educational practice. These impacts, as we read, extend beyond the field-specific into the broader skill development and knowledge base needed by students who continue on in discipline-specific or professional graduate study and those who enter the workforce (Rios et al. 2020; Hart Research Associates 2018).

In the practice section of this issue, Brian A. Eiler and colleagues discuss their work integrating the teaching of basic data-science skills into research labs or methods courses in psychology. With the rise of big data and easy access to data sets relevant to areas of inquiry in the social sciences, Eiler details how he and colleagues identified specific computational tools to help students learn how to manage and analyze complex data sets, as well as develop skills in computer programming and data visualization. Tapping into open-source packages that are relatively easy to learn, Eiler and associates illustrate how students expand their understanding of open-source science projects and the data tools for conducting research in their field, with the added advantage of learning in-demand computational skills.

The assessment section features multiple articles. Laurel Anderson and colleagues discuss assessment of their collaborative, multisite, course-based undergraduate research experiences (CUREs) developed in the Ecological Research as Education Network (EREN). Their pre- and post-surveys examine learning gains across multiple institutions and student levels, providing insight into differential impacts on student learning and ways to fine-tune survey instruments to better address the complexity of multisite, multilevel assessment. Emily Lin and colleagues detail their success developing a more comprehensive assessment model to address the broader goals of a NIH-sponsored summer diabetes research internship. Although the research experience was central, the summer program also included other key components—such as mentoring by faculty, student shadowing of physicians, and launching a journal club—to increase student interest in diabetes-related research and careers.

Matt Honoré and colleagues chart a new direction in assessment by adapting the open-source Contributor Roles Taxonomy (CRediT), a tool designed to improve systems of attribution, credit, and accountability in scientific publication for application to undergraduate research experiences in the biomedical sciences. By administering the assessment tool across three cohorts of faculty mentors and student researchers, Honoré and colleagues were able to identify the contributions of student researchers in various roles in the research process.

Next, Daniel Brown and colleagues at Texas State University discuss the impacts of a holistic summer STEM program on student success metrics at their Hispanic-serving institution. Because of the high percentage of first-generation college students and students from low socioeconomic backgrounds, the program designers included elements such as cultural-competency training for mentors and weekly seminars for students focused on community building, communication skills, and career development. Results from the three cohorts have been impressive, with a notable increase in STEM GPAs after participation (in comparison to a control group) and a persistence rate of 97 percent for the undergraduate participants in the summer STEM program.

In the International Perspectives section, Sun and colleagues review the state of undergraduate research opportunities in the life sciences at Canadian universities based on 2019 survey data from life science departments at leading medical and comprehensive universities. The authors provide a timely and comprehensive snapshot of the prevalent forms of undergraduate research opportunities; the funding models at Canadian universities to support undergraduate research; new co-curricular, team-based competitions; and mechanisms for connecting students to research opportunities and identify platforms for sharing their work.

The vignettes in this issue highlight the creativity and resourcefulness of faculty and students in response to the ongoing COVID-19 pandemic. The vignettes here explore the experiences of reimagining how we teach, conduct summer programs, and share student research. From the sciences to the humanities, these authors share experiences adapting research-based courses, summer research programs, and undergraduate symposia, providing a fascinating window into how faculty continue the work of teaching, learning, and research in new formations with the affordances of technology and human ingenuity.

This issue recognizes the peer reviewers of manuscripts for volume 3 of *SPUR*. The contributions of these individual faculty, researchers, and administrators are appropriately

anonymous in the editorial process but vital to the integrity and quality of scholarship published in this journal. We are indebted to these reviewers for sharing their expertise and guidance in the editorial process.

## References

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