Introduction

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Big Data and Undergraduate Research

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The age of big data has changed the way research and knowledge are considered (Boyd and Crawford 2012). Interpretation can be challenging, and misuse of big data is definitely possible, as was demonstrated by the Google Flu Trends in 2013 (Lazer et al. 2014). Big data may be a vehicle for increasing access to undergraduate research experiences (Abbasi, Sarker, and Chiang 2016) and, with the rise of cloud computing, bringing more intellectual power to important social issues (Hashem et al. 2015). In this issue of SPUR, contributors share models and stories on the use of large databases and data analytics to engage undergraduate students in scholarly work.

Bringing inquiry into introductory-level classes is a direct way to engage students in the scholarly process. Lukes and colleagues describe the design and initial assessment of a series of lesson plans that access and utilize the Paleobiology Database to answer scholarly questions across five different institutions. Survey assessment shows positive student attitudes regarding research in general as well as indications that the developed activities were rather faculty dependent. Still, the collaborative nature of the project provides a model for other disciplines that may seek to apply existing databases for the expansion of undergraduate research experiences.

Similarly, in the First-Year Innovation & Research Experience (FIRE) at the University of Maryland–College Park, Killion and colleagues use big data and team-based collaboration to provide undergraduate research experiences for more than 600 first-year students. This article offers a valuable perspective on large-scale implementation of course-based research experiences.

Two articles describe programs that connect big data research to social issues. Mendez-Carbajo and Davis-Kahl share a story of statistics research contributing to a community's understanding of residential foreclosures. Beginning with funding from a small grant, this project made connections to multiple nonprofit partners and required both faculty and student researchers to adapt as the research questions evolved.

Since 2016, the summer research program at the historically black institution Bethune-Cookman University used data from a statewide database to investigate the variables affecting juvenile delinquency in Florida. The article featured in this issue describes the weekly components of the program and offers useful suggestions for similar implementation at other higher education institutions.

The last article related to big data and undergraduate research provides examples from multiple institutions and students. The Preparing for Industrial Careers in Mathematics program bridges the gap between "the gown and the town" while training students to employ modern data analytical methods to solve real-world problems. This well-established program exemplifies best practices, including valuable faculty training and support.

The big-data theme concludes with three vignettes about projects involving undergraduates in big data research that address social challenges. Jefferson and colleagues contribute a story of economics research and information literacy aided by Federal Reserve Economic Data (FRED). Dawson describes a project at Allegheny College that yields "GeoStories," which lend insights into community patterns and suggest directions for interventions. Finally, Kassel and colleagues at Siena College write about an interdisciplinary project that uses data science to improve a database related to homelessness.

The big questions that can be answered with big data require trained perspectives and skilled analysis. It logically follows that training undergraduate researchers to navigate these uncharted waters is vital. The articles and vignettes in this issue show how big data and well-designed research programs can be used to equip undergraduate students to find answers to real-world questions.

References

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