STATISTICS EDUCATION RESEARCH JOURNAL

Volume 17
Number 2
November 2018

International Association for Statistical Education | http://iase-web.org

International Statistical Institute | http://isi-web.org

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The *Statistics Education Research Journal* (*SERJ*) is a peer-reviewed electronic journal of the International Association for Statistical Education (IASE) and the International Statistical Institute (ISI). *SERJ* is published twice a year and is open access.

SERJ aims to advance research-based knowledge that can help to improve the teaching, learning, and understanding of statistics or probability at all educational levels and in both formal (classroom-based) and informal (out-of-classroom) contexts. Such research may examine, for example, cognitive, motivational, attitudinal, curricular, teaching-related, technology-related, organizational, or societal factors and processes that are related to the development and understanding of stochastic knowledge. In addition, research may focus on how people use or apply statistical and probabilistic information and ideas, broadly viewed.

The *Journal* encourages the submission of quality papers related to the above goals, such as reports of original research (both quantitative and qualitative), integrative and critical reviews of research literature, analyses of research-based theoretical and methodological models, and other types of papers described in full in the Guidelines for Authors. All papers are reviewed internally by an Associate Editor or Editor, and are blind-reviewed by at least two external referees. Contributions in English are recommended. Contributions in French and Spanish will also be considered. A submitted paper must not have been published before or be under consideration for publication elsewhere.

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Publication: IASE/ISI, The Hague, The Netherlands
Technical Production: California Polytechnic State University, San Luis Obispo, California, United States of America

ISSN: 1570-1824

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EDITORIAL

Welcome to the second issue of *SERJ* for 2018. The papers in this edition are the last of the papers managed to publication by former Editor of Regular Papers, Maxine Pfannkuch. Under Maxine's expert leadership, *SERJ* has seen an uptick in the number of papers published, with a reduction in time to publication, and without a decrease in the quality of the publications. We thank Maxine for her outstanding work and commitment to *SERJ*, which continued through the publication of this issue. In addition, we thank Beth Chance for her work as Assistant Editor preparing the papers in this issue for publication. Beth in turn would like to thank Katie Doctor, Randall Groth, Taylor Newcomb, and Jane Watson for stepping in to help with the preparation for this large issue.

We also announce the retirement of two Associate Editors: Hollylynne Lee of North Carolina State University has stepped down after 5 years of service to *SERJ*. Dave Pratt has retired from the Institute of Education at the University of London and is stepping down as an Associate Editor after 14(!) years of service to *SERJ*. We thank both Hollylynne and Dave for their dedication to the journal and wish them well in their new endeavors. Three new Associate Editors are joining the *SERJ* Editorial Board: Noleine Fitzallen of the University of Tasmania in Australia, Susanne Schnell of the University of Paderborn in Germany, and Douglas Whitaker of Mount Saint Vincent University in Canada will start their terms with the publication of the November issue of *SERJ*.

There are 14 articles in this issue: 13 of them are journal articles and one in the category of brief report. Two articles explore problems that arise when testing out new learning strategies. Five articles focus on students' attitudes towards statistics within a variety of contexts and under different conditions, and another three articles report on instruments the authors developed for assessing students' understanding of particular aspects of statistics. Teachers' knowledge, perceptions, and understanding of statistics are features of three more articles, and the final brief report explores the effect of introducing a gamification learning strategy into an undergraduate course.

Catherine Case and Tim Jacobbe describe introductory students' conceptions of hypothesis testing when learning inference using a simulation-based approach. Their research found that a simulation-based approach to teaching was able to clarify two main difficulties that students encounter when reasoning inferentially. Their framework, characterising students' conceptions underpinning those difficulties, is a particularly good explanation of the multifaceted aspects that students need to cognitively integrate, and should help to instigate further research on this topic.

Michael Carey and Peter Dunn's research premise is that language development is an inherent part of conceptual development. Hence, their focus is on improving students' understanding of statistics by developing students' facility with statistical language. Their research investigates the capability of tutors to implement cooperative techniques, which are commonly used to teach language in other disciplines, to introductory statistics students.

Susan Kapitanoff and Carol Pandey investigate the effect of collaborative testing on anxiety and test performance compared to individual testing on community college students. One interesting finding was that the nature of the collaboration, that is, the quantity and quality of interactions within the groups, was related to women's performance but not men's.

Whitney Zimmerman and Stefanie Austin examine scores, achieved by online and face-to-face introductory statistics students, on the Statistics Anxiety Rating Scale (STARS) with the aim of predicting final exam grades and course completion. Their research is a good reminder of how certain attitudes and anxieties and the delivery method may influence student grades and course completion.

Kirsten Doehler has the altruistic goal of raising undergraduate statistics students' awareness about their responsibility to the community now and in the future. Using the Community Service Attitudes Scale, she documents how involving students in consulting–based projects for non-profit organisations resulted in significant changes in several aspects of attitudes towards service.

Betty Lai, Michelle Livings, Michelle D'Amico, Matthew Hayat, and Jeremiah Williams' research purpose was to implement and evaluate a growth mindset intervention on biostatistics graduate students in a pilot study. They examined student responses to four instruments—growth mindset, grit, social,

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and emotional health, and attitudes towards statistics—at three points in time. They found that the first three factors remained fairly constant, whereas four attitudes towards statistics improved. There was a limited relationship between growth mindset and final grades. With growth mindset strategies currently in vogue as a way of improving student motivation and performance, it is important that claims are evidence-based and that any positive findings can be replicated or challenged using various settings and contexts.

Emmanuel Songsore and Bethany White take two attitude domains, student interest in and perceived value of statistics, which are typically measured using a Likert scale in statistics attitude instruments. They qualitatively examine students' written reflections on these domains after completing an introductory statistics online course. Their research adds descriptive detail on contemporary students' interests, goals, and perceptions of statistics.

Anelise Sabbag, Joan Garfield, and Andrew Zieffler report on the Reasoning and Literacy Instrument (REALI) they developed to measure introductory students' statistical reasoning and statistical literacy. The development of the instrument was prompted by a lack of clarity of the definitions and goals for the statistical reasoning and statistical literacy constructs. Their instrument and the instruments developed by the authors of the following two papers contribute to the library of validated instruments that can be used to measure introductory statistics students' knowledge and reasoning.

Laura Ziegler and Joan Garfield, in a similar vein to the previous paper, noted that there were no instruments available to assess statistical literacy. Furthermore, changes to curricula such as the use of simulation-based methods necessitated a rethink on current definitions of statistical literacy and reasoning. Therefore, they developed the Basic Literacy in Statistics (BLIS) assessment for introductory statistics students.

Laura Rabin, Lauren Fink, Anjali Krishnan, Joshua Fogel, Lorin Berman, and Rose Bergdoll describe their instrument Math Assessment for College Students (MACS), which they developed in recognition that mathematical competency is related to performance in introductory statistics courses. Such an instrument may be useful in identifying statistics students' mathematical needs.

Masami Isoda, Somchai Chitman, and Orlando Gonzalez compare Japanese and Thai high school teachers' knowledge and conceptions of variability using well-known tasks from the research literature. They identified where knowledge could be improved in both groups as well as finding that Japanese teachers tended to overgeneralise equiprobability, whereas Thai teachers tended to overgeneralise estimation.

Jennifer Green, Wendy Smith, April Kerby, Erin Blankenship, Kendra Schmid, and Mary Carlson examine how middle-level teachers collected and analysed data to make data-based decisions about their classrooms. Their findings suggested that the requirements for teachers' knowledge of statistics is multi-faceted and has a statistical knowledge for the teaching profession component and a pedagogical component.

Odette Umugiraneza, Sarah Bansilal, and Delia North focus on South African teachers' perceptions about the facets of learning that need to be improved and the teaching strategies that they could use to improve the teaching and learning of mathematics and statistics. A main concern was improving the motivation and interest or engagement of learners. They also investigated relationships between certain factors such as strategies suggested and exposure to professional development workshops.

Beliz Hazan, Wei Zhang, Ecem Olcum, Rose Bergdoll, Evan Grandoit, Faigy Mandelbaum, Georjeanna Wilson-Doenges, and Laura Rabin give a brief report on how they introduced gamified learning to undergraduate psychology students in order to boost their engagement and competency in statistics. Students were assigned either to a gamified learning situation or a traditional setting They assessed student responses to a statistical knowledge pre- and posttest and to an Intrinsic Motivation Inventory. Their findings suggested that the gamified group were further along the path towards developing intrinsic motivation and improved achievement than the traditional group.

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