STATISTICS EDUCATION RESEARCH JOURNAL

Volume 18
Number 2
November 2019

EDITORS

Manfred Borovcnik
Jennifer J. Kaplan

ASSISTANT EDITOR

Beth Chance

ASSOCIATE EDITORS

Egan Chernoff
Sue Finch
Noleine Fitzallen
Randall Groth
Leigh Harell-Williams
Aisling Leavy
Stefania Mignani
Michele Millar
Jennifer Noll
M. Gabriella Ottaviani
Susan Peters
Susanne Schnell
Alejandra Sorto

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

STATISTICS EDUCATION RESEARCH JOURNAL

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.

Further information and guidelines for authors are available at:
http://iase-web.org/Publications.php?p=SERJ

Submissions

Manuscripts must be submitted by email, as an attached Word document, to co-editor Jennifer Kaplan <Jennifer.Kaplan@mtsu.edu>. Submitted manuscripts should be produced using the Template file and in accordance with details in the Guidelines for Authors on the Journal's Web page:
http://iase-web.org/Publications.php?p=SERJ

© International Association for Statistical Education (IASE/ISI), November 2019

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

ISSN: 1570-1824

International Association for Statistical Education (IASE) – an association of the International Statistical Institute (ISI)

President: Joachim Engel (Germany)
President-Elect: Ayse Bilgin (Australia)
Past-President: Gail Burrill (USA)
Vice-Presidents: Stephanie Budgett (New Zealand), Pedro Campos (Portugal), Teresita Terán (Argentina), James Kaleli Musyoka (Kenya), Rob Gould (USA)

SERJ EDITORIAL BOARD

Editors

Manfred Borovcnik, Department of Statistics Alpen-Adria, Universität Klagenfurt, Austria. Email: manfred.borovcnik@aau.at

Jennifer J. Kaplan, Department of Mathematical Statistics, Middle Teneesee State University, Murfreesboro, Tennessee 37132, USA. Email: Jennifer.Kaplan@mtsu.edu

Assistant Editor

Beth Chance, Department of Statistics, California Polytechnic State University, San Luis Obispo, California, 93407, USA. Email: bchance@calpoly.edu

Associate Editors

Egan Chernoff, College of Education, University of Saskatchewan, Saskatoon SK S7N0X1, Canada. Email: egan.chernoff@usask.ca

Sue Finch, Statistical Consulting Centre, The University of Melbourne, Australia. Email: sfinch@unimelb.edu.au

Noleine Fitzallen, School of Education, College of Arts, Law, and Education, University of Tasmania, Australia. Email: noleine.fitzallen@utas.edu.au

Randall E. Groth, Department of Education Specialties, Salisbury University, Salisbury, MD 21801, USA. Email: regroth@salisbury.edu

Leigh Harrell-Williams, Department of Counseling, Educational Psychology & Research, University of Memphis, Memphis, TN 38152, USA. Email: lmwllm14@memphis.edu

Aisling Leavy, Department of Language, Literacy and Mathematics Education, Mary Immaculate College, University of Limerick, Limerick, Ireland. Email: aisling.leavy@mic.ul.ie

Stefania Mignani, Dipartimento di Scienze Statistiche, Università di Bologna, Italy. Email: stefania.mignani@unibo.it

Michele Millar, Department of Mathematics and Computer Science, Mount Saint Vincent University, Halifax, Nova Scotia, Canada. Email: michele.millar@msvu.ca

Jennifer Noll, Fariborz Maseeh Department of Mathematics and Statistics, Portland State University, Portland, Oregon, USA. Email: noll@pdx.edu

Maria Gabriella Ottaviani, Retired, Universitá degli Studi di Roma “La Sapienza”, Rome, Italy. Email: ottavianimariagabriella@gmail.com

Susan Peters, Department of Middle and Secondary Education, College of Education and Human Development, University of Louisville, Louisville, KY, USA. Email: s.peters@louisville.edu

Susanne Schnell, Goethe University, Department of Computer Science and Mathematic, Frankfurt, Germany. Email: sschnell@math.uni-frankfurt.de

M. Alejandra Sorto, Department of Mathematics, Texas State University, San Marcos, TX 78666, USA. Email: sorto@txstate.edu

Douglas Whitaker, Department of Mathematics and Computer Science, Mount Saint Vincent University, Halifax, Nova Scotia, Canada. Email: douglas.whitaker@msvu.ca

TABLE OF CONTENTS

EDITORIAL

Welcome to the second issue of *SERJ* for 2019. I am sad to announce the retirement of Randall Groth as an Associate Editor of *SERJ*. Randall joined the *SERJ* Editorial Board in 2009 and in his decade of service to the *Journal* he could be counted on to provide high quality feedback to authors in a timely manner and he was always willing to manage the reviews of new manuscripts. We will all miss his dedication, but wish him well in his new endeavors. Three new Associate Editors have joined the editorial board since the publication of the May 2019 Issue of *SERJ*: Carmen Batanero of the University of Granada, Stephanie Casey of Eastern Michigan University, and Rini Oktavia of Syiah Kuala University. Finally, I would like to thank the Associate Editors, Manfred Borovcnik, Editor for the Special Issues, and Beth Chance, the Assistant Editor. Without their dedicated service to the mission of *SERJ*, the publication of this issue would not have been possible.

This will be the last November Issue of *SERJ*. Starting in 2020, we will publish three issues per year: two with Regular papers and one Special Issue. Typically, the Special Issue will be published in June, with the Regular Issues coming out in February and October. For 2020, we will publish the Special Issue, *Building future generations of statisticians*, in February, and the Regular Issues in June and October. The change in publication dates underscores the growth of the statistics education community in general, and of the number of high quality manuscripts submitted to *SERJ* in particular. It is a very exciting time for our research field!

There are four articles in this issue as well as a tribute to Tom Short, former editor of *SERJ*, who passed away last November. Two of the articles in this issue use qualitative research techniques: Foucauldian Discourse Analysis is used to analyze the contexts used in US-based mathematics textbooks for statistics content, and Phenomenology is used to uncover how environmental science graduate students acquire computational skills. A third paper utilizes Ordinal Confirmatory Factor Analysis to analyze the structure of the Survey of Attitudes of Statistics (SATS-36). The fourth is a mixed methods study comparing the use of two different statistical software packages in a typical US introductory statistics course. I am particularly pleased with the variety and range of analyses being used in statistics education and encourage authors to continue to seek out new, appropriate methodologies and theoretical frameworks that will benefit our research community.

In the first article, Travis Weiland uses Foucauldian Discourse Analysis to explore the contextual situations used to present statistical content in two mathematics textbook series used widely in high schools in the US. Weiland concludes that although many different contexts were present in the textbooks, the contexts are generally typical of "small talk," such as the weather or personal preferences. Weiland notes an absence of situations that might be considered controversial or useful in decision making, such as climate change, polling, or voter fraud. The literature describing the differences between mathematics and statistics as disciplines typically cites the use of context as a main distinction. As mathematics textbooks may be written, reviewed, and edited primarily by mathematicians, and as calls for higher levels of data literacy on the part of an educated citizenry increase, Weiland's work provides a foundation from which statistics education can build to ensure students at all levels are introduced to statistics in meaningful and rich contexts.

The original paper describing the development and validation of the Survey of Attitudes Toward Statistics (SATS-36) was published in the *Journal of Educational and Psychological Measurement* in 1995. It has nearly 600 citations in the published literature and in this issue of *SERJ* we add one more to the list. Chao Xu and Candace Schau use ordinal confirmatory factor analysis techniques to investigate the six-factor structure of the SATS-36 and to estimate method effects associated with its items and factors. Their results reveal noticeable proportions of common variance associated with the Difficulty construct only when the SATS-36 is used as a pre-test and with the Value and Interest constructs only when the SATS-36 is used as a post-test. Given the widespread use of the SATS-36 and the importance of attitudes to the learning of statistics, I am pleased to publish work that continues to explore the validity and structure of the SATS-36 instrument.

Statistics Education Research Journal, 18(2), 4–5, http://iase-web.org/Publications.php?p=SERJ
© International Association for Statistical Education (IASE/ISI), November, 2019

Bryon Stemock and Lucy Kerns compare the effectiveness of two software packages that might be used in statistics courses: SPSS and R. Given the pervasiveness and choice of statistical software for instruction, studies such as this provide statistics instructors with an evidence base for making instructional choices about software. This paper also reminds us of the need for research into the use of software in instruction: for example, studies of differences in student learning outcomes for students who experience computing versus those who use GUI systems or studies comparing the cognitive load for learners across the two software types. The initial findings of this paper indicate no significant differences in affective or cognitive outcomes, which may surprise those readers who shy away from introducing programming in introductory statistics courses.

In the final paper in this issue, Alison Theobold and Stacey Hancock explore methods by which graduate students acquire statistical computing skills. Their study reveals three themes in these students' paths towards computational knowledge acquisition: use of peer support, seeking out a singular "consultant," and learning through independent research experiences. These themes provide rich descriptions of graduate student experiences and strategies used to develop computational skills to apply statistics in their own research, which may serve as a foundation or framework for exploring similar phenomena at the undergraduate level as is suggested by the Stemock and Kerns paper.

This issue begins with reflections on the life of Tom Short, former Editor of *SERJ*, with memories compiled by Allan Rossman. Tom was the Editor of *SERJ* when I submitted my first manuscript as an author. I have vivid memories of my lack of understanding of the content of the first reviews. Tom was not only gracious enough to schedule a phone call with me, he was also patient on that call, helping me understand the changes needed for the manuscript to be publishable. The manuscript was published and I am grateful to Tom not only for his advice about the revisions, but also for his persistence in tracking down reviews that were slow to arrive. Later in my career, I had the opportunity to interact with Tom around the Advanced Placement (AP) statistics program. I will truly miss Tom and his calm outward demeanor and ability to explain and/or defuse a potentially difficult situation, usually with a wry bit of humor, As I serve in the role he once did, I hope to provide similar service as I keep him in mind so, as we say in my culture, his memory can be for a blessing.

JENNIFER J. KAPLAN