

## EDITORIAL

Welcome to the first issue of *SERJ* for 2023. While I have now completed my term as the Editor of Regular Papers at *SERJ*, it is likely that both Regular Issues in 2023 will be comprised of papers I managed as the Editor. Before I discuss the papers in this issue, let me introduce the new Editor of *SERJ*, Susan Peters of the University of Louisville, USA. Sue had previously served as an Associate Editor for *SERJ* since 2017. In addition, she recently served as the Editor of the ICOTS-11 Proceedings. From my time working with Sue as a *SERJ* Associate Editor, I am convinced she will lead *SERJ* successfully and with vision. In her early days as Editor, Sue has added four new Associate Editors: Matthew Beckman, The Pennsylvania State University (USA), Stephanie Budgett, The University of Auckland (New Zealand), Sibel Kazak, Middle East Technical University (Turkey), and Susanne Podworny, Paderborn University (Germany). We thank them in advance for this important service to the field of statistics education research. There is one retirement from the Editorial Board. Bruce Carlson, Ohio University (USA), is stepping down as an Associate Editor of *SERJ*. Bruce was one of the most consistent Associate Editors during the pandemic. He made my job as Editor much easier and I am sorry Sue will not have his expertise, but I trust the replacement Associate Editors will handle the load capably.

This issue of *SERJ* will have five papers at the time of publication, but I expect to use the OJS capabilities to publish a sixth article in late Spring. The first article is a conceptual essay, in which Kimberleigh Hadfield proposes a conceptual framework illustrating the relationships between the elements of formative assessment cycles and student attitudes and achievement and suggests a comprehensive transformation of assessment practices to provide pathways for student success in statistics courses. The author conducted a literature review, using andragogy as a theoretical lens and considering the interaction between Bandura's theories of Self-efficacy and Self-regulation with the Theory of Formative Assessment in the intersection between Bandura's theories. The author suggests a three-pronged approach to formative assessment: using of lower stakes assessment, providing students automatic feedback aligned with learning outcomes, and giving opportunities for students to be reassessed on the same learning outcomes. While the literature reviewed suggests that improving formative feedback in this manner will improve affective outcomes for undergraduate students, the author suggests future empirical work to study the specific impacts of different implementations of formative feedback not only on student learning outcomes, but also affective outcomes, such as self-efficacy, self-regulation, and attitudes toward statistics and statistics learning.

Amir Arjondandi, Alfredo Paloyo, and Sandy Suari provide an example of the use of formative assessment in the form of real-time interactive polling in statistics courses, and found benefits to student engagement, student interest, and enjoyment from smaller group discussions. This research is grounded in a long history of research across Science, Technology, Engineering, and Mathematics (STEM) education research focused on the use of active-learning in general and classroom response systems (CRS) in particular. Using a randomized cluster design, tutorial (recitation) groups of students were assigned at random to use or not use real-time polling at the start of their weekly sessions. While the use of real-time polling did not have an association with student success in the course, it did appear to promote student attendance at the sessions. The use of CRS in statistics courses is not new and this is not the first study to investigate their use, but the findings of this study, combined with the theoretical perspective provided by Dr. Hadfield's paper, suggests that even if the use of CRS does not lead to strong cognitive outcomes, they may lead to improved affective outcomes and the statistics education community should continue to study these phenomena.

Dan Spencer, Emily Griffith, Kayla Briska, Justin Post, and Chris Willis also studied non-cognitive factors of undergraduate statistics learners, including self-efficacy, and uncovered changes in students' affect toward statistics over the course of the semester. Like Dr. Hadfield, the authors of this paper used self-efficacy as defined by Bandura as part of the theoretical framing of their study. Self-efficacy theory is combined with Expectancy Value Theory and previous findings of research of attitudes toward statistics to

pose research questions investigating how student affective outcomes change over time and how student motivation is related to help-seeking behavior and course learning outcomes. The research considered a population not typically used in research published in *SERJ*: undergraduate students in an engineering, calculus-based introductory statistics course. Unlike previous studies, which have suggested attitudes toward statistics are relatedly stable and resistant to change over time, these authors found that students viewed statistics as more difficult, less valuable, and more costly to engage in over time. They also found that students were more likely not to seek help when needed at the end of the semester. The authors offer several explanations for the difference in their findings compared to previously published work, but also provide suggestions for future research that would shed more light on the complicated construct of student motivation and affect toward statistics and statistics learning.

Turning to cognitive outcomes, Randall Groth, Megan Rickards, and Elizabeth Roehm analyzed students' learning of compound probability by describing connections they generated while engaged with probability tasks involving two independent events and describing teaching moves that prompted students to attend to multiple relevant task dimensions. The authors of this study used the theoretical lens of actor-oriented transfer in designing their study and analyzing their data. In summary, this approach uncovered both small and large scale connections generated by the student-subjects as they solved compound probability tasks. The design-based research comprised four instructional scenarios completed by four 12-year old students. The authors are clear that this small case study may not be generalizable, but their findings provide future directions for research. In particular, they suggest structures for classroom discourse, posit that the learning progression for two-stage compound probability problems may not be linear, and argue that the lens of negative transfer may not be productive when analyzing student thinking.

In the last paper uploaded at the initial publication of this issue, Yuhal Yilmaz, Kubra Ergul, and Gursu Asik investigated Preservice Mathematics Teachers' (PMTs) use of contextual knowledge to analyze data associated with historical events and how the use of data helped the PMTs gain more knowledge about the historical events. This case study is based on three tasks used by a cohort of seven PMTs taking an elective course in teaching statistics and probability. The results of the study suggest PMTs use context knowledge of data by bringing new insights, explaining the data, identifying useful information, and justifying a claim. The authors further claim using open-ended tasks in which PMTs have the ownership of posing research questions they would like to investigate allows them to create connections between data and context as they meaningfully engage in statistical investigations, but also remind us that these findings should be researched further with other and/or large samples of subjects.

Finally, in the paper to be published later, Tugce Balkaya and Gamze Kurt explore middle school students' informal inferential reasoning using sampling and sample distributions to reason about the population. The authors examined students modeling processes using the theoretical lens of the Reasoning with Informal Statistical Models and Modeling (RISM) framework. Their data come from eight 11–13-year-old students as they worked through three sampling activities using *TinkerPlots*<sup>TM</sup>. Using deductive coding, the authors examined the students' modeling processes comparing the data model with the conjecture model, identifying affordances and limitations of the inferences (comparison model) generated through the modeling.

I hope the *SERJ* readers enjoy this set of papers and many thanks again to the *SERJ* Assistant Editor, Associate Editors, Reviewers, and Authors, without whom this issue would not exist.

JENNIFER J. KAPLAN  
Outgoing Editor of *SERJ*  
Editor Vol 22(1)