Abstract

Statistical association is a key facet of statistical literacy: claims based on relationships between variables or ideas rooted in data are found everywhere in media and discourse. A key development in introductory statistics curricula is the use of simulation-based inference, which has shown positive outcomes for students, especially in regards to statistical literacy and conceptual understanding. In this dissertation project, I investigate students from the Change Agents for the Teaching and Learning of STatistics (CATALST) curriculum in activities I designed for learning statistical association and linear regression. First, I analyzed the informal line fitting strategies of CATALST students. Findings suggest that students still face many challenges in informal line fitting, but their use of the offsetting distances criterion may be a future point of focus for teaching and activity development. Next, I compared student outcomes in a traditional course and a CATALST course on their ability to recognize the need for inference and hypothesis testing. Results revealed that CATALST students were more prepared to learn inference in their course and made greater gains by the end of the linear regression unit. Finally, I examine CATALST students' inferential reasoning in light of frameworks that identify challenges in learning simulation-based inference. Based on the success CATALST students demonstrated, I propose technology innovations to the simulation software so that the classroom can better focus on learning statistics rather than technology. Overall, this dissertation provides insights into activities that expand the existing CATALST curriculum to include linear regression and shares the benefits of leveraging this simulation-based curriculum while highlighting challenges these students experienced and directions for future work to address these challenges.