The development of informal inferential reasoning via resampling

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Syracuse University, Syracuse, USA, jamcle01@syr.edu

This study focuses on the development of secondary and tertiary students' informal inferential reasoning while engaging in data driven sampling and resampling activities. Through the use of hands-on manipulatives and simulations with technology, the participants will construct empirical sampling distributions in order to investigate the inferences that can be drawn from the data. Data collection and analysis will begin during the fall of 2014. Results and initial analyses will be presented in this poster.

Keywords: Statistics education, resampling, modelling.

RESEARCH TOPIC

A trend in statistics education is the shift from a focus on theoretical distributions and numerical approximations into an emphasis on data (Cobb, 2007). Cobb asserted that many statistics curricula are outdated and based on how statistics could be learned prior to the computing power of modern times. Technology is now capable of collecting many samples nearly instantaneously and this advance in technology should have an impact on the statistics curriculum. New curricula for introductory statistics courses, such as the CATALST (Change Agents for Teaching and Learning Statistics) curriculum at the tertiary level (Garfield, delMas, & Zieffler, 2012), emphasize the ideas of data creation, exploration and simulation with methods of sampling and resampling. This study aims to continue in the direction of such curricula and investigate how students develop their reasoning of resampling methods, the reasoning that develops as students move from using sampling methods to resampling methods, and the reasoning that is revealed and supported by moving from use of hands-on manipulatives to computer simulations during sampling and resampling activities.

THEORETICAL FRAMEWORK

The focus of analysis for this study will be the models of sampling and resampling that the students will create while engaging in a model development sequence (Lesh, Cramer, Doerr, Post, & Zawojewski, 2003). This study defines models as "conceptual systems ... that are expressed using external notation systems, and that are used to construct, describe, or explain the behaviors of other system(s)" (Lesh & Doerr, 2003, p. 10). Teaching and learning from a modeling approach shifts the focus of an activity from finding an answer to one particular problem to constructing a system of relationships that is generalized and can be extended to other situations (Doerr & English, 2003). Students' mathematical models are useful for research since they provide a means for investigating students' developing knowledge.

DESIGN AND METHODOLOGY

This study is a mixed methods case study with an intervention and a pretest, post-test, and delayed post-test. I will collaborate with two introductory statistics instructors (one each at the secondary and tertiary levels) to create an instructional unit that will consist of two model development sequences. During the unit, I will videotape four focus groups of students, collect student work from all participants, and videotape whole class discussions and presentations. Select students from the focus groups will participate in interviews to discuss their thinking while participating in the instructional unit. I will analyze the pretest, post-test, and delayed post-test quantitatively to investigate changes in students' understandings. The development of participants' reasoning collected from the videos, student work, and interviews will be analyzed with qualitative methods in order to construct the development of models of inferential reasoning used by participants.

POSTER PRESENTATION

The poster will discuss details of the two model development sequences, including how the hands-on manipulatives and simulations with technology were used. Student work and the initial analyses of their models of inferential reasoning will also be presented.

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