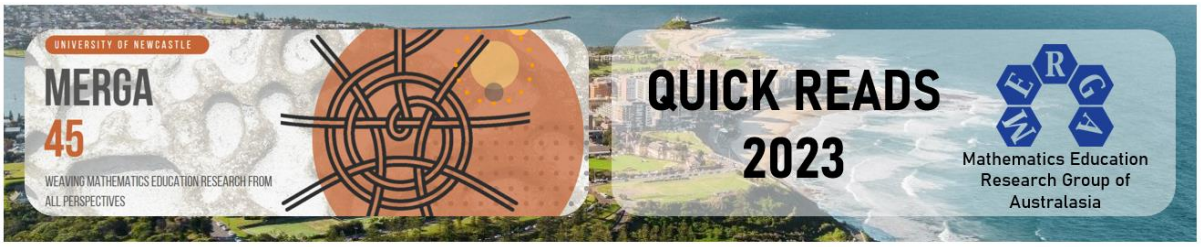

Tertiary Students' Understanding of Sampling Distribution

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A crucial idea in the study of statistical inference is the "sampling distribution," which is the outcome of repeatedly drawing samples from a population of a fixed size, calculating the sample statistic's value (invariably, the mean) for each sample, and then forming a distribution of those values. Studies have revealed that the concept is often poorly understood despite playing a crucial part in comprehending inference (e.g., Ozmen & Guven, 2019). To understand sampling distribution, it is necessary to conceptualise sampling from a population, sampling variability, effect of sample size, and long run frequency. Ozmen and Guven (2019) add that the understanding of the relationship between population parameters and sample means was important for competency in students' knowledge of sampling distributions.

This study was part of a research project investigating students' conceptual understanding of sampling distribution taught with the support of simulation learning activities. Students experienced computer-based simulation activities that were intended to build conceptual understanding of sampling distribution. Eight students enrolled in a first-year tertiary introductory statistics unit provided data for the study, in the form of written responses to three questions about sampling distribution concepts. The questions used as instruments for data collection were qualitatively structured so that students' responses are a result of critical thinking about concepts and not just undertaking the procedural use of formulas they might not understand. For example, students were asked "Which is more likely—that a randomly chosen cat's length falls between 17 and 19 cm, or that an average length of 50 randomly chosen cats falls which this range, or are these probabilities equal?" Additionally, students were asked to describe their thinking.

The Structure of the Observed Learning Outcome (SOLO) taxonomy (Biggs & Collis, 2014) was used to identify different levels of student understanding of the statistical concepts associated with sampling distribution. Through the use of the SOLO taxonomy the researcher could observe what components of sampling distribution were conceptually understood and to what extent, and how well the components were integrated. The SOLO taxonomy categorisations revealed that some students had only pre- and unistructural understanding of sampling distribution, indicating limited conceptual understanding, and none provided responses at the extended abstract level, which would have indicated deep conceptual understanding.

References

Biggs, J. B., & Collis, K. F. (2014). *Evaluating the quality of learning: The SOLO taxonomy (Structure of the Observed Learning Outcome)*. Academic Press.

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