

PRESERVICE MIDDLE SCHOOL MATHEMATICS TEACHERS' STATISTICAL REASONING ABOUT DISTRIBUTION

Nazlı Akar and Mine Işıksal-Bostan
Middle East Technical University, Turkey

The instructional goals in statistics education shift from computational skills to conceptual understanding of basic statistical ideas (Franklin et al., 2007). Accordingly, it is expected that people reason with statistical ideas and make sense of statistical information named as statistical reasoning (Garfield, 2002). Distribution is one of the important statistical ideas to get as it is an overarching concept that includes the interrelated concepts of shape, center, and spread. The understanding of how the data is distributed is essential to notice variability among measures so that it rises to analyze the data by selecting appropriate statistics (e.g., mean, median, and mode) and graphical representations.

This paper is the part of design-based research that aims to develop the reasoning about distribution. In this paper, we examined 14 preservice middle school mathematics teachers' reasoning about distribution, which is the starting point of the design experiment. The participants were selected through purposive sampling method. A test of 10 questions including measures of center, measures of spread, data displays, shape, comparing distributions, and bivariate distribution was applied to evaluate their existing statistical knowledge about distribution. Based on the answers given for the test, semi-structured interviews were conducted to understand their reasoning about distribution in depth. We analyzed the data from the test descriptively and used thematic analysis for interview transcripts.

The data obtained showed that the preservice teachers could compare distributions with unequal sample sizes with being aware of multiplicative reasoning. Furthermore, they tend to use mean as average regardless of the shape or spread of the distribution. While they could reason about the shape of the distribution, spread or center, separately, they could not establish a relationship among them. For bivariate distribution, they could interpret the relations of variables with each other. The results revealed the need to improve the preservice teachers' reasoning about distribution by connecting shape, center and spread.

References

- Garfield, J. (2002). The challenge of developing statistical reasoning. *Journal of Statistics Education, 10*(3).
- Franklin, C., Kader, G., Mewborn, D., Moreno, J., Peck, R., Perry, M., & Scheaffer, R. (2007). *Guidelines for assessment and instruction in statistics education (GAISE) report: A Pre-K12 Curriculum framework*. Alexandria, VA: American Statistical Association.