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Types of student reasoning on sampling tasks.

Johnsen Høines, Marit (ed.) et al., Proceedings of the 28th international conference of the International Group for the Psychology of Mathematics Education, PME 28, Bergen, Norway, July 14–18, 2004. Bergen: Bergen University College. Part IV, 177-184 (2004).

Summary: As part of a research project on students' understanding of variability in statistics, 272 students, (84 middle school and 188 secondary school, grades 6 - 12) were surveyed on a series of tasks involving repeated sampling. Students' reasoning on the tasks predominantly fell into three types: additive, proportional, or distributional, depending on whether their explanations were driven by frequencies, by relative frequencies, or by both expected proportions and spreads. A high percentage of students' predominant form of reasoning was additive on these tasks. When secondary students were presented with a second series of sampling tasks involving a larger mixture and a larger sample size, they were more likely to predict extreme values than for the smaller mixture and sample size. In order for students to develop their intuition for what to expect in dichotomous sampling experiments, teachers and curriculum developers need to draw 'explicit' attention to the power of proportional reasoning in sampling tasks. Likewise, in order for students to develop their sense of expected variation in a sampling experiment, they need a lot of experience in predicting outcomes, and then comparing their predictions to actual data.

Classification: K43 K44 C43 C44 A63 A64

Keywords: sampling; sample size; descriptive statistics; thinking skills; secondary school students; logical thinking; empirical investigations

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