

Sharkey, C. K. (2001). *Secondary school students conceptions, factors behind achievement, and problem solving strategies with stochastic problems*. PhD The American University. Supervisor Lyn Stallings.

The purpose of this study was to investigate the conceptions secondary school students have when dealing with stochastic questions and the heuristics these students use to solve stochastic questions. The second purpose of this study was to determine if there were any effects of gender, grade level, mathematical placement, reading ability and prior stochastic experience on the students' stochastic achievement. The students' stochastic achievement was based on the percentage correct on a multiple-choice stochastic test and the students' conceptions and the heuristics they used were based on the answers students gave on a stochastic reasoning test. The analysis sample for the study consisted of 392 secondary school mathematics students in the Toms River, New Jersey, school district who took the multiple-choice stochastic test. Eighteen of the 392 students volunteered to take the reasoning test, where six students were from each group of students who scored in the top third, middle third and bottom third of the multiple-choice test. Statistical methods were used to test if there were any effects of the variables mentioned earlier on students' stochastic achievement, and whether there was a difference in the proportion of correctly answered questions on the multiple-choice test between probability and statistics questions. The results indicated that, at the 0.05 significance level, reading ability, grade level (Grade 9), the interaction between gender and mathematical placement (track 3), and the interaction between reading ability and stochastic experience had a significant effect on students' stochastic achievement. In addition, there was a significant difference in the proportion of correct answers between probability and statistics questions. Another question that was investigated in this study was if secondary school students use heuristics to solve stochastic questions. This question was qualitatively researched. From the results of the reasoning test, it was concluded that secondary school students use the following heuristics to solve stochastic problems: Belief Strategy, Equiprobable Bias, Bigger is Better, Prior Experience and Normative Reasoning. Belief strategy was used more often than the other heuristics. Also, it was determined that students do not always use the same heuristics to solve similar types of problems.