

# **LEARNING STATISTICAL INFERENCE THROUGH COMPUTER-SUPPORTED SIMULATION AND DATA ANALYSIS**

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This dissertation explored the effects of two different interventions on the learning of statistics. Each intervention corresponded to a different conception of statistical learning and used a particular type of computer-tool. One intervention used data analysis tools and focused on authentic situations of statistical activity. The other intervention used simulations and focused on formal aspects of probability. Data Analysis (data) and Probability (chance) are the constituent parts of statistical inference and the two lens from which is possible to present this topic. In this study, both perspectives were compared in their effectiveness to teach ANOVA, a central topic in inferential statistics. The results of this study showed that the intervention that used simulations improved students' knowledge about probability, sampling and sample size effects. Protocol analysis of students' answers indicated that the gains in probability knowledge did not alter the way students explained group differences. The intervention that used data analysis tools showed no significant effects on students' data analysis knowledge. Studying the evolution of a sub sample of students suggested that data analysis knowledge develops over periods of time longer than those of this study. Additionally, protocol analysis of students solving statistical questions showed that students use simple decision rules to evaluate sampling and data analysis problems. These rules allowed students coordinating simple descriptions of the problem's elements with conclusions about significance and sampling effects.