

# THE EFFECT OF STUDENT-DRIVEN PROJECTS ON THE DEVELOPMENT OF STATISTICAL REASONING

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Research has shown that even if a student passes a standard introductory statistics course, they often still lack the ability to reason statistically. Many instructional techniques for enhancing the development of statistical reasoning have been discussed although there is often little to no experimental evidence that they produce effective results in the classroom.

The purpose of this study was to produce quantitative data from a designed comparative study to investigate the effectiveness of a particular teaching technique in enhancing students' statistical reasoning abilities. The study compared students in a traditional lecture-based introductory statistics course with students in a similar introductory course that adds a semester-long project. The project was designed to target three main focus areas found in an introductory statistics course: (i) distributions, (ii) probability and (iii) inference. Seven sections of introductory statistics courses were used. One section at each level served as an experimental section and used a five part project in the course curriculum. All other sections followed a typical introductory curriculum for the specific course level.

All sections involved completed both a pre-test and a post-test. Both assessments were designed to measure reasoning ability targeted by the project in order to determine if using the project aids in the increased development of statistical reasoning.

Additional purposes of this research were to develop assessment questions that target students' reasoning abilities and to provide a template for a semester-long data analysis project for introductory courses.

Analysis of the data was completed using methods that included ANCOVA and contin-

gency tables to investigate the effect of the project on the development of students' statistical reasoning. A qualitative analysis is also presented to provide information on aspects of the project not covered by the quantitative analysis.

Analysis of the data indicated that project participants had higher learning gains overall when compared with the gains made by students not participating in the project. Results of the qualitative analysis also suggest that, in addition to providing larger learning gains, projects were also enjoyed by students. These results indicate that the use of projects are a valuable teaching technique for introductory statistics courses.