DISCOVERY PROJECTS IN ELEMENTARY STATISTICS: CURRICULUM MATERIALS AND MEASUREMENT OF STUDENT OUTCOMES

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INTRODUCTION
        In a multi-year study supported by the NSF, materials were developed to help instructors implement authentic, real-world, discovery learning projects in introductory statistics courses; and mixed methods are being used to investigate instructors' use of these materials and to measure the impact of these projects on student outcomes. The study is in progress.

DESCRIPTION OF PROJECTS
        The discovery projects focus on statistical analysis using linear regression and t-tests. The projects are intended to be highly student-directed: Students choose their own research questions; identify the necessary variables for their inquiry; gather, organize, and analyze the data; interpret the results; and summarize and report the process and their findings. The projects were also designed to be the primary vehicle through which these topics are taught, rather than as culminating assignments after the material has been covered.

CURRICULUM MATERIALS
        Curriculum materials developed include an Instructor Guide, Student Guide, Technology Guide, and several supporting appendices. The Instructor Guide describes project phases, student and instructor roles and tasks, potential project timelines, and best practices for facilitating projects. Instructor appendices contain such resources as assignment handouts and evaluation rubrics. The Student Guide describes the required project tasks from the student's perspective, addressing issues such as articulating research questions, defining variables, and identifying the target population. Student appendices provide resources to assist students in defining constructs and collecting data.

RESEARCH DESIGN
        Participating instructors nationwide tested the methods and curriculum materials; each instructor taught a *control group* of one or more sections without using these materials or methods; each instructor then conducted a *treatment group* during a subsequent academic term, consisting of one or more sections taught using these methods with the supporting curriculum materials. Three student outcomes were measured in both treatment and control groups: content knowledge, statistics self-efficacy, and perceived usefulness of statistics. To identify instructor effects, instructor variables were also measured, and a qualitative research component was included.

PROGRESS AND PRELIMINARY RESULTS
        Despite strong instructor effects, results overall (among all instructors) so far suggest that the projects yield improved outcomes on two subscales: self-efficacy for data collection and content knowledge in selecting an appropriate statistical analysis method. Other benefits realized by certain instructors include significant improvement in sampling content knowledge, linear regression content knowledge, statistics self-efficacy (SSE) overall, and many SSE subscales. Additional treatment groups are in progress, and qualitative study of instructors is near completion.

REFERENCES
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