Title

Training Teachers to Use Authentic Discovery Learning Projects in Statistics

Abstract

Researchers and educators have called for improvements in statistics instruction through authentic statistical experiences using the scientific method. Improved pedagogies in statistics teaching have fostered achievement gains and improved attitudes toward statistics. Research also suggests that apprentice learning, wherein students complete mathematics in authentic settings, develops better conceptual understanding and better knowledge transfer to non-academic settings. To leverage these research findings, it is essential that secondary educators learn how to implement authentic discovery learning experiences when teaching statistics.

This line of inquiry prompted the 3-year project, "Authentic, Career-Specific, Discovery Learning Projects in Introductory Statistics," funded by the National Science Foundation. The project scope includes: 1) development of teaching methods and materials for using discovery learning projects to teach statistics; 2) training secondary teachers to use the methods and materials developed; 3) experimental research to evaluate student outcomes, using control groups (traditional teaching methods) and treatment groups (discovery methods developed); 4) comparing both content knowledge and attitudes toward statistics between treatment and control groups; and 5) refining teacher training based on pilot data and teacher feedback.

Teacher training workshops have evolved in content and structure to best facilitate preparing secondary teachers. Workshops model classroom implementation of key project components, allowing teachers to experience the methods themselves, then to devise a plan for incorporating the methods into their own classes. The workshops include sessions on defining variables, effective survey design, project organization, assessment methods and rubrics, data analysis methods, technology tools, and overall implementation best practices.

Quantitative data analysis suggests that students in classes using the discovery projects have significantly higher content knowledge and stronger perceived usefulness of statistics than do their traditional class counterparts. Results also suggest that the degree of improvement in student outcomes varies by instructor, by the type of training the instructor received before using the methods, and by the instructor's level of experience with the methods. Details of these findings will be shared, including information about the instruments developed to measure outcomes.

The goals of the session are to: a) inform participants about the NSF funded study; b) acquaint participants with the nature of the discovery learning statistics projects; c) share instructors' experiences using these teaching methods; d) share research results about the effectiveness of these teaching methods for improving student outcomes; e) share results about the success of the teacher training workshops; and f) discuss the task of training mathematics teachers to use these methods effectively.