Using Graphics and Simulation to Teach Statistical Concepts

Mervyn Marasinghe
William Meeker
Dianne Cook and Tae-sung Shin
Department of Statistics
Iowa State University
Ames, IA 50011

September 19, 1994

Abstract

The value to students of *active* learning has been recognized. This has lead to the wide use of assignments in statistical methods courses where students use statistical software and computing equipment to analyze data. These assignments enable most students to master the *mechanics* of data analysis. The amount of experience that a student can get with such assignments is, however, limited. Thus, a sizable proportion of students have difficulty grasping some of the many *concepts* that are introduced in these courses. Nevertheless, these concepts are important for effective modeling and data analysis and instructors should focus on them. By using modern computing technology, it is possible to supplement standard data analysis assignments and algebraic (numeric) derivations (illustrations) and have students become actively involved in the learning of important statistical concepts. The learning experience can be enhanced by giving students additional statistical "experiences" by using combinations of carefully designed and implemented multiple simulations and high resolution dynamic graphics to illustrate key ideas. In this article we describe and illustrate several software modules that will assist instructors in the teaching of introductory statistics courses.

Keywords: Education; teaching; dynamic graphics; Monte Carlo; simulation