

SCHENKER, JASON D., Ph.D., December 2007

Educational
Foundations and
Special Services

THE EFFECTIVENESS OF TECHNOLOGY USE IN STATISTICS INSTRUCTION IN HIGHER EDUCATION: A META-ANALYSIS USING HIERARCHICAL LINEAR MODELING (223 pp.)

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The use of various forms of technology to enhance instruction has been on the rise throughout colleges and universities in the United States, including increased use of technology in traditional classrooms, increased enrollment in distance education courses, and increased use of two-way interactive video or teleconferencing (Van Dusen, 1998). Several researchers have found that enhancing instruction with technology leads to greater levels of learning and achievement among students than traditional instruction (Kulik & Kulik, 1986; Bayraktar, 2002; Timmerman & Kruepke, 2006). The purpose of the study was to examine the effectiveness of using technology to enhance statistics instruction, using meta-analytic techniques. Specifically, the focus was to determine whether or not various uses of technology differentially affect statistics achievement and attitudes among undergraduate or graduate students. Also, the relationships between effect size and several intervention and methodological variables across studies were examined.

The mean achievement effect size from 46 studies was found to be 0.239, indicating that technology was modestly effective in improving students' statistics achievement. Simulations were significantly more effective than other technology types, while online learning was no more effective than traditional instruction. Other variables

related to achievement effect size included course level, student academic standing, publication status, and type of control group. Significantly larger effect sizes were found in introductory courses, in courses with graduate students, in studies published in professional journals, and studies that included a control group that received no instruction.

The mean effect size, across 27 studies, for the effect of technology on attitude was found to be 0.162, and was not statistically significant. Four technology types were significantly, but negatively, related to attitude effect size: statistical analysis software, enhanced lecture, web-based, and online learning. Other variables significantly related to attitude effect size included year, function, duration, academic discipline, course type, and publication status. Studies with significantly larger attitude effect sizes included those that were more recently published, involved technologies that served supplemental rather than substitutive functions, were of longer duration, conducted in mathematics departments, conducted using research methods rather than statistics classes, and published in professional journals.