Chapter 9
Interactive Whiteboards and Student Achievement

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ABSTRACT

This study explored the effects of teachers’ use of interactive whiteboards on students’ reading/language arts and mathematics performance. Reading/language arts and mathematics achievement test scores of all students in the third through eighth grades in a small urban school district in northern Ohio, United States, were compared between students whose teachers used interactive whiteboards for instruction and those whose teachers did not. A statistically significant but not meaningful positive main effect of whiteboard use on mathematics achievement was found. A statistically significant main effect on reading achievement was not found, although the reading/language arts scores of students whose teachers used whiteboards were slightly higher than those of students whose teachers did not use them. In addition, statistically significant and meaningful interactions between whiteboard use and grade levels were found, leading to a more careful look at differences in the ways teachers employed whiteboards in their instruction. A within-group comparison of such usage between teachers whose students scored above the mean on standardized tests and those whose students scored at or below the mean revealed that teachers of high-scoring students used interactive whiteboards more frequently and in more creative and constructivist ways than did teachers whose students performed at or below the mean. The results suggest that the use of interactive whiteboards can enhance student learning of mathematics and reading/language arts when teachers use them in a manner that takes advantage of their unique capabilities.

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INTRODUCTION

Interactive whiteboards are a relatively new instructional technology that is being used in many schools as a replacement for the traditional chalk and blackboard. Many educators see these electronic boards as a versatile digital tool that can help them in increasing student achievement levels. The research reported in this chapter takes a look at a small city school district in Ohio that has invested heavily in interactive whiteboards in the hope that their integration in its classrooms will improve student scores on the mandatory state achievement tests. More specifically, the objective of this study was to explore the effects of teachers’ use of interactive whiteboards on student performance in mathematics and reading/language arts.

BACKGROUND

Current theories of learning emphasize the importance of actively engaging children in the learning process (Bransford, Brown & Cocking, 1999), and a variety of digital technologies has been introduced in schools to support active engagement in learning (see Swan et al., 2007; van ‘t Hooft & Swan, 2007). One recently introduced technology is the interactive whiteboard. Interactive whiteboards allow teachers and students to interact with content projected from a computer screen onto a whiteboard surface. Virtually anything that can be done on a computer can be done on an interactive whiteboard. The advantage of an interactive whiteboard is that the interaction with the digital content involves manipulation of information with fingers and pens, making learning with an interactive whiteboard more active, kinesthetic, and engaging. In addition, drawing, marking, and highlighting of any computer-based output is supported; a whole class can follow all such interactions; and lessons (including audio) can be saved and replayed at a later time.

Initial research on the use of interactive whiteboards in both K-12 and higher education, albeit still fairly exploratory, has been promising. Studies have documented that both teachers and students like the technology (Beeland, 2002; Hall & Higgins, 2005; Kennewell & Morgan, 2003; Smith, Higgins, Wall & Miller, 2005), and that students are more engaged and motivated to learn when whiteboards are employed (Beeland, 2002; LeDuff, 2004; Miller, Glover & Averis, 2004, 2005; Painter, Whiting & Wolters, 2005; Smith, Hardman & Higgins, 2006). Moreover, several research studies have noted that the use of whiteboards shifts instruction from presentation to interaction, and moves students’ focus away from teachers and onto content, making interactive whiteboard lessons more student-centered than traditional ones (Cuthell, 2005; Miller, Glover & Averis, 2003, 2004; Painter, Whiting & Wolters, 2005).

Additionally, there is some data-based evidence that the use of interactive whiteboards can increase student achievement. Zittle (2004), for example, explored the effects of whiteboard lessons on the geometry learning of Native American elementary students by comparing pre- to post-test gains of 53 students whose teachers used interactive whiteboards with 39 students whose teachers did not. He found statistically significant differences in gain scores between the interactive whiteboard group (average gain score of 20.76) and the control group (average gain score of 11.48). Similarly, Dhindsa and Emran (2006) compared pre- to post-test gains between college classes that were taught six organic chemistry lessons, either with or without interactive whiteboards. Here too, the authors found statistically significant differences in gain scores between students taught with interactive whiteboards, averaging a mean effect size of 2.68 and the control group, averaging a mean effect size of 2.16.

Two large-scale investigations of the effects of the use of interactive whiteboards on teaching and learning undertaken in the United Kingdom