

Chapter 15

How Do Technology Application and Equity Impact Student Achievement?

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ABSTRACT

This study examines the impact of technology application on student achievement in the state of Georgia. Technology application includes elements such as technology access, technology integration, and teacher technology proficiency. Student achievement refers to students' standardized test scores in language, social studies, sciences, and mathematics in elementary, middle, and high schools. Results of Multiple Regression analysis yielded significant percentages of variance in student achievement that was attributable to Internet connected computer access. Another purpose of the study was to investigate the equity issues of school technology. School levels and student socioeconomic status were used as independent variables to determine if significant differences in technology application existed among the school levels and the socioeconomic status categories. Results of Analysis of Variance indicated that students of low socioeconomic status had far less opportunities to access Internet connected computers than students of high socioeconomic status. The level of technology application increased as students moved up the school level.

INTRODUCTION

When large amount of fiscal resources have been committed to the development of educational technology, educators are held accountable for justifying the expenditure by providing evidence of improved student achievement. However, does increased technology access really mean higher student achievement? Are technology access,

integration and teacher proficiency equitably distributed among school and socioeconomic levels?

Huge amount of dollars have been invested nationwide in the improvement of instructional use of technology in schools (Chung, 2002; Grove, 1998; Komacek, 1987; Phalen, 2004). In Georgia, the statewide lottery proceeds commit substantial amount of dollars in support of educational technology and school districts also provide special local funds for technology installation and faculty

DOI: 10.4018/978-1-4666-1882-4.ch015

technology training. As a result of state and local efforts, Georgia became the only state to receive an “A” in the annual “Technology Counts” report by Education Week on March 29, 2007 (Georgia Department of Education, 2007).

CONCEPTUAL FRAMEWORK

For over a decade, educators have touted the potential of personal computing and high-speed Internet access to improve student learning. Theoretically, these new technologies provide students and teachers with access to instructional resources that would otherwise be unavailable. For example, in networked classrooms, students are able to access information on virtually any topic of study, thus strengthening their ability to direct their own research interests and to follow their own inquiry paths. Information and communication technologies afford opportunities for students to collaborate with peers and mentors beyond the local school and classroom. With technology, students have access to new tools to create products and analyze data in much the same way as scientists, writers, and practitioners in other disciplines complete their daily work. Web 2.0 technologies can offer dimensions of meaning and rigor by allowing students to readily publish their projects to real audiences who often use and care about the results. Interacting, or even creating, multi-user games and simulations provide engaging options for students to discover standards-based concepts. Computer-based testing systems and electronic portfolios offer instructors innovative methods to assess student learning and to differentiate instruction for individual student needs.

In spite of the potential of technology to student learning, conflicting research has cast doubt on whether the predicted benefits are truly materializing. Positive relationship of technology integration and student achievement is supported by studies conducted by Howery (2001), Karpyn (2003), Komacek (1987), Middleton (1998), Ngan,

Lee, and Koo (2003), Peake (2003), Phalen (2004), and Wenglinsky (1998). The use of technology in the learning process strengthened motivation to learn, transfer of knowledge, and understanding of subject areas (Bruce & Levin, 2003). Students were encouraged to acquire technology literacy skills necessary for work and life in the new century (Lemke, 2002).

However, Bogle (2000), Dean (2004) and Manus (1997) do not find any classroom use of technology applications that had increased student performance gains. Two recent studies are even more confusing. Johnson (2002) argued that the use of technology might hinder student achievement in secondary geometry classes. In Sim’s Study (2003), mathematics teachers expressed different levels of agreement concerning how the use of educational technology should be implemented in the classroom instructional procedures along with its potential impact on student achievement.

While reconciling these conflicting results is still difficult, plausible explanations center on several essential conditions related to improved student achievement. Among the most cited of these essential conditions include reliable, convenient access to technology; consistent use of technology embedded in effective instructional practices; and teacher proficiency in choosing and implementing technologies for the purposes of student learning (Lemke & Coughlin, 1998; Porter, 2002).

Access to Technology

In their study of classroom conditions for technology innovation, Zhao, Pugh, Shelton and Byers (2002) found that teachers were more inclined to use technologies when these technologies were easily available to them. Similar results were found in Ngan, Lee, and Koo’s study (2003) of technology implementation in elementary schools. Additionally, studies by Becker (2001) and the U.S. Department of Education (2000) also confirmed that teachers with more available computers in

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