



Changing teachers, changing students? The impact of a teacher-focused intervention on students' computer usage, attitudes, and anxiety



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ABSTRACT

An important purpose of integrating computer use into everyday classroom instruction is to help students approach technology as a learning tool. Effective classroom integration is dependent not only on access to computers but also teachers' implementation of computing into learning. Successful implementation, in turn, depends largely on teachers' beliefs about classroom computing. The purpose of this study is to examine the effects of a teacher-focused technology intervention on students' attitudes toward and use of computers as learning tools. Teachers' attitudes, anxiety, and classroom computer use are explored as mediators of this relationship. Data were collected during a technology intervention in fourth and fifth grade classrooms in an urban public school district. Results suggest that the technology intervention itself had a positive effect on students' attitudes toward and use of computers for educational purposes. There was no evidence, however, that teachers' use or attitudes had any mediating effect on this relationship. These results suggest that it is possible to increase students' attitudes toward computer use through intense interventions aimed at their teachers. Future research should further investigate the mechanisms through which this relationship exists.

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1. Introduction

The inherent assumption underlying increased computer integration in the classroom is the belief that increased access will effectively enhance students' learning outcomes; however, research on the impact student use of technology has on educational outcomes is inconclusive. On one hand, numerous researchers have pointed to the positive impact classroom computer use has on educational outcomes, including increases in literacy, problem solving skills, student motivation, critical thinking and creativity (Drayton, Falk, Stroud, Hobbs, & Hammerman, 2010; Lowther, Ross, & Morrison, 2003; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010; Suhr, Hernandez, Grimes, & Warschauer, 2010; Weston & Bain, 2010). Further, researchers have noted that increased access to computers in the classroom helps to shift students' views of computer technology from viewing technology as a tool for gaming to viewing computer technology as an effective learning tool (Lowther et al., 2003; Warschauer, 2008).

Many computer integration studies have utilized one-to-one computer access models to test the effects of computer integration on student outcomes. For example, Suhr et al. (2010) utilized a quasi-experimental design to compare changes in English Language Arts (ELA) test scores among 2 groups of elementary students, one group of 54 students with individual laptop access and one group of 54 students without such access. The results of this analysis showed that, after two years of intense computer integration, students in the individual laptop group outperformed non-laptop students in ELA test scores, with significantly higher performance in reading comprehension. Moreover, students with individual access believed they were more involved with their classwork, reported writing longer papers and being better able to revise

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their work using a laptop. Approximately 84% of students said they preferred learning with a laptop and 80% reported that school became more interesting with the integration of computers into their classwork. Other studies have shown similar positive outcomes. In a controlled experimental design in which students were given individual laptop access, [Lowther et al. \(2003\)](#) found that students given access to laptop computers reported very positive attitudes toward the use of computers in the educational setting. Specifically, students reported that access to such computers facilitated a greater understanding of higher level work, better teacher–student communication, cooperative learning, and access to educational resources. In contrast, the students who were not given individual access to computers were less likely to see computers as an essential educational tool and had less confidence in their ability to utilize basic software programs.

Although advancing technology has long been hailed as a benefit to the American education system, its potential is counterbalanced by the challenge of effective integration into the learning process ([Cuban, 2009](#); [Weston & Bain, 2010](#)). A series of studies conducted by the [U.S. Department of Education \(2007\)](#) investigated the usefulness of algebra, math, and reading tutorial software on increasing test scores in first, fourth, and sixth grade classrooms, utilizing an experimental design where one group was assigned to use the software (treatment group) and one not (control group). In each study, researchers found that the implementation of these computer technologies had no significant effects on overall test scores; scores did not significantly differ between treatment groups and control groups. Researchers reported that poor implementation and integration of computer technologies were, in part, responsible for the lack of significant findings.

These conflicting results point to a need for a better understanding of factors which mediate the relationship between computer technology and academic achievement. While access is an important factor, access alone does not explain differing effects of educational computing. The purpose of this study is to examine the impact of a teacher-focused intervention on students' use of technology for educational purposes. Additionally, this study investigates whether teachers' anxiety and attitudes toward computers mediate the relationship between the intervention and students' attitudes and anxiety toward computers. The current intervention focuses on integrating computing activities into existing educational curriculum, learning *with* computers, as opposed to learning *about or from* computers ([Cuban, 2009](#)). The current study examines the impact of the intervention in terms of, both its improvements in students' attitudes toward and usage of computers for learning purposes, and the degree to which those improvements can be attributed to the intervention's impact on teachers. The intervention involved fourth and fifth grade students in a school system located in a predominantly African–American, lower socioeconomic status, and urban area.

2. Literature review

2.1. Teachers' role in student engagement with technology

Because of the movement to increase educational access to computer technology, many teachers now have access to computers to use in their classrooms; however, research indicates that access to computers alone is not enough to impact teacher integration of these technologies into their classrooms or to increase student engagement ([Warschauer, Cotten, & Ames, 2011](#); [Weston & Bain, 2010](#)). While various factors are related to students' usage of computers and their attitudes toward them, two factors which numerous studies have shown to be important are computer anxiety and teacher attitudes toward computer usage ([Azarfam & Jabbari, 2012](#); [Gibbs, Dosen, & Guerrero, 2009](#); [Gomez, 2012](#); [Rohaan, Taconis, & Jochems, 2010](#); [Shah, Hassan, & Embi, 2012](#)).

Computer anxiety is thought to be one factor reducing the integration of computer technologies into the classroom setting and, as such, an appropriate target for intervention ([Azarfam & Jabbari, 2012](#)). Computer anxiety is conceptualized as anxiety or fear when using, or considering using, computer technologies ([Leso & Peck, 1992](#)). The relationship between computer anxiety and classroom integration is mixed. Previous research has found that computer skills and technology acceptance are inversely related to computer anxiety ([Ekizoglu & Ozcinar, 2010](#); [Shah et al., 2012](#)). On the other hand, some researchers predict that computer anxiety may actually increase when technology use increases because teachers become more aware of computer anxiety when they utilized computers more in their classrooms ([Beckers & Schmidt, 2001](#); [Cotten, Hale, Moroney, O'Neal, & Borch, 2011](#)). Further, studies have found that some teachers are apprehensive about teaching students how to use technology because they fear that students will become too reliant on technology and thus not be able to solve problems for themselves ([Cuban, 2009](#); [Li, 2007](#)).

In addition to computer anxiety, teacher attitudes and beliefs are important in student engagement because these individuals are effectively the key holders to integration of computer technology and student engagement. Though many students report technology as a beneficial tool for increasing educational engagement ([Li, 2007](#); [Suhr et al., 2010](#)), it is unclear whether or not this is consistent with the reality of technology use in educational pursuits. In a recent report, [Purcell et al. \(2012\)](#) found that teachers at the middle and high school levels had mixed views on the overall impact of student technology use in the classroom. Teachers noted that motivated students had become more independent information seekers and explored topics in a variety of different media. However, the same teachers also had concerns about students' ability to discern the quality of information during Internet research and expressed fears that students' use of technology can be more of a distraction than a benefit to learning. The perception from educators therefore appears to be that students are able to quickly engage with more information, utilizing computer technology more than ever before, but at the cost of long-term in-depth engagement in a given topic.

Teacher attitudes and beliefs toward the use of technology in their classroom play a major role in the extent to which they will integrate computers into their classrooms and provide their students opportunities to engage with technology for educational purposes ([Hermans, Van Braak, & Van Keer, 2008](#); [Inan & Lowther, 2010a,b](#); [Lowther et al., 2003](#); [Sclater, Sicolu, Abrami, & Wade, 2006](#)). In fact, [Inan and Lowther \(2010a\)](#), utilizing path analysis to examine computer integration among 396 K–12 teachers, found that teacher beliefs were the single most important factor when predicting computer integration. More recent research by [Celik and Yesilyurt \(2012\)](#) echoed these results. With a sample of 471 pre-service teachers, they found that teacher attitudes toward technology, perceived computer self-efficacy, and computer anxiety were significant predictors of attitudes toward using computer supported curricula in their classrooms.

In a qualitative investigation examining the attitudes of 7–12 grade students and teachers toward computer and technology use in the classroom, [Li \(2007\)](#) revealed a disconnect between the attitudes of teachers and students concerning technology use in the classroom. Consistent with previous findings ([Lowther et al., 2003](#)), 87.3% of students stressed that they were excited about computing and believed that it could strongly enhance their learning. Students reported feeling that technology is an invaluable resource for diverse learning styles and

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