

The Use of Technology in K-12 Classrooms

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Abstract

This study looks at the survey result for factors that may or may not have an influence on technology use in public school classrooms. The results of the survey show that few students use technology for more than twenty minutes a day and many students use technology for less than ten minutes a day. This study compared the impact of factors included number of years teaching, number of college educational technology classes completed, and comfort with using technology had on technology integration in a teacher's classroom. The one area teachers reported they do integrate technology was for skills reinforcement or practice.

In 2001, Larry Cuban declared that computers have been oversold and underused, at least in K-12 classrooms. Has much changed in the past fifteen years? Is technology being used more in today's classrooms than in the past? Current literature suggests that more research is needed in this area to determine contributing factors for integration of technology into the curriculum by teachers in public schools. Several studies have attempted to determine causes of technology integration, and several have reached similar conclusions. Three factors are frequently cited in the literature. The first is demographics and self-efficacy. The second is a lack of resources and/or accessibility to the existing resources (Inan & Lowther, 2010; Wachira & Keengwe,

2011). A third factor pertains to support and training (Machado & Laverick, 2015; Wachira & Keengwe, 2011). Most teachers believe that technology is valuable in an education setting, contributing to content and meaningful learning; however, the benefits have not necessarily outweighed the obstacles (Howard, 2011; Machado & Laverick, 2015; Webb 2007; Whitacre & Pena, 2011).

Review of Literature

Demographics & Self-Efficacy

Inan and Lowther (2010) examined environmental factors, as well as teacher characteristics that affect the integration of technology. They surveyed 1,382 teachers from 54 schools. The questionnaire used included two parts focusing on teachers' perceptions of technology use and demographics. Participants' readiness and beliefs had a positive effect on their integration of technology. Proficiency of computer use had the strongest effect on teachers' readiness. Demographics also affected the readiness of the participants to integrate technology. Years of teaching and age negatively affected computer proficiency; whereas, computer proficiency positively affected integration of technology. Of all factors examined by Inan and Lowther, "the one having the most influence on technology integration was the teachers' readiness to integrate technology..." (2010, p. 148).

Wachira and Keengwe (2011) analyzed data from 20 teachers enrolled in a "Teaching Mathematics with Technology" graduate course. Both qualitative and quantitative data were collected. Both external and internal barriers to the uses of technology were identified. External barriers included availability of technology, unreliability of technology, and technology support and technology leadership, which is detailed in the next section. Internal barriers included lack of time, lack of knowledge, and anxiety and confidence. Technology skills and pedagogical knowledge were both stated as areas that teachers were lacking to effectively integrate technology. The participants were also concerned that they would harm the computers and tools or make mistakes when using them. While a "significant portion of the teachers were unsure of their abilities to integrate technology into their teaching, they generally held a positive dispositions in regards to learning how to use technology tools" (Wachira & Keengwe, 2011, p. 21).

Resources & Accessibility

Resources for technology use include both hardware and software. Lack of such resources has long been a barrier cited to technology use by teachers. Even if these resources are present, they are not always available and accessible for teachers at the time they are needed or requested (Inan & Lowther, 2010; Machado & Laverick, 2015; Wachira & Keengwe, 2011; Whitacre & Pena, 2011). Although Inan and Lowther (2010) found that teachers' readiness and beliefs were the most significant factors in technology integration as described above, computer availability was also considered medium to strong in directly impacting computer use by the participants in their study.

Machado and Laverick (2015) conducted a study of graduate students who currently taught in their own classrooms. The participants received instruction on technology standards, hands-on activities, and presentations. A pretest and posttest focusing on technology skills, as

well as integration skills, were administered. In addition, discussion forum data were collected. The factors preventing technology integration could be grouped into three categories, two of which were access to resources and functionality of those resources.

The external barriers found in Wachira and Keengwe's study (2011) described in the previous section included availability of technology, unreliability of technology, and technology support and technology leadership. The primary external barrier found was the lack of hardware and appropriate software.

Whitacre and Pena (2011) sought relationships between teachers' technology knowledge and use of the technology in field experiences. Sixty-five undergraduate students participated in the study involving a questionnaire to determine knowledge, as well as lesson plan development and presentation during field experiences. Although the majority of participants were proficient in using technology, they did not integrate technology within their lesson plans used for field experiences. "When asked why they did not integrate technology, many of the students said that limited resources prohibited them from designing technology-based lesson plans and those resources that were available involved logistical difficulties in procuring" (p. 239).

Support & Training

After analyzing all significant factors found by Inan and Lowther in their study in 2010, they discovered that the strongest effect on teachers' beliefs was overall support. Machado and Laverick (2015) found that several factors contributing to the lack of technology integration by teachers fell into the category of lack of knowledge, support, and training. In Wachira and Keengwe (2011), lack of technology leadership "led to the acquisition of a 'mishmash' of technology, tools, as one teacher put it, some of which may not be useful to the teachers. It also created disparities in the availability of technology in a school or even within a grade level thus creating inequities in student access to technology" (p. 20).

Methodology

This descriptive study involved sending researcher-developed surveys to 4950 teachers, alternative certification interns, or student teachers whose names and contact information were found within a large university system database. One thousand one hundred ninety-two surveys (24%) surveys were completed and returned. The subjects taught in a variety of settings from large urban school districts to small rural districts.

Instrumentation

A survey was designed by the researchers to answer the following questions:

1. Does the district curriculum including STAAR (the state mandated test) preparation have any impact on teachers' use of technology?
2. Does teaching in a rural, suburban, or urban school district have an influence on teachers' use of technology?
3. Does the gender of a teacher have an influence on teachers' use of technology?
4. Does the age of the teacher have an influence on teachers' use of technology?
5. Does the size of a school district have an influence on teachers' use of technology?

6. Does the amount of technology (computers, tablets, smart boards) have an influence on teachers' use of technology?
7. Does the number of years of teaching have an influence on teachers' use of technology?
8. Does the number of college technology classes that a teacher completed have an influence on teachers' use of technology?
9. Does the number of technology related in-service training a teacher has attended have an influence on teachers' use of technology?
10. Does a teacher's comfort level with using technology have an influence on teacher's use of technology?

Subjects

Teacher demographics. Eighty-one percent of the teachers who completed the survey were female and 78% taught at the elementary level. Fifty-six percent of the respondents were between the ages of twenty-six and forty-five. Teaching experience was as follows, first year of teaching, 17%; two to four years experience, 18%; five to seven years experience, 10%; eight to ten years experience, 10%; 11 to 12 years experience, 6%; 13 to 15 years experience, 8%; and over 15 years experience, 21%. Thirty-six percent of the teachers taught at urban schools, 39% at suburban schools, and 25% at rural schools. All of the teachers surveyed completed at least one, three-hour or four-hour college level technology course and 7.5% completed 12 college level courses.

Classrooms and school districts demographics. Ninety-two percent of the school districts represented in this sample offered at least one technology professional development session during the academic year. Fifty-two percent offered more than three technology professional development sessions during the academic year. Ninety-three percent of the teachers reported their classroom had at least one computer and 95% reported having internet access in their classroom. Seventy-one percent of classrooms were equipped with document cameras and 66% had LCD projectors. Teachers reported that 51% of classrooms had tablets and 52% had interactive whiteboards.

Results

Descriptive Data

The researchers acknowledge that the survey return rate was low. That being said, the teachers who did respond to the survey represented a broad range of school districts. The teachers who did respond to the survey reported that their students, on average, did not use technology often during the school day. From the teachers who responded, 60% reported their students used the computer for 15 minutes or less during the school day. Of the 60%, 32% reported their students used a computer for five or less minutes while at school. Only 25% of the teachers reported their students used technology for 20 minutes or more during the school day (see Table 1).

Table 1

Number of Minutes Students Use Computers

Percent	Number of minutes students use computers in a day
32	0-5
12	6-10
16	11-15
14	16-20
25	21+

Most teachers reported they felt comfortable designing lessons that integrate internet use (88%), computers (79%), and document cameras (73%). When students did use technology in school, it was most likely for skills reinforcement. Eighty-six percent of the teachers reported skill reinforcement was the most common use of computers by students. Fifty-four percent of the teachers said the district curriculum had an impact on their use of technology, and 47% said that preparation for the state mandated test had an impact on the use of technology.

Correlation Data

A Pearson test of correlation was run for each research question. The only research question that was found to be significant was between number of college courses completed and student classroom computer use. The correlation results show a weak positive correlation between the number of educational technology courses completed in college and the amount of time students use technology. For all other research questions the correlational data were not significant.

Conclusion

In the study conducted by Machado and Laverick (2015), “the majority of participants recognized the important role that technology integration plays in content acquisition” (p. 89) and how technology assists students in making connections in meaningful ways. “Technology can create more learning opportunities for students... many teachers realized that technology is motivational” (Wachira & Keengwe, 2011, p. 22). “Despite the ubiquity of technology in everyday life, it is not always readily available in some schools and, when it is available, it is difficult to obtain and schedule further discouraging teachers from integrating it into their curriculum” (Whitacre & Pena, 2011, p. 239).

The descriptive data indicate that little has changed over the years. Teachers may feel more comfortable using technology and designing lessons that integrate technology. Yet, the teachers reported that students used little classroom time engaged with technology. District curriculum demands and state mandated testing preparation impacted the use of technology of about half the teachers in this survey. The authors recommend additional research is needed to determine what teacher preparation programs and school districts can do to assist teachers to integrate technology into their classrooms in meaningful ways.

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