Literature Review:

Does the Utilization of Technology in the Classroom Aid in Student Learning?

Erica C. Boswell

University of West Georgia

Abstract

The use of technology in the classroom has become a hot topic among educators, administrators, teachers, and students. Students live in a world saturated with technology. From their reliance on cell phones and video games for entertainment to their ability to access the world at their finger tips, their life outside of school is overrun with technological opportunities. The common idea of thinking is that technology within the classroom can only lead to good things, as well. In an effort to provide evidence that technological advances in the classroom lead to increased learning and higher test scores, there have been ample studies on the topic of educational technology. The research, for the most part, supports the use of technology and its benefits in the classroom. However, some studies have found that the use of technology has no bearing on the learning of the student. One commonality among these studies is that, without proper training on how to effectively use the resources, the students are no better off with the technology than without it. It cannot be denied that the use of technology in the classroom – laptops, interactive whiteboards, multimedia presentations, LCD projectors, etc – is a good thing; however, it is critical to provide training and resources for the teachers or the technology cannot be used to its fullest potential.

Keywords: education, technology, student learning, student achievement, teacher training

Literature Review: Does the Utilization of Technology in the Classroom Aid in Student Learning?

There is ample research regarding the issue of educational technology and the resources available for use in the classroom. From interactive whiteboards to the abundance of multimedia opportunities available for students, the classroom looks quite different today than it did 10 or 15 years ago. The available research focuses on the effectiveness of the use of technology as an instructional strategy. Research has been conducted at all educational levels, and this review will address studies conducted at the elementary, middle and high, and collegiate levels. Studies seek to prove whether or not the addition of technology in the classroom does lead to an increase in student learning and retention of information. Overall, studies are finding that the use of technology does improve student achievement; however, there are studies that address the issue of merely presenting teachers with technology and expecting magical results (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010; Weston & Bain, 2010). In addition to the studies being conducted on the technological strategies being used to teach K-12 students, colleges and universities are using innovative strategies to instruct students. Teachers are also being offered technologically focused in-service opportunities for improving their instructional skills.

Elementary School Students

Elementary schools have received much of the initial funding for technology in school systems across the state. In Barrow County, for instance, elementary schools have received interactive whiteboards in all classrooms, where the middle schools have received them for all math and science classrooms. The high schools, however, are receiving them sporadically throughout the school. A study conducted by the National Center for Educational Statistics (Gray, Thomas, & Lewis, 2010) cited technological opportunities within elementary and

secondary classrooms. Surveys were conducted at the district, schoolwide, and teacher levels and found that 98% "of [elementary] teachers had one or more computers … in the classroom every day" (Gray, Thomas, & Lewis, 2010). However, only 52% had access to a mobile lab (Gray, Thomas, & Logan, 2010). In terms of specific technologies in the classroom, less than 50% of teachers had access to the following technologies in their classroom: LCD projectors, videoconference units, interactive whiteboards, classroom response systems, MP3 players/iPods, document cameras, and handheld devices (Gray, Thomas, & Logan, 2010).

Studies have been conducted regarding specific technologies in the classroom: student response systems (Penuel, Boscardin, Masyn, & Crawford, 2006) and laptops (Suhr, Hernandez, Grimes, & Warshauer, 2010). Penuel, Boscardin, Masyn, and Crawford (2006) conducted research seeking to address the following issues: teachers' "goals for using student response systems, the instructional strategies they employ when using the system, and the perceived effects of response systems." Student response systems are used as a method for students to respond to a teacher directed question. Student's answers can either be kept anonymous or be made public. 209 elementary school teachers were surveyed, with 76.6% teaching English/language arts, 73.2% teaching mathematics, 60.8% teaching social studies, and 61.2% teaching science (Penuel, Boscardin, Masyn, & Crawford, 2006). However, the study goes on to "note that it is not possible to determine how representative this sample was of the population of teachers using response systems" (Penuel, Boscardin, Masyn, & Crawford, 2006). Of the given goals for student response systems, the most popular are for instant feedback (average selection of 4.62 of a 1-5 scale), better understanding of student knowledge (4.56), and student learning (4.55) (Penuel, Boscardin, Masyn, & Crawford, 2006).

Even though "there has been a movement in many districts toward one-to-one laptop instruction, in which all students are provided a laptop computer" (Suhr, Hernandez, Grimes, & Warshauer, 2010), little research has been done regarding the correlation between test scores and laptop initiatives. Suhr, Hernandez, Grimes, and Warshauer (2010) conducted research "comparing the ELA test scores of a group of students who entered a one-to-one laptop program in the fourth-grade to a similar group of students in a traditional program in the same school district." Teachers and students both reported their uses of laptop computers within the school and outside of school. Both the laptop and non-laptop groups saw gains in the fourth grade, 20% and 27% respectively. However, when they entered fifth grade, the laptop groups made statistically insignificant progress and maintained their progress. However, the non-laptop groups "lost most of their gain from the previous year" (Suhr, Hernandez, Grimes, & Warshauer, 2010). Neither group experienced the fourth grade slump – a period in which scores traditionally go down among elementary school students, but the non-laptop groups experienced a decline in their scores in fifth grade (Suhr, Hernandez, Grimes, & Warshauer, 2010).

Secondary School Students

Middle and high schools are not immune from these types of technological investigations and studies. There are numerous journal articles which address the inclusion of technology into the secondary classroom. In addition to technology, Admiraal, Dam, and Heeskerk (2009) also addressed the differences in the ways that girls and boys view and utilize the technology. The findings support the benefit of the use of technology for both genders. However, the different ways in which the technology is used can offer one gender more of a benefit than the other. The aforementioned Penuel, Boscardin, Masyn, and Crawford (2006) study also investigated the effectiveness of using student response systems in the secondary classroom. Within the

investigative group of secondary teachers, an assortment of content areas were represented - traditional academic areas to foreign language (1.7%) and other (22.4%) (Penuel, Boscardin, Masyn, & Crawford, 2006). The findings addressed previously in terms of the most popular choices for use of the student response systems included, not only elementary teachers, but secondary teachers as well - instant feedback (average selection of 4.62 of a 1-5 scale), better understanding of student knowledge (4.56), and student learning (4.55) (Penuel, Boscardin, Masyn, & Crawford, 2006). Selwyn and Husen (2010) investigated secondary students and their perceptions of how they use technology. While this study was self-reported and does not account for perceptions over time, this study does offer a snapshot into the viewpoints of the students. Overall, students reported that they did not feel that a comfort level with technology correlated with academic success (Selwyn & Husen, 2010).

Post-Secondary School Students

Additionally, several studies have been conducted investigating the use of technology in the post-secondary classroom. Adeeb and Hussain (2009) investigated PhD students and professors in the College of Education at the International Islamic University and their use of mobile technology – cellular phones, MP3 players/iPods, PDAs, etc. The types of mobile technology owned by the students and faculty were addressed as well as the ways in which they utilize the technology. Interactivity and flexibility were two of the benefits of utilizing mobile technology (Adeeb & Hussain, 2009). Delfino and Persico (2007) investigated the differences between face-to-face and online training for preservice teachers. These two ways of delivering instruction were addressed, with the theory being that “educational technology cannot be taught without using educational technology” (Delfino & Persico, 2007). By utilizing the types of technology that preservice teachers are expected to use with their own students, they can become

more familiar with them and feel more comfortable in using them in their own classrooms. While the finding supported that the preservice teachers were using technologies on a regular basis, there was negative feedback regarding the feelings of online training versus face-to-face trainings (Delfino & Persico, 2007).

In order to learn how to utilize the available technologies, many professional development opportunities are being offered for teachers (Brunvard, Duram, & Fossum, 2009). In this study, "17 student teachers, 17 cooperating teachers, 5 university-level faculty, and 3 student teaching supervisors" worked together to investigate the ways in which technology can be used in the science classroom (Brunvard, Duram, & Fossum, 2009). The study explains that the traditional approach to educational technology was to provide preservice teachers with a class in which they learn to use different types of technology, and were "then expected to apply these technology skills to teach content in their subject area" (Brunvard, Duram, & Fossum, 2009). Rather than reinforcing this backward approach, this study encourages that teachers work together to learn technology skills and utilize networking to include them into the classroom. Likewise, Shriner, Clark, Nail, Schlee, and Libler (2010) worked with social studies teachers to investigate the ways in which technology can be utilized in the classroom to reinforce student learning. Technology has long been in the background of the social studies classroom and curriculum, with few opportunities being utilized. Like the Brunvard, Duram, and Fossum (2009) study, this study also found that, through networking and investigation, preservice and inservice teachers found an increase in their levels of comfort and competence in teaching social studies (Shriner, Clark, Nail, Schlee & Libler, 2010). Additionally, Lee (2009) explored how the use of a local college could help middle school students learn to use technology. In teaching the students, the teachers also became better at utilizing technology and teaching with the

technology. While there were struggles, qualitative data supports that the students and teachers both saw gains in their knowledge, comfort levels, and feelings of support in terms of technology (Lee, 2009). Karaman and Celik (2007) investigated the ways in which preservice computer teachers learned about Project Based Learning through this type of instruction.

Cautions

As successful as technology initiatives are, there are studies which offer caution against the simple implementation of technology in the classroom and expecting results. Weston and Bain (2010) offered their own literature review in which they investigated one-to-one laptop initiatives and the findings of these studies. To sum up their findings, the belief that "educationally beneficial uses of computers will emerge spontaneously from … laptop computers" is flawed (Weston & Bain, 2010). There are studies in which the implementation of laptops has led to higher test scores and better student knowledge; however, not all studies find an increase in scores by merely incorporating technology into the classroom (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010). Bebell and Kay (2010) also support the theory that "the full effects of computers in school cannot be fully realized until the technology is no longer a shared resource."

Conclusion

This investigation was done utilizing Galileo and the ERIC database to collect journal articles discussing the use of various technologies into the classroom. Overall, the research supports the idea that students are immersed in technology throughout their lives, but the technology in their classrooms is lacking (Means, 2010). Many students are equipped with technology, from cell phones/smart phones to MP3 players/iPods, and laptops/computers, but their classrooms may not even have a computer. However, this paradox is changing. Students are

experiencing more and more technology in their classrooms, from elementary students all the way to doctoral candidates. However, one constant struggle for teachers is the lack of training on how to utilize the technology. Without this training, the use of technology can prove moot in terms of student understanding and learning (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010; Bebell and Kay, 2010). With the correct training, support, and resources, technology can have a positive impact on the learning and academic success of the students.

Future Research

Even though there is an abundance of research regarding educational technology and the innovations being made within this field, there are opportunities for improvement and future research studies. The current research seemed to focus on the amount of teacher use of the technology, but there seemed to be a lack of research focusing on student use of technology. Possible questions for research include:

- How often do students create multimedia presentations?
- How often are students able to present multimedia presentations using interactive whiteboards or LCD projectors?
- How often do students get to use computers in the classroom? Do these computers have internet?
- What programs are students utilizing on the computers?
- What types of enrichment or remediation are students receiving through technology?

Research which would answer these questions would be qualitative in nature, but could be collected utilizing quantitative research methods. Through the use of Likert scales and frequency charts, quantitative data could be gathered. However, qualitative data could be gathered about the types of programs being created. Additionally, questions could be included which address the

feelings of students about their opportunities to use technology. In addressing the qualitative data points, a potential hypothesis to be researched could be: Even though there is an increasing amount of technology in the classroom, students are not personally using the technology on a regular basis.

References

Admiraal, W., Dam, G., & Heemskerk, I. (2009) Gender inclusiveness in educational technology and learning experiences of girls and boys. *Journal of research on technology in education*, 41(3), 253-276. Retrieved from ERIC database.

Adeeb, M. & Hussain, I. (2009). Role of mobile technology in promoting campus-wide learning environment. *The turkish online journal of educational technology*, 8(3), 48-56. Retrieved from ERIC database.

Bebell, D. & Kay, R. (2010). One to one computing: A Summary of the quantitative results from the berkshire wireless learning initiative. *Journal of technology, learning, and assessment, 9*(2). Retrieved from ERIC database.

Brunvand, S., Duran, M, & Fossum, P. (2009). Preparing science teachers to teach with technology: Exploring a K-16 networked learning community approach. *The Turkish online journal of educational technology,* 8(4), 21-42. Retrieved from ERIC database.

Delfino, M. & Persico, D. (2007). Online or face-to-face? Experimenting with different techniques in teacher training. *Journal of computer assisted learning*, 23, 351-365.

Gray, L., Thomas, N., and Lewis, L. (2010). Teachers' use of educational technology in U.S. public schools: 2009. *National center for education statistics, institute of education sciences, U.S. department of education.* Washington, DC. Retrieved from ERIC database.

Karaman, S. & Celik, S. (2007). An exploratory study on the perspectives of prospective computer teachers following project-based learning. *Springer science + business media*. Retrieved from ERIC database.

Lee, K. (2009). Technology lecturer turned technology teacher. *International journal of teaching and learning in higher education*, 20(2), 79-90. Retrieved from ERIC database.

Means, B. (2010). Technology and education change: Focus on student learning. *Journal of research on technology in education*, 42(3), 285-307. Retrieved from ERIC database.

Penuel, W., Boscardin, C., Masyn, K., & Crawford, V. (2006). Teaching with student response systems in elementary and secondary education settings: A survey study. *Association for educational communications and technology*, 55, 315-346. Retrieved from ERIC database.

Selwyn, N. & Husen, O. (2010). The educational benefits of technological competence: An investigation of students' perceptions. *Evaluation & research in education*, 23(2), 137-141. Retrieved from ERIC database.

Shapley, K.S., Sheehan, D., Maloney, C., & Caranikas-Walker, F. (2010). Evaluating the implementation fidelity of technology immersion and its relationship with student achievement. *Journal of technology, learning, and assessment, 9*(4). Retrieved from ERIC database.

Shriner, M., Clark, D., Nail. M., Schlee, B., & Libler, R. (2010). Social studies instruction: Changing teacher confidence in classroom enhanced technology. *The Social Studies,* 101, 37-45. Retrieved from ERIC database.

Suhr, K.A., Hernandez, D.A., Grimes, D., & Warschauer, M. (2010). Laptops and fourth-grade literacy: Assisting the jump over the fourth-grade slump. *Journal of technology, learning, and assessment,* 9(5), Retrieved from ERIC database.

Weston, M. & Bain, A. (2010). The end of techno-critique: The naked truth about 1:1 laptop initiatives and educational change. *Journal of technology, learning, and assessment,* 9(6). Retrieved from ERIC database.