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THE UNIVERSITY OF OKLAHOMA

RESEARCH IN FOCUS:

# Technology in the Classroom

## INTRODUCTION

In recent decades, mechanisms for integrating technology into the classroom have become increasingly utilized. A 2003 research survey indicated that more than 50% of teachers use technology for classroom communication, research, and problem-solving (Barron, Kemker, Harmes, & Kalaydjian). Over the last decade the number of teachers using technology in the classroom has continued to increase (Proctor & Marks, 2016). This brief explores benefits of technology integration, important factors which contribute to its successful implementation, and specific technological tools designed to improve student learning in various classroom settings.

## WHY USE TECHNOLOGY IN YOUR CLASSROOM?

Knowledge of the benefits of integrating technology into the classroom setting continues to expand. Research has shown that laptop use in the classroom leads to an increase in just-in-time learning, autonomous or individualized learning, a greater ease with conducting research, and increased empirical investigation skills (Warschauer, 2007). Additionally, student engagement appears to improve through immersive, tablet-based activities (Ward, Finley, Keil, & Clay, 2013). Integrating technology into the classroom also enhances the development of culturally aware students who are able to integrate information in cognitively complex ways (Miller, 2015; Pope & Golub, 2000). Through technology, students in Orlando, Florida, are able to simultaneously read and discuss *The Adventures of Huckleberry Finn* with students in Russia; and students in New York are able to publish a literary magazine with articles written by student authors from around the globe (Pope & Golub, 2000). When used effectively, technology can contribute to student learning in meaningful and important ways.

## FACTORS CONTRIBUTING TO SUCCESSFUL INTEGRATION

*“As teachers might expect, technology use and innovation are more likely to be successful in a school culture that supports the use of technology (Zhao, Pugh, Sheldon, & Byers, 2002).”*

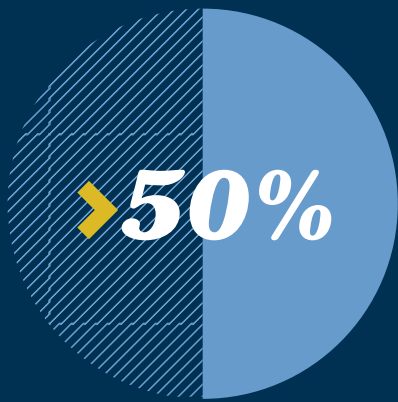
As teachers might expect, technology use and innovation are more likely to be successful in a school culture that supports the use of technology (Zhao, Pugh, Sheldon, & Byers, 2002). Supportive cultures include an adequate technological infrastructure; personal, dedicated technical support; institutional policies and procedures regarding technological issues, purchases, and professional development; and supportive peer networks. Additionally, technology innovations are more likely to succeed if the innovator (the teacher) knows how to use the technology and understands the context in which the technology operates successfully (Zhao et al., 2002). For example, the teacher must not only understand how to use email, but must also understand what is needed to access email (i.e., a device and Internet access).

Teachers who are able to successfully integrate technology into the classroom are typically reflective and flexible and view technology as a means to an end (Zhao et al., 2002). They are able to utilize technology as a tool to facilitate diffusion of the curriculum in a manner which promotes student understanding and growth. Integrating technology into the classroom may seem an imposing task to many. However, Pope, and Golub (2000) remind teachers of a critical lesson: “We will never be completely caught up; we will never know everything. We will constantly learn with and from our students” (p. 92). Teachers are encouraged to learn as much as they can about the technologies they wish to integrate into their classrooms but to keep in mind that, at some point, they must take the leap.

While both school and teacher characteristics are important to the successful integration of technology in the classroom, the technologies themselves also contribute to successful use. Zhao and colleagues (2002) found that innovative lessons involving technology use are more likely to succeed if they incorporate a minimal number of people and locations. For example, lessons that require the students and teacher to participate together in the classroom have a higher chance of success than lessons that require teachers, administrators, and outside technologies.

### Social Studies

Although the research on technology use in social studies classrooms is relatively limited, the available research suggests several advantages to technology integration in social studies instruction. In one study, researchers compared the use of the iPad application Explore 9/11 (National September 11 Memorial & Museum, 2015) to the use of a packet of primary sources taken from the same app (Friedman & Garcia, 2013). The app allows students to take a virtual tour in which they are able not only to read transcripts from primary sources but also to see the images and hear the voices of the survivors. Students who were able to engage and interact with the application itself were more likely to stay on task, work diligently, and remain interested throughout the three-day project. Additionally, students using the Explore 9/11 app seemed to develop a greater sense of empathy and relatability to the survivors of the attack (Friedman & Garcia, 2013).



A 2003 research survey indicated that more than **50% OF TEACHERS USE TECHNOLOGY FOR CLASSROOM COMMUNICATION, RESEARCH, AND PROBLEM-SOLVING** (Barron, Kemker, Harmes, & Kalaydjian), and that number is expected to continue to increase.

Beyond mobile applications, several studies report that commercial video games depicting historical content have been shown to be effective means of engaging students beyond the classroom, especially when used carefully as supplemental material in a soundly designed instruction module (Devlin-Scherer & Sardone, 2010; Lee & Probert, 2010; Squire, 2005; Watson, Mong, & Harris, 2011). Though not supported by research-based evidence, some peer reviewed journals include single-teacher case studies. Teachers report the effective use of technologies such as TV political dramas (Journell & Buchanan, 2012) and UDL Book Builder (Miller & Toth, 2012) in teaching a variety of concepts related to history and government.

### Math

Increasingly, math instructors are integrating technology into the classroom to promote inquiry-based learning in instruction. Longitudinal studies indicate that students who are able to engage with digital game-based learning (DGBL) at an early stage of their education have increased performance and retention in STEM programs during college (Romney, 2011). Additionally, the integration of DGBL in math classes has been shown to increase student performance on end-of-year examinations, decrease anxiety related to studying mathematics, and increase motivation to learn (Huang, Huang, & Wu, 2014; Romney, 2011).

Several researchers argue that problem-posing activities, as opposed to problem solving activities, can enhance students' mathematical learning, creativity, and understanding (Chang, Wu, Weng, & Sung, 2012). Arguably, several forms of technology can play a strong role in helping students develop problem-posing skills. In problem-posing learning, students attempt to develop and solve self-posed mathematical problems. Students receive feedback from their instructors and determine for themselves whether or not their solution is reasonable. They then refine the problems based on feedback and

move on to create new problems. Abramovich and Cho (2015) argue that mathematics instructors can use a variety of technological tools including computer-based graphing calculators, spreadsheets, and various computer software programs to educate students from a problem-posing perspective. Additionally, researchers have established the effectiveness of several educational games in increasing mathematical achievement. For examples of well-researched educational games pertaining to mathematical instruction see Mayo's 2009 article.

The use of technology has also been shown to improve mathematical concept understanding and performance in students with emotional disturbances, students with autism spectrum disorders, and those who are hard of hearing (Burton, Anderson, Prater, & Dyches, 2013; Chou, Liu, Liu, & Yang, 2006; Haydon et al., 2012).

### Science

Students in science classrooms can benefit from a variety of computer simulation activities. Although research on the use of educational games in the secondary classroom is relatively limited (Young et al., 2012), computer simulations used within a lesson context can be highly effective tools for science-related process learning (Bell & Smetana, 2008). Bell and colleagues outline best practices for use of computer simulations, and their recommendations include 1) using simulations as supplemental material, 2) creating student-centered instruction, 3) identifying the limitations of the simulation, 4) and maintaining content as the focus of the lesson. A variety of online simulations are available for free or at minimal cost. For example, astronomy instruction might include the use of the Starry Night virtual planetarium.. Genetics instruction might benefit from the ExploreLearning (2016) mouse breeding simulation. Students can build atoms with the help of a variety of atom builder simulations available for free from PBS and other sites.



## English Language Arts (ELA)

Beyond word processors and the plethora of scholarly research engines available, ELA teachers are finding innovative approaches to technology integration (Pope & Golub, 2000). One pioneering English teacher developed an end-of-the-year project combining traditional texts and a variety of technological tools (Tarasiuk, 2010). She had students read a novel then used Wikis to organize and summarize information from the story, develop characterizations, and enhance student vocabulary. After reading the novel, student groups were tasked with developing a final movie trailer designed to entice others to read the novel. Reportedly, the project increased student performance and motivation in comparison to traditional novel reading, packet work, and a final paper project (Tarasiuk, 2010).

## CONCLUSION

As technology advances, avenues for integrating technology into the classroom continue to increase. Studies show that utilizing technology in a classroom setting provides students with increased motivation, engagement, and autonomy in learning. For technology use to be successful in the classroom, educators need to feel supported by administration, understand the tools they are integrating, and have access to technical support when needed. When a supportive infrastructure exists, both educators and students are likely to benefit from the educational use of technologies such as laptops, tablets, and mobile apps.

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