Factors Affecting Technology Integration in the Classroom

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Abstract

Technology is an integral part of our everyday lives. In fact, students in our public schools are considered digital natives and have become accustomed to always being connected to their devices and the Internet. In 2013, 71 percent of the US population age 3 and older used the Internet (Snyder, de Brey, & Dillow, 2016). Given the importance technology plays in our lives, schools now have a responsibility to integrate it into teaching and learning and prepare students for 21st Century skills and careers (Cakir, 2012; Luterberbach & Brown, 2011). Although classrooms may have access to many technology devices, there are several external and internal factors that affect the proper implementation of technology in classrooms. In preparing students to be college and career ready, technology integration is imperative. This paper will discuss factors such as poor infrastructure, inadequate technology, lack of sufficient technological tools, effective professional development (external factors), low teacher self-efficacy and teacher perceptions (internal factors) that affect technology integration in PK-12 schools.

Keywords: technology integration, self-efficacy, digital literacy, digital natives, 21st-century skills

In today's culture, you will be hard-pressed to find a child of any age not plugged into some form of technology. Students today are considered digital natives and are immersed daily in the world of interactive technology such as mobile phones, iPods, television on demand, and other limitless resources that provide the answer to any question with just a few clicks of a keyboard or taps on a screen. Over the past few years, technology has become a major tool used in just about every career field and has provided educators with a valuable resource to support teaching and learning (Mac Callum, Jeffrey, & Kinshuk, 2014). The traditional model of education with lectures and students sitting in straight rows is no longer sufficient. Schools now have a responsibility to integrate technology into the curriculum and prepare students for 21st Century skills and careers (Cakir, 2012; Luterberbach and Brown, 2011).

Practically speaking, there is an obvious need for students to be prepared to use technology to compete in the 21st-century global economy. Technology is an essential life skill in the workforce. Students who are technologically savvy often have a better chance of getting a job and excelling in their careers (Savage & Brown, 2015). However, the task of integrating technology into classroom instruction in a meaningful and state-of-the-art way remains challenging (Pittman & Gaines, 2015). Although classrooms may have access to technology initiatives, there are several circumstances that affect the proper implementation of technology in classrooms such as poor infrastructure, inadequate technology, lack of sufficient technological tools, effective professional development (external factors), low teacher self-efficacy and teacher perceptions (internal factors). In preparing students to be college and career ready, technology integration is imperative. This paper will discuss those external and internal factors that affect technology integration in PK-12 schools.

External Factors Limiting Technology Integration

Poor Infrastructure

There is a revolution underway in K-12 classrooms as school districts and boards move to adopt a new style of classrooms and pedagogy focused on mobile learning. To succeed, the move to anywhere, anytime learning must be supported by a strong foundation in technology, particularly network infrastructure (Build the 21st Century Classroom, 2018). By focusing on the right technological advances in network management and security from the right vendor, school districts can prepare their classrooms for tomorrow's networking needs. Too often infrastructure is overlooked when making the decision to purchase technological tools and how they will be utilized in the learning environment. When making these decisions certain aspects should be considered such as the range of the devices, duration the device's purpose. Collaborative classrooms require not only furniture grouped to facilitate clusters of learners, but also a strong Wi-Fi signal that assures students of anywhere anytime connectivity for a range of devices (Build the 21st Century Classroom, 2018). Infrastructure can affect Wi-Fi connection and limit internet access to technology devices. Especially, in rural schools and older building without proper power voltage to support multiple tech devices. Only 68% of students say they have Wi-Fi access at school (Pearson, 2015). Hence, school districts would greatly benefit from focusing on the best networking management tools for their system to further prepare classrooms for tomorrow's networking requirements.

Inadequate Technology

From the perspective of learning theory, the integration of technology usage into the classroom serves constructivist and sociocultural principles. According to the constructivist view, learners create knowledge as a result of their interactions with the environment, building on existing knowledge and dependent upon the relevance of the content or instructional activity in their own lives. From the sociocultural perspective, technology provides the platform, and the tools to engage via numerous media with other individuals and groups beyond the immediate reach of the learner (Pittman & Gaines, 2015). There is an obvious need for students to be prepared to use technology. In 2013, 71 percent of the US population age 3 and older used the Internet (Snyder, de Brey, & Dillow, 2016). However, due to limited funds and budgets schools don't have the resources to provide adequate technology for every student. In the Student Mobile Device Survey National Report: Students Grades 4-12 conducted by Pearson (2015) it found that 14% of elementary students attend a school with a 1:1 initiative. However, most students access to technology is through a computer lab (37%) or shared in a classroom (33%). Sixty-two percent of students want to use technology more in the classroom, but the reality is that the resources are just not available. In schools that implement Bring Your Own Device (BYOD), it is assumed students will have the devices to fill in gaps where schools lack the resources. However, only 8% (elementary) and 13% (middle and high) school students bring their own devices to school for personal use. The opportunity to engage broadly and deeply with virtual environments made possible by technology continues to lag in education. The practical applications for learners as they create knowledge for themselves are numerous and growing, as can be evidenced by a simple Internet search on the subject. As districts continually move toward 21st-century classrooms, it is important to bridge the gap between utilization and adequate resources.

Lack of Sufficient, Effective Professional Development

Even with adequate technology access, effective professional development remains a reason that makes it difficult to increase the level of technology integration in classrooms. Little is understood about what these experiences might look like for teachers ''on the ground,'' during implementation of technology-integrated professional development (Wilkerson, Andrews, Shaban, Laina, & Gravel, 2016). Research indicates that simply providing teachers with professional development opportunities related to using technology does not translate into higher levels of integration in the classroom. It is only when they are provided the knowledge, skills, resources, and support that they will integrate technology in the curriculum to maximize its effects on teaching and learning (Papanastasiou, Zemblyas, & Vrasidas, 2003). However, schools are providing technology-related professional development. Technology integration was the second most common topic for professional development (67% of teachers) only following training on a content specific area (Rotermund, De Rocje, & Ottem, 2017). But, of those that participated in training, 59% only received 8 or fewer hours indicating teachers are left on their own with the daunting task of choosing the most appropriate technology tool to support teaching and learning.

Internal Factors that Limit Technology Integration

Low self-efficacy

Self-efficacy is the belief that a person can perform a task to achieve the desired outcome. It is an essential concept of Bandura's social cognitive theory (1977) that affects how you choose to interact with society and your surroundings. Researchers in education focus on the principles of self-efficacy involving performance accomplishment, vicarious experiences, verbal persuasion, and physiological stress (Howardson & Behrend, 2015; Pan & Franklin, 2011). It is predicted that digital classrooms, which involve many technological devices, will improve students' success level. However, without effective technological integration, it is unreasonable to claim it is possible to reach these goals without the necessary online technologies self-efficacy (Ozerbas & Erdogan, 2016). The theory of self-efficacy is "that people process, weigh, and integrate diverse sources of information concerning their capability, and they regulate their choice behavior and effort expenditure according to that information" (Bandura, 1977). We have control over our behavior not control of the outcome. There is also a significant correlation to teacher's use of technology in the classroom with their self-efficacy (Li, Worch, Zhou, & Aguiton, 2015). Due to high demands of student achievement and accountability, if teachers felt the use of technology had a positive outcome on their students' learning it was more likely they would integrate it into their practice. However, if they felt it would not increase their student's performance they would not use it. Another point worth noting, 62% of elementary students feel they know more about technology than their teachers (Pearson, 2015) which may add to some teachers perceived low self-efficacy.

Teacher Perceptions

Despite increasing access to technology in schools, teachers are usually portrayed as hesitant users. They are accustomed to the old standard which can create frustration when trying to shift to a new paradigm leading them to stray away from the use of 21st-century technological devices. Teachers who are not digitally literate, able to understand and use information from a variety of digital sources, will be the ones who integrate technology. They perceive the effort needed to learn the new technology and practicality or value of it as a significant consideration in whether they use it or not (Mac Callum, Jeffrey, & Kinshuk, 2014). This is consistent with other research that found teacher's readiness, or lack thereof, had the highest total effect on whether teachers integrated technology in their classrooms (Inan & Lowther, 2009). Teachers also perceive technology integration negatively due to the amount of time it takes to integrate into the curriculum through additional training and planning. Technology integration requires preparation, classroom management practices, and demands attention that is not normally spent in those areas. It is easier to just remain with the "status quo."

Summary

The integration of technology in the classroom is a multifarious process. One of the greatest challenges for teachers is the link between educational technology innovations, promising practices for teaching and learning and integrating technology with increases in student

achievement (Middleton & Murray, 1999). Successful student-use of technology in education hinges on knowing how to manage technology efficiently and overcoming barriers that come with integrating technology. Simply equipping schools and classrooms with technology is not the panacea for improving student achievement. It would be necessary to conduct a longitudinal study to suggest if the tools used are even effective and then the district can construct a plan to help schools address these hindering internal and external factors.

Self-efficacy plays a significant role in the desire to use such tools in the classroom. Therefore, teachers must be supported and felt that their needs are being met throughout the implementation process. When teachers are not confident in the usage of these tools, they tend to have a lower perception of its value. Hence, the tools will not be used to their full capacity creating an internal barrier. Administration adds to teachers' low self-efficacy by not providing them sufficient amount of professional development. Coupled with poor infrastructure, lack of network bandwidth and a shortage of enough devices for classroom usage may cause teachers to feel discouraged and abandon fully implementing technology into their practice. Furthermore, hindering the students from receiving 21st-century instruction. As schools are moving toward college and career readiness, it is imperative that districts address these barriers, and include them in the process when developing technology plans for new investments and expansions.

As society continues to grow in its use of technology for social reasons it is expected that education will continue to grow in the usage of such tools as well. Addressing these barriers is a step in a positive direction in closing this gap.

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