3-2015

It IS a Small World After All! Blurring Geographic Lines Through Technology

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Disciplines
Education

Comments
Presented at the American Council for Rural Special Education (ACRES) Conference in New Orleans, Louisiana, March 2015.

Also included in 2015 Conference Proceedings.

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Rural and urban schools often experience a digital divide, unable to keep pace with suburban counterparts. Technology inequities include lack of 'tech savvy leadership,' lack of resources and lack of ongoing professional development opportunities. Limited resources call for creative solutions such as community partnerships, and virtual experiences like digital field trips, augmented reality, and on-line instruction. Resources are recommended to help teachers integrate technology into the curriculum to support the varied and unique needs of a diverse group of students.

Introduction

According to a U.S. Department of Education National Technology Education Plan (NETP 2010), technology is a facet of every part of our lives. Subsequently, educators should leverage this and incorporate technology into "engaging, powerful learning experiences and content" (p. 10). The NETP plan recommends technology-powered learning, with the following goals: learning, assessment, teaching, infrastructure, and productivity. It is important that administrators and teachers improve their own technology skills, in order to effectively integrate technology into instruction and classroom management, to support high expectations overall for students.

A Digital Divide

Many rural and urban school districts are still playing "catch up" to their suburban counterparts when it comes to technology. Cheung and Slavin (2012) report while suburban schools have an advantage regarding instructional technology resources and technical support, comparatively, rural schools are at a disadvantage with budgetary constraints, having to do more with less. However, the use of technology provides the chance for educators in rural schools to provide the same opportunities as their suburban counterparts. Redding and Walberg (2012) note that rural school districts often struggle with connection problems, citing limited or inadequate bandwidth capacity, which again can be an obstacle to leveling the technology playing field.

Also problematic for rural environments, there are many families that are less likely to have access to computers or broadband internet connections at home and also "less likely to have the necessary skills and knowledge to meaningfully use these resources" (Ritzhaupt, Liu, Dawson, & Barron, 2013, p. 292). Students are not able to practice and refine technology skills outside of their classroom (Ritzhaupt et al., 2013).

McCollum (2011) declares that low income, rural and minority populations receive scrutiny as technology "have-nots." However, research shows the reverse to be true for African American youth, noting they are accessing the Internet for "gaming, watching videos and social networking at more than twice the rate of young whites" by using mobile technologies like smart phones (Watkins, as cited in McCollum, 2011, para 11). They are also using these devices to complete homework and conduct research. Watkins sees potential for integrating these devices into the classroom. Using applications like *Poll Everywhere* or *Skype*, or using smart phones to look up vocabulary terms, allows students with the technology at their fingertips to engage in content. *Poll Everywhere* is a website where teachers can pose questions and students anonymously text their responses.

However, Watkins cautions that they are by no means getting anywhere near the best digital technologies available. Given these inequities, it is important for educators in rural and urban environments to maximize the resources available to them.

Educating the Educators

21st century students are tech savvy, understanding the role technology plays in their lives. In Project Tomorrow, researchers surveyed 300,000 students, parents, and administrators from all 50 states, and conducted interviews and focus groups to verify the results. The survey indicated that schools limit student use of technology such as cell phones, email, and texting. Over 40% of 6th through 12th grade students polled indicated they saw their teacher as an obstacle to using technology in their classrooms (Project Tomorrow, 2008).

Rural schools are less likely to have "technology savvy leaders" to help teachers learn how to integrate technology into the curriculum, not only recommending technology resources, but suggestions on how to incorporate technology into lessons. In rural schools, 36% do not have full time technology leaders, with 23% not having any technology leader at all. Compared to city schools where 79% have technology leaders, teachers in rural school districts have less training opportunities. Neason (2014) states that rural teachers may have to travel hundreds of miles for technology training opportunities, as they are not readily available to them in their own localities.

Sugar and Tryon (2014) report that many schools do not have budgets that allow for the inclusion of a technology leader. They suggest the use of virtual technology coaches to provide professional development for PreK-12 teachers as they learn how to infuse technology into their classrooms, and to support continued technology integration. The development of professional learning communities can occur within a school or virtually as well. Professional development communities allow for learning, discussing and problem-solving technology strategies where teachers can share ideas and help each other become confident with a wider range of technologies than they would on their own. They assert that ongoing professional development helps to sustain initiatives, and one-dose professional development is not enough to support teachers in their technology needs, promoting a "sustained adoption of knowledge, and buy in from teachers" (p. 55).

Neason (2014) comments that schools have been incorporating technologies like laptops and iPads or tablets into classrooms, and teachers need to be able to teach with them the way

students learn. Neason asserts that technology without training can be disastrous. The provision of a virtual technology leader and virtual technology training can fulfill training needs, keeping educators and students on track.

Limited Resources Call for Creative Solutions

Local partnerships. Rural students need opportunities to explore the world and technologies to be competitive in a global world. Small rural districts often have limited resources, both physical and human (Sundeen & Sundeen, 2013). Kerr (2014) describes a partnership between pre-service teachers and a small rural school district, to conduct a STEM fair. The STEM fair was a final project for local university students who were enrolled in an engineering and technology methods class. The STEM fair met multiple needs. It provided STEM education to an underserved community, career exposure to the students, and teaching experience to the pre-service teachers. Although the fair was open to the public, it targeted the K-6 students who attended the elementary school, and provided a variety of engineering and technology experiences. Each student who attended left with a hands-on project. Materials were donated from a local hardware store, university book store, and a NASA Educational Resource Center (NRC). (A list of NRCs by state can be found on the NRC website). Kerr reports "in subsequent years, the STEM fair team grew to include local conservation groups, preservice teachers outside of Engineering and Technology Education, parent volunteers, and school board members" (p. 8).

On-line K-12 education. Low student enrollment, geographic isolation, financial constraints, and teacher retention are all reasons why rural schools use on-line education to supplement learning or provide additional academic opportunities. On-line learning allows small school districts to individualize instruction to the needs of their student population, and provide additional programs like Advanced Placement. Rural schools utilize on-line education more than urban and suburban schools.

On-line learning, however, is not without problems. The on-line format can be challenging for students particularly since it lacks face to face interaction, and when students and teachers encounter technology problems, it can be frustrating (de la Varre, Irvin, Jordan, Hannum, & Farmer, 2014). Additionally, Barbour and Reeves (2009) note that students also need to be "highly motivated by intrinsic sources, and have strong time management, literacy, and technology skills" (p. 402).

Supporting Learning through Technology Integration

Incorporating technology into curriculum has been a focus over the past decade (NETP 2010). When schools have limited resources, virtual experiences can support content, provide background knowledge, and help support instruction of learners.

Rawson (2014), in his review of the literature on collaboration between science teachers and school librarians, states that "technology tools may be especially effective in teaching scientific thinking and habits of mind. Video games, for example, have been shown to help students develop specialized vocabulary, systems and model-based reasoning, and collaborative problem solving" (p. 24). He also posits that students are accustomed to problem-solving

collaborations within their on-line networks and these practices can move beyond the social realm and into virtual science communities and networks, thus "creating the ideal hybrid spaces where students can connect their personal interests and identities to STEM learning activities" (p. 24). Subsequently, students have access to experiences that might not readily be available at their schools.

Virtual stories and field trips cover a wide range of subjects and are "virtually" available at every developmental level. They can be tailored to the needs of individual learners, used with small groups, or with the entire class. Kirchen (2011) states they allow children to expand their worlds beyond home, school, and their community without having to worry about weather, safety, transportation, or accessibility.

Virtual field trips can support learners before a field trip to build background knowledge, or after learning to extend knowledge. They can provide opportunities to experience places that they may not otherwise have access to. Simulations to augment, not teach content can engage students in ways that lectures can't when hands-on activities are not available. Kirchen (2011) states that when it comes to technology, anything is possible. Students can explore distant lands, learning about the people and their culture, visit different historical periods, or travel under water to learn about whales. They can be pre-developed, or teacher-created using video clips, photos and narration. This flexibility allows for differentiation by learning styles, accommodations and modifications specific to each individual in a class, complimenting learning.

Using augmented reality is an efficient way of supporting students in the classroom. Podcasts, videos, and links to websites can be added to lessons, worksheets or in learning centers. Students who are absent can watch demonstrations, or listen to recordings. Remediation, language translation, and extension activities can be added by simply adding a Quick Response (QR) code or using an application like Aurasma. QR codes are two-dimensional bar codes. QR code generator websites make it easy to add content, and QR code readers are free and can be installed on smart phones, tablets, or any computer that has a camera.

Additionally, the universality of technology can be used to cross language barriers that prevent English Language Learners from actively being involved in the classroom and with their peers, encouraging diversity and cooperation (Hollenbeck & Hollenbeck, 2009). Liu, Navarrete, and Wivagg (2014) investigated using an iPod Touch to support language and content learning with internet-based multimedia resources, provide differentiated instructional support, and extend learning from classroom to home, establishing a better home/school connection. Students indicated they practiced more when they had the iPods, helping them read better and become better oral speakers.

Styslinger, Walker, Lenker, and Fink (2014) encourage instruction to begin in the classroom and end on-line. This can be problematic when students do not have access to home computers. Kirchen (2011) states some activities like digital field trips can be printed and sent home when families do not have access to technology. Learning, in instances when technology is not available at home, can also be extended to the school library or learning centers in the classroom.

Summary

Technology has the potential to enhance academics and level the playing field for students with disabilities and English Language Learners. Students with disabilities may be more inclined and/or comfortable using technology when the rest of the class also has access to similar devices. The advancement of devices and applications has allowed students with disabilities to use every day technologies while meeting their unique needs. As technology continues to change and advance, teachers also need to keep pace, but this can be a challenge without sufficient and ongoing professional development. As teachers become familiar and comfortable with equipment, applications, and teaching strategies, they are more likely to integrate it to create engaging lessons. The integration of technology can enhance student learning when it is used as a tool, incorporated with a purpose, and provided in the context of instruction.

Additional Resources

Art/ Drawing
Weavesilk.com
http://drawisland.com/
http://www.queeky.com/app
http://www.artsonia.com/

Augmented Reality
http://www.aurasma.com/aura/

Geography
http://education.nationalgeographic.com/education/?xpop=1&ar_a=1
http://www.scoop.it/t/geography-education?tag=technology

QR Code Generators
http://www.schrockguide.net/qr-codes-in-the-classroom.html
http://www.qrstuff.com/
http://mashable.com/2011/06/22/qr-code-apps-android/
http://www.free-qr-code.net/top-10-qr-code-readers.html

Virtual field trips
http://www.naeyc.org/files/yc/file/201111/Kirchen_Virtual_Field_Trips_Online%201111.pdf
http://www.educationworld.com/a_tech/tech/tech071.shtml

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