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Research Article

Digital Technologies in Teaching and Learning

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ABSTRACT

Education is changing. Digital technologies are impacting what, where, how and why students learn, and who they learn from. Infusing technology into instruction could methodically address the challenges and provides a platform for transformative effect. However, the many benefits of learning with digital technologies are accompanied by some potential risks for students and schools. These 'digital challenges' are real and present a dilemma to schools seeking to use digital technology to enhance student learning. Many studies of e-learning programs have concluded that the key to ensuring successful outcomes is to blend more traditional classroom approaches with those that use technology. A blended approach mixing face-to-face classroom methods with technology-mediated activities seems to provide the highest learning outcomes. These results suggest that teachers need to develop a model that would include a shared vision, entire school community involvement, specific training for staff and time for the training and time for the staff to communicate and share among peers for technology to be an effective tool in the classroom curriculum. Although technology is not a panacea for all educational ills, technology is an essential tool for teaching (OTA, 1995). To use technology as an effective instructional tool, training and time is needed for teachers to infuse technology into their curriculum. This paper highlights the benefits and challenges of using digital technologies in teaching and learning in the classroom.

Keywords: *Digital technology, e-learning, Blended approach*

Education provides the promise of meaningful employment and a movement towards knowledge-based economy. The building of the knowledge infrastructure base is necessary before the full benefits of the educational investments can be realized. This phenomenal increase brings hope to leapfrog over many of the problems such as a shortage of teachers, school books and low achievement levels, and to train their students in technologies and to have "21st century skills" such as creative thinking and problem solving. ***"Research suggests that simply putting computers into schools is not enough to impact student learning. That***

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said, specific applications of ICT can positively impact student knowledge, skills and attitudes, as well as teaching practices, school innovation, and community services (p.1, Kozma, 2005).”

Technology can help facilitate the knowledge-constructed classroom. A number of researchers (Bork, 1985; Laboratory for Comparative Human Cognition, 1989; Papert, 1980; Ragosta, 1983) views computers as having an influential effect on the teaching and learning processes. They state that with the use of computers in the classroom, schools would become more student-centered and that more individualized learning would take place than ever before. In the student-centered classrooms of today, with the aid of digital technologies, students are able to collaborate, to use critical thinking, and to find alternatives to solutions of problems (Jaber, 1997). This type of teaching requires a change in the teacher’s method of teaching and learning, the amount of time needed to learn how to use the technology and the location of models that work with technology (Sheingold & Hadley, 1990). Negroponte, Resnick, and Cassell (1997) argue: ...that digital technology can enable students to become more active and independent learners. The internet will allow new ‘‘knowledge-building communities’’ in which children and adults from around the globe can collaborate and learn from each other. This shifts the student’s role from ‘‘being taught’’ to ‘‘learning’’ and the teacher’s role from ‘‘expert’’ to ‘‘collaborator’’ or ‘‘guide’’ (p. 1).

The current educational system does not consistently provide students with the skills they need to be responsible, contributing citizens in today’s global community. Many assert that the existing system of educator preparation is not developing teachers with the skills needed to enable their students to be successful in the 21st century. Schools must be transformed from teaching organizations into new kinds of learning spaces, and teachers must be trained in these new learning spaces so they are ready to work in the schools of the future. To create the workforce demanded by the global knowledge economy, we must focus on creating new teachers for new schools. To begin this process, schools of education must go beyond the present paradigm of teacher preparation. Today’s students need educators who have the knowledge and skill to facilitate their participation in a collaborative, Web-based learning culture. They need teachers who know how to create a learning culture that looks and functions like the real and virtual workspaces of today. Such teachers would be able to

- Facilitate and inspire student learning and creativity so that all students achieve in the global society. Teachers must engage today’s digital-age learners to close the achievement gap, so that all students are ready to succeed in college and careers.
- Enable students to maximize the potential of their formal and informal learning experiences. Teachers will work within a technology-empowered learning ecology and must know how to help students orchestrate the resources of this new learning environment to meet their individual learning needs.
- Facilitate learning in multiple modalities. In an open learning ecology, teachers must embrace a greater diversity of spaces, times, resources, media, and methods for learning. Twenty-first century learning environments are synchronous and asynchronous, face-to-face and virtual, local and global. The rapid growth of virtual

high schools and courses underscores the need for teachers with the skills to teach both in classrooms and online environments.

- Use digital technologies to customize learning activities for individual student needs. They will contribute to the continued evolution of these tools and continuously develop their knowledge of how to use them to improve learning.
- Work with their students to co-create new learning opportunities. Teachers must respect their students' abilities to contribute to the work of their learning team; they need to encourage divergent inquiry that goes beyond compliance with monolithic learning standards.
- Be lifelong learners. Teachers must continuously engage in formal and informal professional development to upgrade their skills in a rapidly evolving knowledge and technology-based global society.
- Be global educators. Teachers must empower their students to live and work successfully in a globally integrated community. They must engage their students in learning opportunities that extend the boundaries of the classroom and consistently place knowledge acquisition and skill development in a global context.
- Work with policy leaders as change agents. Teachers should communicate established research-based education principles to colleagues, parents, and society at large to continuously improve the educational system.

In order to produce teachers with the above characteristics, it is necessary to transform schools of education into 21st century learning organizations staffed by teacher educators who themselves manifest the characteristics of 21st century teachers. To make this possible, a digital-age educator must

- Model and advocate 21st century teaching practices and integrate them into the curriculum and instruction.
- Extend the curriculum to include informal learning.
- Prepare teachers to teach in online and blended learning environments.
- Model technology-supported learning communities of peers, faculty, and mentor teachers throughout pre-service teachers' academic experiences.
- Model strategies for addressing the needs of all learners. Future educators must work in learning teams whose members collectively possess a fundamental knowledge of brain-based learning, multiple intelligences, special education law, universal design, and other evidenced-based approaches that are helpful in adapting the curriculum to meet the needs of varied learners.
- Be responsive to changes in the global society.
- Prepare teachers for career-long professional growth.

BENEFITS OF USING DIGITAL TECHNOLOGIES IN THE CLASSROOM

Digital technology in the classroom encourage active learning, knowledge construction, inquiry, and exploration on the part of the learners, and which allow for remote communication as well as data sharing to take place between teachers and/or learners in different classroom locations. This in turn can enable learners to attain higher grades based

on their enhanced understanding. It enables schools to link more effectively with the examination process through computer-based and online assessment processes and improves the efficiency of the system. The other potential benefits of digital technologies are:

1. It can foster dialogic and emancipatory practice
    - Dialogic practice is that in which students are active, engaged and empowered participants in a conversation from which learning emerges. For example, learners working on a maths modelling programme can start to have conversations about what they see on a computer screen without having to rely on terminology that they may not yet have (look at 'that', what happens if you do 'this'?) The teacher can then add the appropriate language into the conversation as the project develops.
    - Emancipatory practice is that in which an individual student's ideas go beyond the learning prescribed by the teacher/syllabus as they draw on knowledge gained outside formal education to construct understanding. For example, in music lessons learners can use their own knowledge and expertise of playing instruments or using technology to construct their own recording environments (perhaps using their mobile phone). They can then bring in ideas that they have created at home or in instrumental music lessons.
2. Different technologies can improve learning by augmenting and connecting learning activities. For example, in a geography lesson two classes in different schools may link up via the internet to explore cultural differences in relation to a particular global issue such as pollution or energy supply. The groups could work together to understand not just the issue itself but its impact on communities and individuals by talking to real people. In situations where bandwidth is limited this could be done at a whole class level via video or even over email or SMS (Short Message Service) messaging.
3. Digital technology can often also be exciting for learners and offers a potentially more engaging alternative. At the same time it is important to be aware that some learners may be less confident in learning with digital technologies and steps need to be taken to ensure equality of access.
4. Digital technology offers immediate feedback for both the learner and the teacher

CHALLENGES/CRITICISMS OF DIGITAL TECHNOLOGIES IN THE CLASSROOM

1. A lot of time and resources are invested into technologies and applications that have yet to be proven to be effective or efficient when compared to more traditional classroom learning contexts.
2. Teachers and schools need to think carefully about when, why and how to use technologies as well as evaluating their efficiency and effectiveness.
3. There is a 'digital divide' - the divide between those who have access to digital technology and the internet, and those that do not.
4. Implementing and then maintaining technology is costly particularly as systems can quickly become out of date.

5. There may be problems with the existing infrastructure, for example internet connections may be inconsistent and/or slow.
6. Safety for students and teachers is a key challenge with prevention of cyber-bullying, the hacking of personal information, access to illegal or banned materials and distractions from learning (such as social networking and mobile phone use) all being high on institutional agendas.
7. Some uses of technologies can be harmful. For example, poor posture and eyestrain are common problems when working at desktop computers for prolonged periods. Also Repetitive Strain Injury (RSI) is a risk that occurs from the repeated actions necessary to control mobile devices.
8. Evidence suggests that at the moment the potential of digital technologies in the classroom is not being realized. A report on digital technologies from the charity Nesta in the UK notes, "What is clear is that no technology has an impact on learning in its own right; rather, its impact depends upon the way in which it is used" (2012:9).

ROLE OF TEACHERS IN USING DIGITAL TECHNOLOGIES IN THE CLASSROOM

Integrating digital technology into the classroom begins with the teacher preparing lessons that use technology in meaningful and relevant ways, using technology to support curriculum rather than dominate it. Technology should assist the teacher in creating a collaborative learning environment and help the teacher transition from the role of facilitator to that of a learner. A major goal is to allow students to use technology, experiment with real world problems and manipulate them to see what different scenarios will do to the problem. Thus, students are able to think about possible outcomes if the variable is changed. So when teachers are trying to integrate technology into their classroom lessons, they can teach the basic concepts and then have the student work with the computer or other technology.

1. Teachers can make the best use of technology in the classroom by developing their awareness of a range of digital technologies and considering carefully both how and why they can be used to support students' learning. Effective selection of software and devices is only part of the story. The consideration of what learning will be achieved and how the technology may help is fundamental to its effective deployment.
2. The SAMR (Substitution, Augmentation, Modification, Redefinition) model developed by Dr Ruben Puentedura is a useful reference when considering the implementation of technology in the classroom. The model (see below) shows the stages that adopters of educational technology often follow as they integrate their teaching and learning with technology.

CONCLUSION

Tomorrow starts today. Technology is capable of unlocking keys of learning. The evidence in this paper shows that technology has a positive effect on student learning expectations and outcomes. To reiterate, technology integration has the following benefits: 1) increased student motivation; 2) increased student engagement; 3) increased student collaboration; 4, increased hands-on learning opportunities; 5) allows for learning at all levels; 6) increased

confidence in students, and 6) increased technology skills. Sandholtz et al. (1997) concluded that the impact of technology in schools is the way to make a positive change in schools to it's a new fad. Steps must be taken for technology to make a difference. Stakeholders of the schools must plan and include everyone at the beginning of the plan, not after technology arrives. Teachers must change the way they teach. Classrooms must take on the student-centered learning methods. Teachers need to become facilitators. Students need to be allowed to use technology as a tool, which will enable them to collect, analyze, and reflect.

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