Chapter 1
Transforming K-12 Classrooms with Digital Technology:
A Look at What Works!

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ABSTRACT

Powerful emerging technologies, data systems, and communications have converged to change how we play, work, communicate, learn, and even what we think. It is fundamentally changing our institutions and support systems, especially our schools and their classrooms. Thus, the teachers that use these classrooms need to also change. If schools and classroom designed for a 20th century industrial age are to survive, then how do they need to be transformed to respond to the rapidly changing needs of today's 21st century students? There is currently much "hype" on what technology can do for students and their classrooms. This chapter explores what the research says works regarding the integration of digital technologies for schools, teachers, and most importantly the 21st century students that today's classrooms are intended to serve. However, with most emerging technologies, the research has not kept pace with the ever increasing advance, so this chapter also highlights some of the promising new technology devices, programs, and educational practices in need of quality evaluative research. By exploring how today's students and their learning needs are being changed by current and emerging promising digital technologies, a personal vision for the reader should begin to emerge on how schools might transform their 20th century teachers and classrooms into spaces, including virtual spaces, that better serve today's 21st century students.

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INTRODUCTION

We are living in fascinating times. For education these times can be both exhilarating and challenging. Education and its current structures are being questioned as never before. Our concepts of what it means to be educated and how the educational process will take place in a new world of technology enhanced lifelong learning is radically changing.

While it may be argued that there is a need for students to physically be in today's schools for reasons other than academics including socialization, child care, extracurricular activities and sports; it is difficult to debate that technology is not having a transformative impact on schools and their classrooms and will continue to do so at an accelerated pace. Moje (2012) proclaims that "the classroom as we know it is dead. It is outdated in helping children meet their full educational potential, and needs to be replaced to better meet the needs of today's students" (p.1). But, what might that transformed classroom look like? Is it more office like with cubicles, open spaces or virtual with teachers and students at home? How might teachers need to change their teaching practices? Will they need to learn to work online, or from a flipped classroom, and/or in collaborative groups? While some research exists to provide guidance on what currently works, in general, educational research has not kept pace with rapidly emerging instructional technologies and practices.

Let's start with a look at how the student who will be using these spaces, virtual or otherwise has changed. We will also explore the use of digital technologies that the research claims does make differences, or at least provides the same results at less cost. In the process several common methodological problems with educational technology research related studies will be acknowledged. Finally, this chapter will explore some of the more promising emerging digital technologies for their potential impacts on classrooms to meet the needs of 21st century students.

BACKGROUND: THE DIGITAL STUDENT

To adapt to overwhelming amounts of information, and continual interaction with visual media and game playing, researchers, Carter (2009), Feinstein (2004), Kandel (2006), and Small and Vorgon (2008), tells us that the newest generation of K-12 students have neurologically changed their brains to try to keep pace and literately see and learn differently than their parents and grandparents, in that they see and remember visual images in place of text. The television is being replaced by computer screens, mobile devices and game consoles as primary sources of information and entertainment (Prensky, 2006). Today's paper textbooks are about to be replaced by intelligent, colorful, multimedia response programs that fit on mobile devices such as iPads, Kindles, smart phones and other digital devices that students are now starting to bring to school (Leneway,2012). According to electronic game designer, Aponte, Levieux and Natkin (2009), "the new interactive games require a decision every 1-2 seconds and rewards every 7- 12 seconds" (p.8). Meanwhile, our schools, our classrooms and our curriculum have remained relatively the same in their assessment practices. In Brain Rules, Medina (2009) said "as a society, we ignore how the brain works and the only scandal is why we're not fixing it. In fact, if you were to envision a large group of students sitting passively in a classroom listening or writing for long periods of time, you would be picturing an almost perfect anti-brain learning environment."

At the same time, recent media attention toward the state of education has multiple hands trying to gain control of our educational systems and the content they teach. Recently, legislation like No Child Left Behind and governmental threats of public sector takeovers has taken much of the power and funding from programs that needed it.

It is clear from this media attention that public education is being attacked by powerful enemies.