

THE INCREASING IMPORTANCE OF  
TECHNOLOGY AND DIGITAL MEDIA IN THE ART CLASSROOM

by

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*To all of the supportive family and friends,  
artists, educators, and creative mentors in my life.*

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# **THE INCREASING IMPORTANCE OF TECHNOLOGY AND DIGITAL MEDIA IN THE ART CLASSROOM**

## **Introduction**

Teachers in all areas of curriculum are currently expected to incorporate technology into the classroom, as a way of engaging learners and providing meaningful experiences that connect learning to the real world. A strong understanding of current and emerging technologies has become a requirement for successful employment in almost any field of work. Research suggests the scope of art education must include a stronger emphasis on technology in order to remain relevant in a world that relies increasingly on visual modes of communication, which are created, accessed, and broadcast using new technologies. This thesis will review the current relationship between art education and technology, the ways technology is incorporated into the art classroom, impediments to the use of technology in the art classroom, and implications for the future of art education, as well as suggestions for the integration of technology into art curriculum.

This thesis will have two parts. The first will be a review of literature related to technology and art education. This part of the thesis will include an examination of: 1) the current state of art education and technology; 2) the changing relationship between art and technology in, and 3) outside of, the art classroom; and 4) current difficulties associated with the incorporation of technology into art curriculum. The second part of this thesis will discuss the implications of the research findings for pedagogical practice.

## Literature Review

Research on the topic of technology and art education often focuses on the benefits and pedagogical challenges of integrating art and technology into core subjects, and while some in the field of art education believe incorporating technology is becoming increasingly important, it is acknowledged that technology instruction in the art classroom is often viewed as an add-on, and is given only a small segment of instruction time for many art teachers in under-funded districts where a focus on math and reading prevails, and computer labs are often booked for testing, practice testing, and for core subject projects.

Though there have been calls to incorporate digital and emerging technologies into art classrooms since at least the early 1990's (Francis, 1993), legislators and school administrators have largely ignored the arts, relegated art education to the bottom of budgets, and failed to consider that visual communication and digital and new media technologies have become an integral part of life in the modern, digital, globalized world. Art education advocates and researchers point to the implementation of the No Child Left Behind Act (NCLB) in 2002, and the resulting emphasis on the subjects of math and language arts, as well as an emphasis on accountability and test scores, as part of the reason art education has been devalued and underfunded, despite the arts being acknowledged as a core academic subject under NCLB (Francis, 1993; Pink, 2007; Gooch and Saine, 2011; Hausman, Ploof, Duignan, & Hostert, 2010; Heilig, Cole, & Aguilar, 2010; Beveridge, 2010; Spohn, 2008). As Choi and Piro (2009) found, when asked where time was cut to accommodate increases in math and language arts instruction, “school districts responded that these increases primarily came at the expense of decreased time in the social studies, sciences, arts, and physical education” (p. 27). Bevins (2011) notes that legislators have started to place a high emphasis on STEM (science, technology, engineering, and mathematics) subjects, which is seen as the best way to improve economic growth in our country

and the global economy (p. 12), while the arts are marginalized. Gouzouasis (2006), proposes that technology and art should be taught together by instructors well-versed in the visual arts. Gouzouasis describes the current state of affairs:

In North America, experienced teachers in the system lack the foundation for teaching an integrated arts and technology curriculum. First, the arts have been overlooked in the delivery of technology curriculum (ISTE 2000 2002; Beaver & Moore 2004) and, second, arts educators are not sought after as readily as technology instructors, whose knowledge of arts is limited. (p. 7)

Gouzouasis (2006) notes that technology instruction involving new media requires integrated artistic instruction in order to be effective and engaging, saying: “In all likelihood, it is no longer possible to merely treat artistic sensibility as a frill or add-on in the development and creation of all forms of new media” (p. 6). High quality, artistic, effective, immediate, and engaging visual communication has become the standard in digital culture.

A lack of concern about teaching the arts and new media visual literacy is an issue in public schools across the United States, as well as in other developed nations such as Australia and the United Kingdom (Flood & Bamford, 2007) where “the art classroom has been slower than others to embrace these new technologies....Allocation of only one or two computers per class of children does not provide an environment conducive to exploration and investigation” (p. 99). By capitalizing on the close relationship between the visual arts and technology, arts educators can show that art education teaches the skills students need in order to participate in the current digital, global culture. Choi and Piro (2009) see an opportunity for art education to prepare students for a competitive global, digital marketplace, declaring that “the arts must reinvent themselves as pathways to help sustain a culture of innovation that is increasingly important in the light of the economic instability that has recently surfaced” (p. 28). Goldman (2012) found that when integrated with technology, arts education is able to “serve unique purposes for instilling participatory, collaborative, discursive and non-linear thinking

skill sets” (p. 70).

Our culture has recently undergone a technological transformation. While there is debate as to *how* art education should be redefined, there is no doubt that it will *have* to be redefined as the relationship between art, culture, and technology becomes increasingly complex. In this section, I will review literature related to (1) the current state of art education and technology in public schools, (2) the changing relationship between art and technology inside the art classroom, and (3) outside the art classroom.

### **Current State of Art Education and Technology**

According to art education advocates, such as members of the Critical Visual Art Education (CVAE) Club (Hausman et al., 2010), art education is at a moment of crisis in which “radical new technologies” and “extraordinary political and economic shifts in culture” demand that approaches to art education move “toward broader, culturally relevant discourse” (p. 370). Hausman et al. (2010) argue that in our current visual culture, everyone is an artist, creating visual content as communication via new media technologies, potentially in a global online community (p. 371).

Francis (1993) completed case studies regarding the interface of art, culture, and technology, in which preservice and inservice teachers worked with interactive image database software, computers, projection screens, videodiscs, and CD-ROMS. At that time in the early 1990's, Francis asserted that art education had been “revitalized by multiculturalism... and the impact of new technologies” (p. vi), and constructed a study in which education students attempted to design and present art-based lessons employing technology, with the goal of promoting multiculturalism. Francis was concerned with positioning art education “as a vehicle for broader social, historical, and cultural education” (p. 3) as a way to give greater influence and validity to art education. In the early 1990's, prior to the current state



of crisis in art education, Francis noted that “the visual arts are in retreat in an era of a faltering economy, a compressed curriculum, and calls for accountability” (p. 6), showing that art education typically suffers greater marginalization in times of economic trouble, such as the current slow recovery from the global recession of 2009.

Art education has failed to redefine and reposition itself despite the call of Francis (1993) and others, and currently faces marginalization and irrelevance as a subject in public schools. Demand for accountability in education reform culminated in the introduction of No Child Left Behind, and the U.S. economy is still sluggishly recovering from a deep downturn in 2007-2009.

Beveridge (2010) notes, “As budgets are cut nationwide, the funding for nontested subjects are affected first, because the majority of resources are directed at the areas that are tested for accountability” (p. 4). Beveridge cautions that when administrators are pressured to stay within bare bones budgets, arts teachers are often encouraged or forced to integrate standardized tested subjects into their curriculum, which could lead to the arts no longer being recognized as worthy of separate instruction, with specific skills and concepts that are valuable and complex enough to be studied for their own sakes (p. 5).

As noted previously, some voices in education, such as Gouzouasis (2006) take the opposite view, espousing the idea that art *should* be taught as an integrated subject to enhance lessons, add art and design sensibility to technical skills, and to motivate learners. Gouzouasis (2006) foresees arts integration specifically with Information and Computer Technology (ICT), while others would include STEM subjects (Bevins, 2011), and standardized tested subjects such as language arts (Gooch & Saine, 2011). Bevins (2011) says that “the future is bright for the liberal arts and STEM, but not as separate, independent disciplines” (p. 12), essentially asserting that since STEM subjects have become a focus for legislators, and thus a focus for administrators, the liberal arts must integrate with STEM if they are

to survive future educational reform. At this time, there is no consensus on exactly how art education should attempt to gain greater validity as a core subject; there is only agreement that currently art education is pushed aside in favor of basic skills and STEM subjects in public schools, where schedules revolve around tested subjects, preparation for tests, and remediation (Beveridge, 2010).

What is clear to many in education, especially in the fields of information technology and the visual arts, is that a special relationship exists between the two, which is not currently addressed or exploited in K-12 education. Tillander (2011) notes that a “new way of viewing” is provided to technology by art and vice versa (p. 40), and that there has been a shift in culture away from the image as something consumed to something produced with the increasing popularity of new media, such as social networking sites, in which image, text, video, and audio are created, collected, remixed, appropriated, modified, and shared among users. For example, an internet meme is “deliberately altered” appropriated content that is spreads virally, “leaping from IP address to IP address (and brain to brain)” (Solon, 2013).

Internet memes are often referred to as simply *memes*, a word coined by Richard Dawkins in his book *The Selfish Gene* (Solon, 2013). The term *meme* was created to describe the spread of an idea, (and may include tunes, catchphrases, and images), which Dawkins compares to the evolution of genes, saying that ideas replicate and evolve in human brains in the same way (Gleick, 2011). When asked how he felt about *meme* being re-appropriated by the internet, Dawkins said, “ 'when anybody talks about something going viral on the internet, that is exactly what a meme is and it looks as though the word has been appropriated for a subset of that' ” (Gleick, 2011).

Gleick's (2011) article includes images and embedded videos that are examples of internet memes that feature Richard Dawkins himself, including one in which his face is compared to the features of actress Emma Watson, which Dawkins suspects to have been enhanced with facial

morphing software, and a video recording of Richard Dawkins speaking at Saatchi & Saatchi's New Directors' Showcase at the Cannes Advertising Festival in 2013, titled *Just for Hits*, in which he ends the speech by playing a video imitating style elements of internet memes, such as auto-tuned repetition of catchphrases and white, all-capitalized, block-letter text with a thin black outline.

While the elements of art and principals of design are largely ignored in the creation of internet memes (often purposefully, both for entertainment value and to mock the original content), the use of appropriation, imitation, and creativity in altering content to convey new messages and make an entertaining cultural or political point, is a process previously used almost exclusively by artists, and is now used by a multitude of participating members in digital culture. Internet memes can reach a global audience in a matter of days, hours, or minutes, spreading “virally” (the popular terminology for the phenomenon is to say the content “went viral”) as they are shared among users of social media. Internet memes may have started out purely as entertainment, but they have evolved into brief, witty commentaries on cultural and political issues using few words and images.

Internet memes, while typically created purely for entertainment purposes, become part of a cultural conversation. There are websites specifically devoted to archiving internet memes, along with descriptions of their origins and appropriated content. The power of the internet meme to reach a global audience is a largely unrealized power by those who create them. However, other entities have started to realize the power of internet meme: political candidates are one such example. Neuman (2012), in an article for NPR (National Public Radio) online, reports that in the 2012 presidential race, candidates and their campaigns were scrambling to control damage done by viral content posted after political debates, or during news coverage in which the candidate or an affiliated party spokesperson said anything that could be mocked via internet meme:

“Memes have become a running commentary on the debates — and the most effective

ones echo long after the debates end, Brewer says. While political memes aren't entirely new, they've caught fire largely because the way we experience debates has changed.

'Many of us are using television, social media, smartphones and tablets all at the same time as we take in the debates,' Brewer says. 'By the time the debate is halfway over, there's already a Tumblr site full of memes.' "

In the current cultural climate, much of the general population, including K-12 students, participates in online environments and shares visual content on a daily basis. However, the art education community, legislators, parents, and even the students themselves do not view this type of visual participation in culture as requiring or benefitting from the input of art instruction, skills, or knowledge of design. Tillander (2008), who completed a study entitled *Cultural Interface as an Approach to New Media Art Education*, remarks, "students in this study often saw the newness of technology as transgressive and explicitly part of their unique [private] culture outside of the institution of school... It was as if infiltrating this teenage cultural place was not welcomed within a school art lesson" (p. 228). Tillander worked with art educators to transform instruction via new media, focusing on digital culture as an entry point of engagement for students, finding that the key to engaging students through culture was incorporating new media ways of participating, sharing, collaborating, and constructing knowledge such as "archiving, annotating, appropriating, and remixing digital content (Lenhardt & Madden, 2005)" (p. 238).

Could it be that the reason art and design is not seen as relevant to online communication is that new media visual content is first and foremost about ideas, while art education in public schools focuses on technical skills and art theory? The common misconception that art is only a technical craft, the precise application of specific elements and principals, an expressionist use of traditional materials, or the beauty of a design, ignores the postmodern art movement all together, which is the reason anyone who does not have a background in art immediately denies that much of contemporary art is, in

fact, art, often with the commonly heard phrases, “*I could do that!*”, “That takes no skill!” or “Why is this in a museum?”

There is a pervasive cultural ignorance about contemporary art, which results in most students believing that art is primarily about learning to create tedious, albeit aesthetically pleasing, decoration, or the narcissistic, meaningless “free expression” of an individual artist. Art educators themselves can be the source of these misconceptions, for as Francis notes (1993) there is tension between “those intent upon teaching the content of art and those seeing it as self-expression”, resulting in art education theories that focus on either the “perceptions and experiences of the child or the student” or “a hierarchical structure where the child absorbs or reflects learning from cultural experts” (p. 17), and in doing so other philosophies of art are ignored, as are alternative ways of creating and thinking that are opened up by technology. Art education must start fully integrating technology into instruction to remain relevant, for as Flood & Bamford (2007) write, “the arts – largely outside formal education – are breeding a growing band of powerful users of ICT [information and computer technology] capable of designing interactive experiences and defining future media literacies” (p. 100).

Another way the enactment of No Child Left Behind reforms has relegated visual art to the periphery of education is in the drive to create lists of standards that can be evaluated objectively. As a result, a higher emphasis is placed on demonstrating knowledge of facts, technical skills, and art history, rather than skills such as creative problem solving, exploration of a medium or idea, and collaborative or conceptual approaches to art. Accountability as an emphasis in art education means that the end product, not the process, takes precedence in the art classroom, since the teacher must use work produced to document that students have gained specific knowledge and technical skills.

From Viktor Lowenfeld, who viewed children as naturally visually creative, promoted “free art expression” and was criticized by some for equating art with play (Francis, 1993, p. 21), to Elliot

Eisner, who first attempted to create a discipline-based art curriculum in the early 1970's (the "Kettering" curriculum, Francis, 1993, p. 24), then later admitted that his approach was too focused on technical skill and did not allow for imagination or teacher creativity in lesson planning (Francis, 1993, p. 25), there has been ongoing debate as to what art education should encompass, how it should be taught, and whether exploration of materials, ideas or technical mastery of specific mediums is more important.

Art education in the recent past, in an effort to be included in legislation for standards and to be given legitimacy as a core subject, has taken the stance that "art is serious", and emphasized that the fine arts require dedication, intelligence, and the development of specialized skills. However, overemphasis of this stance has in fact marginalized art education but making it too serious for the real world, and too removed from everyday life to be relevant. While students may lack the knowledge to use good design and artistic elements in the production of shared online content, they are able to create content with a sense of play and exploration that is often missing in education. Even art education classes that incorporate technology can be dull if the student is simply fed digital information and asked to copy it (Goldman, 2012, p. 65). To take advantage of the way technology engages the current generation, the student must be a creator/producer, and challenged to develop creative thinking skills.

There will continue to be tension between the desire to encourage playful exploration and generation of ideas, and the careful practice and application of technical skills to produce finished work for evaluation, since this tension is part of the creative process itself. However, the current emerging relationship between art education and technology positions art education to take on a new role: teaching students how to effectively contribute, interact, evaluate, and succeed in a digital, online, global culture. Given descriptors such as "digital natives" (Prensky, 2001), "screenagers" (Wilks, Cutcher, & Wilks, 2012), and "iKids" (Unrath & Mudd, 2011), the current generation is able to easily

produce content using technology, but “students lack essential skills in composition, storytelling, and design” (Tillander, 2008, p. 221), as well as the ability to deconstruct visual content to know how it might have been manipulated.

Without a proper “visual education” for “*expression and participation in an increasingly visually mediated world*” (Dinham, J., Grushka, K., MacCallum, J., Pascoe, R., Wright, P., & Brown, N.C.M., 2007), students will continue to navigate online culture as visual illiterates, unable to apply discernment and critically analyze the images and other multimedia content presented to them. Flood and Bamford (2007) write:

We afford very little importance to aesthetic literacy. Future eras will be dominated by multidimensional communication systems, but schools do not see this as vital in the curriculum. The prevailing attitude is that the arts are elitist... nice, but not really necessary! (p. 101)

Now that digital and new media technologies have become part of everyday life in our culture and the global culture, art education has an opportunity and an obligation to be redefined as a subject that embraces technological change, “facilitate[s] contemporary cultural conversations” (Tillander, 2008, p. 239), and to instill “participatory, collaborative, discursive and non-linear thinking skill sets” (Goldman, 2012, p. 70). With this redefinition, art education would become a true core subject in public schools, with access to adequate funding, qualified instructors, and increased number and variety of classes including traditional media arts, design, and technology courses infused with a digital cultural awareness, available to all students as part of an essential contemporary K-12 education.

## **The Changing Relationship Between Art and Technology Inside the Classroom**

The relationship between technology and art education has been in a state of change inside the classroom since the early 1990's, in regards to access to technology, the quality and quantity of technologies available, an increasing variety of hardware and software available to schools, and the digital knowledge of the students and the art education teachers themselves. In addition, technology has changed the thinking patterns of the current generation of students (Prensky, 2001). This changing relationship offers opportunities to address and engage contemporary culture in new ways (Tillander, 2008).

Starting with Francis (1993), who conducted studies of Hawaiian art education students and inservice teachers by designing, teaching, and studying the participants of two classes, in which assigned projects integrated art, culture (mainly as multicultural awareness), and technology into pedagogy, researchers have realized that access to technology is a problem for art educators who wish to use new technologies in their classrooms. Since it was not until the mid- to late- 1990's that technologies such as personal computers and digital cameras became widely available and affordable for the average consumer, Francis' hope that art educators would be able to incorporate technology-based pedagogy was not feasible for almost another decade after the publication of *Working at the interface of art, culture, and technology: Case studies in art education* (Francis, 1993). In the paper, Francis acknowledges that the costs of new technologies (“interactive videodiscs, electronic cameras, and certainly CD-ROMS”) meant that they were scarce in public schools, and that when they were present “computer teachers reserved the equipment for the use of computer classes” and that “the conditions and statistics informally reported on the post-course questionnaire reinforce arguments that access to expensive technology is, or has been used in schools as a means to privilege certain groups over others” (p. 233).



The costs of new technologies have become much less prohibitive since 1993, when most households did not own a personal computer, digital cameras were a brand new (and expensive) market, and the advent of the World Wide Web (or “Web”), and web browsers, which made the Internet accessible to the general public, and thus increased the demand for personal computers (PC's), was yet to come in 1993-1994 (Chapman, 2009).

Laptops and mobile devices such as tablets and smartphones are now commonplace in U.S. households, and are increasingly being introduced into public school classrooms, in some cases they are provided for each and every student in a classroom (Sherman, 2001). Even though initial costs are still somewhat prohibitive when providing students with access to relevant technology, “once equipped there are cost and time advantages; and teachers are using computers as a research, an art-making and a communication tool” (p. 160). Currently, art educators have the most opportunities since computer technology was introduced to schools to embrace it not only as a pedagogical tool, like Francis (1993) suggests, but to integrate the recent digital cultural shift into art curriculum.

Laptop classrooms or laptop schools are an excellent opportunity for art educators to integrate technology into curriculum. As a graduate student completing courses for a visual art certification in teaching, I had the opportunity to observe multiple classrooms in a school district which provides a laptop for each high school student's personal use, for all four years of high school. A year after my observations, the high school laptops were upgraded, and the older laptops were cycled down to the middle schools. Teachers were able to save class time for instructional activities and project working time by placing instructions, rubrics, vocabulary lists, and links to tutorials either on the class web page, in a class folder on the shared drive, or on the class blackboard (educational course content management software program). Instead of asking students to print out papers or images for evaluation, the teachers were able to grade and give feedback from their own laptop or PC. Quizzes

and tests could be taken on the laptops and instantly graded.

One of the most useful ways the laptops were employed was as an all-in-one resource while exploring ideas for art projects. A student beginning a project could have instant access, in one portable device, to all the relevant worksheets, instructions, lecture notes, and tutorials, as well as access to their previous digital work and digital images of their non-digital work, and the Internet as a source of information and image-based research on any topic.

Anecdotally, I remember the frustration of starting a project in my high school art class by trekking down the hall to the library, searching for books under a few topics from my brainstorming list, hoping they were not already checked out, taking the books back to art class, discovering that I needed to research in a different direction, walking back down the hall to the library, returning the books, searching for more, and taking them back to class, until I found enough quality source material to get started; the entire process usually required at least one entire class period for research to form an idea. It was particularly frustrating to me as a “digital native” (Prensky, 2001) who attended high school from 2001-2005, to not have access to the Internet as a resource in my art classes. The only computer in our art classroom was the teacher's workstation, which we were occasionally allowed to use, one student at a time, for very specific purposes, such as creating a slideshow portfolio of completed artwork at the end of the year.

While purchasing a laptop for every student is not possible within the conservative budgets of many school districts, a technologically rich environment is required in order to give adequate instruction to students in the digital age; “the advent of the computer age and more specifically the widespread use of the internet has present[ed] both a great opportunity but also a set of unprecedented challenges... resources need to be put in these programs and projects not because we're going to be cutting edge, but just merely keep our heads above water” (Houston & Grana, 2005/2006, p. 40). As

teachers are increasingly asked to integrate technology into instruction, students must be offered a “broad palate of forms with which to explore their ideas... to provide them with the means to function completely in this increasingly technological world” (Flood & Bamford, 2007, p. 99). Schools districts must distribute technology in a manner that makes them accessible to all students and all subjects. Bamford and Flood (2007) also note that one of the reasons the art classroom has been slower to embrace new technologies is that art departments are the last to receive designated computer labs and new technology (p. 99).

Buffington (2010), observes that starting as early as 1967, classrooms have not kept technological pace with students' home lives, saying “keeping teaching practices fresh is always a work in progress” (p. 12). Buffington focuses on Web 2.0 technologies: internet-based media that represent “the Web's transition from a 20<sup>th</sup>-century information repository, to a 21<sup>st</sup>-century dynamic, interactive, participatory, and content-sharing environment” (p. 4), which include social media such as podcasts, blogs, the ability to tag content into categories, social bookmarking, and social networking, as a ways to engage students. These Web 2.0 media are largely available without the purchase of expensive software programs or new gadgets, making them ideal for the art department with a small budget. Buffington focuses on podcasts, which “emerged from the idea of audio blogging” (p. 12) as instruction tools, primary sources for research, and even an opportunity to create a multimedia project with advanced students. A podcast can be an audio-only or multimedia file that includes images or video, is shared via the Internet, and can be easily created on a computer “with Internet access, a microphone, and sound editing software ... GarageBand (Mac), Adobe Audition (PC), or Audacity (cross-platform)” (p.12).

According to Buffington (2010), the benefits of using podcasts as instruction tools include acknowledging and utilizing “the tools of twenty-first century artists” (p. 13), giving students control

over the speed of content and ability to access the content anywhere with an internet connection, access to primary source material such as interviews with artists, art historians, and art critics (p. 13), and to potentially allow students to participate in the collaborative creation of a podcast conversation that is “casually rehearsed” but still delivers information (p. 14). Since most or all of the software needed to produce a podcast is available at no cost, either as a free download or as part of the standard software installed on computers and laptops, Buffington makes a strong case for the use of podcasts in art education.

With the explosion of visual- and technology-based design fields such as graphic design, digital animation, web design, digital photography, multimedia content design, digital video production, and game design, the cultural value placed on visual communication is high, and the value placed on technological knowledge and exploration must be high for those in art education. As Prensky (2001) notes, digital natives prefer graphics first, then text or lecture as explanation and elaboration, the opposite of traditional teaching methods which often use sparse graphics to elaborate or clarify after giving the information, or interspersed with long blocks of text (p. 2).

Prensky's (2001) article *Digital Natives, Digital Immigrants* describe what students born since the late 1980's/early 1990's, have experienced as the first generation to attend K-12 as “digital natives”, specifically that the education system still operates largely on pedagogy and educational ideals that are no longer relevant, and often counterintuitive, to how students best learn. Growing up with access to hypermedia in their own homes, and increasingly on personal mobile devices, “digital natives” think differently than previous generations. Current students prefer to learn through fast-paced, non-linear access to information, rather than a scripted, slow, step-by-step process that “digital immigrants” (those who learn to navigate the digital world after reaching adulthood) tend to use to learn new information and skills. Prensky (2001) writes:

“It's very serious, because the single biggest problem facing education today is that *our Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language...* Digital Natives are used to receiving information really fast. They like to parallel process and multi-task. They prefer their graphics *before* their text rather than the opposite. They prefer random access (like hypertext). They function best when networked. They thrive on instant gratification and frequent rewards. They prefer games to 'serious' work. (Does any of this sound familiar?)” (p. 2)

Prensky goes on to describe indicators of a digital immigrant's “accent”, which is seen in a strong preference for in-person interaction, verbal communication, seeing an object itself rather than a digital reproduction, and preferring to store physical copies of information rather than use digital management (p. 2). Printing emails or documents to edit them, instead of reading and editing on a screen, is one such example of a digital immigrant's accent showing that they either do not trust technology, are not comfortable with technology, or simply do not take advantage of technology's efficiencies in ways that are natural for a digital native.

Prensky (2001) also notes that the attitude of a digital immigrant teacher plays a role in how successful he or she will be in teaching digital native students:

Smart adult immigrants *accept* that they don't know about their new world and take advantage of their kids to help them learn and integrate. Not-so-smart (or not-so-flexible) immigrants spend most of their time grousing about how good things were in the 'old country'” (p. 3).

Prensky's suggestions for teachers who need to assimilate into digital culture will be included in the section Implications for Pedagogical Practice.

Taylor and Carpenter II (2007), support Prensky's (2001) view that “digital kids” are used to fast-paced ways of seeking and viewing information, describing most North Americans under the age of 25 (as of 2007) as knowing a “digitally mediated existence as standard” (Taylor & Carpenter II, 2007, p. 84). Taylor and Carpenter II (2007) also note that “digital kids do not need instructions or

tutorials for computer software, equipment, or games” (p. 85), echoing Prensky's (2001) observation that a sign of a digital immigrant is “reading the manual for a program rather than assuming that the program itself will teach [the user] to use it” (p. 2). Taylor and Carpenter II (2007) also note that in a Virginia survey of 23 3<sup>rd</sup> through 5<sup>th</sup> grade teachers assessing their comfort using computer technology:

...most used e-mail and printed documents but few were comfortable creating PDF's, transferring digital video and still images from digital cameras, or uploading files to a server... fewer than 50% of these teachers were comfortable doing the kinds of tasks necessary to respond to the types of assignments and activities we know to be meaningful, constructivist learning activities for students. (p. 88-89)

The issue of teacher training and support is still valid, seven years later, as there are still many digital immigrant teachers in the classroom who fall somewhere on the spectrum between digitally illiterate, interacting with technology as little as possible, and those willing to learn new technologies and new media literacies as their time and support from their administration permits (Ching-Chiu, 2011, p. 12). Even though Sherman (2011) reports that the laptop classroom outcomes have a positive impact on teaching and learning, Taylor and Carpenter II (2007) reiterate that “having the technology is meaningless without the training and support for teachers to use it comfortably and effectively” (p. 89).

Support may not have to come solely from the top down, though it is certainly a requirement for successful technology integration in a school. It has been over a decade since Prensky (2001) observed the behavior of digital immigrant teachers and noted that a change was due. Teachers currently completing certification programs and entering the workforce are digital natives, their numbers increasing every year. Not only will these new teachers understand digital culture and new technologies intuitively, using them often as a tool, resource, and source of inspiration, they also will be able to share their knowledge with their digital immigrant coworkers – if there is an open attitude of collaboration, willingness to learn, and respect on the parts of both the veteran teachers and their younger colleagues.

Ching-Chiu (2011), examined the case of Newark Community High School, where the integration of technology into every classroom was strongly encouraged and supported (p. 12). The art teacher at the high school stood out as a technological leader for the school, teaching technology workshops to colleagues (p. 16). After being hired with minimal knowledge of digital art programs or website management, and with enormous support and encouragement from the school principal in terms of funding and approval for the purchase of new software programs, William Blidy is “a one-man visual arts department” that encompasses computer graphics and multimedia, as well as serving as Webmaster for the school website and managing the school art gallery and art class blog online (p. 13). Ching-Chiu identifies “deep ties between art education and technological innovation in teaching” and finds that research on the subject suggests “employing art teachers as school technology leaders” (p. 16).

Ching-Chiu (2011) proposes a technologically integrated “school ecology” where there is an institutional, pedagogical, and organizational emphasis on collaborative integration of technology; “within this model, the understanding of technology moves beyond its function as a *tool* to highlight its *social practice* that involves human interaction and collaboration served by technology” (p. 16). At Newark High School, Ching-Chiu found that the staff and faculty embrace the immersive technological experience and “covey to their students that technological competence is imperative in both society and the workplace” (p. 15).

The collaborative nature of the environment at Newark High School was not limited to teacher-to-teacher interactions. Ching-Chiu (2011) notes that William Blidy, the art teacher, modified his instructional strategies to include collaboration with his students in technological “knowledge production”:

I have observed that in his teaching technology-infused art curricula, Blidy shifted from being the sole source of knowledge about content and media to sharing expertise and authority with students...he encourages art student involvement through the exploration of software programs. (p. 14)

While Blidy does not introduce a software program without first exploring and practicing the basic skills in order to teach it, he also tells students that he is learning the program along with them in class (p. 14). This type of student-teacher collaboration in constructing knowledge is the type of transformational change needed in education for the digital age, and art classrooms are an ideal place for creative exploration, collaboration, and problem-solving.

Goldman (2012) offers the perspective that hypermedia, specifically the web page content or software programs that organize access to information in a similar manner, with instant, random access, and hypertext links, are “truly beneficial to the art making process... experimental, experiential, intuitive and highly personalized” (p. 10). Goldman proposes that hypermedia learning environments can encourage self-regulating skills, richer scaffolding of knowledge, and learner-centered instruction with greater flexibility and freedom, and bring in “multiple voices and perspectives” (p. 10). Hypermedia learning puts the student in control of how to make sense of content, and this is highly compatible with visual arts learning, which requires exploration and experimentation. Hypermedia could even be said to promote constructivist learning by offering multiple viewpoints, “access to large knowledge bases” and a “high level of learner control” (p. 18-19).

Gouzouasis (2006) also notes the strong relationship between the visual arts and technology education, comparing digital media to traditional artist tools “as extensions of the human mind” (p. 8); part of his observation that new media require artistic sensibilities. Saying that it still takes “years of study and learning to become an artist”, despite the fact that almost anyone can learn to create digital visual content, (p. 8), Gouzouasis argues that art must be integrated into technology education. Indeed,



with the ever-changing, ever-faster pace of new media and technological innovation it is short-sighted to suggest that isolated study of either art or technology will prepare a student for the “diverse spectrum of thought and praxis that exists in an arts-inclusive reality” (p. 8) of a digitally mediated world. Concluding that the contemporary world values “conceptual mastery over application of skill” (p. 8), Gouzouasis claims that this new area of “integrated art and new learning technologies requires teachers with strong conceptual understandings and background in the arts” (p. 8), and that the arts must be given a “primary role” in a technologically integrated educational environment (p. 9).

The relationship between art and technology in the classroom has changed greatly in recent years, and is still in transition as art and technology educators have started to see strong links between their subjects. At this time there is no consensus on the best way to integrate art and technology education, or what the practical implications of such a convergence of subjects will mean for future curriculum development. However, it is clear that at the moment arts educators must advocate for greater influence and consequence as a core subject, on the basis that the arts are uniquely qualified to integrate new media technologies into instruction, and uniquely qualified to teach students how to apply creative problem solving within new technologies.

### **The Changing Relationship Between Art and Technology Outside the Classroom**

Changes in art instruction inside the classroom have been identified and discussed, and researchers agree that there must be a further broadening of the art curriculum in regards to digital art and new technologies. Amid calls for the greater use of technology across all subjects, art education has been revealed to have a unique connection to technology that is the result of the close relationship between art and technology in the “real world” outside of the classroom walls.

The generation dubbed “digital natives” (Prensky, 2001), is made up of students who have lived

their entire lives in a visually rich, digitally mediated world. Francis (1993) points out that visual media communication of social, cultural, and political ideas started with the advent of photography, long before computers turned our culture to digital modes of visual representation (p. 10), yet art education has been slow to integrate new technologies or offer digital arts classes as an essential art medium. Education in general does not address the fact that today's students need instruction in visual communication, digital literacy, and design just as much as they need to be able to read and do basic math. As revolutionary business writer, Daniel Pink said in a 2007 interview, “what really matters is the sorts of thinking that the arts engender... big picture thinking, symphonic thinking, design thinking. That sort of cognitive ability is what these kids are going to be doing for a living” (p. 8).

Pink (2007) also says that one of the exercises from his book that educators have adopted is writing “mini sagas”, which are stories with beginning, middle, and end, told in just 50 words as a challenge (p. 13). The concept of this challenge is no longer novel, since the rise in popularity of the social networking site Twitter ([twitter.com](http://twitter.com)) around the same time as Pink's 2007 interview. Twitter allows users to post brief messages of only 140 characters from a mobile device, which can be read by anyone who visits the site. The popularity of Twitter lies in the networked instant sharing that is possible, in addition to the challenge of crafting a witty, entertaining, and often culturally coded message.

Twitter represents just one of numerous websites and *apps* (small programs run on a mobile device, often for the purpose of updating a profile or posting content to a corresponding internet social media site via a streamlined interface designed specifically for mobile devices) that people use to connect and share content online. A discussion of social media at this time must also include Facebook ([facebook.com](http://facebook.com)) and YouTube ([youtube.com](http://youtube.com)).

Facebook is a social networking site where users create personal profiles and add *friends* (other

people who have created profiles), share multimedia content, post *status* (text-based) updates about their lives, archive a timeline of life events and digital photo albums, upload mobile multimedia content, and post comments, links, or content on the *wall* (home page) of friends' profiles. Facebook is similar to an online, public scrapbook shared fully with all the user's friends, or filtered so that certain groups of friends can see specific content.

YouTube is a video-based content sharing site, in which users create a profile and upload videos. Other users may post comments, if comments are “enabled” by the poster, and videos can be up- or -down voted with the click of a button. Recently, YouTube has become saturated with *vloggers* who post *vlogs* (short for “video blog” - “blog” comes from the original term “web log” which is a text-based online personal journal or topical commentary with regular updates), create a YouTube channel and upload episodic videos of themselves facing the camera discussing topics of interest to them and their *followers* (those who subscribe to their channel and follow the updates). Vlogs are often enhanced with music, sound effects, animation, still photography, camera tricks, and digital art, and the video on YouTube is embedded in the vlogger's personal web page alongside a text- and/or image-based entry.

Outlining the major functions of just two of the most popular social media websites shows that new vocabulary evolves quickly as people find new ways to share ideas, entertainment, and details about their lives online. Increasingly, this social media sharing involves visual multimedia content, and these outlets are also now used by businesses, artists, and non-profit groups to remain competitive, reach more people, and maintain a reputable online presence. Even small local businesses must be accessible online in the digital age, and most now maintain a website and a *Facebook page*, which is a business or group profile that can be *liked* by Facebook users (which means that the user will receive messages and updates about the business as they are added, and other users will be able to see the list

of businesses to which their friends subscribe).

Sweeny (2009), explores the impact of social media and the networked identity on art education, noting that social media brings up questions of authenticity, authorship, and authority that continue the conversation at the core of modernist art, which still dominates art education (p. 201). Touching on tagging, the mash-up, blogs, wikis, social networking sites, and simulated environments, Sweeny discusses the implications, potential uses, and limitations of social media in art education. Sweeny places importance on the users' ability to produce and share content, calling it empowering, but also warns that critics have observed the “digital collective” to be “equally uncontrollable...at worst a digital version of mob mentality” (p. 202). This critique supports other researchers' calls for visual and media literacies to be taught the era of the networked identity.

Sweeny (2009) found that in discussions of Web 2.0 technologies, their visual qualities often are ignored in relationship to their social impact, even though social media is image-saturated and visually stimulating (p. 203). Sweeny recommends that art educators begin the discussion, and start to consider incorporating new media into the classroom as a way to both engage students and to equip them to participate and navigate through digital culture with discernment. Teaching students to be savvy and skillful users of social media is a relevant goal, since social media sites such as YouTube have the potential to launch and end the careers of many people, from web personalities to Senators (Sweeny, 2009, p. 205).

The exponentially quickening pace of the evolution of technology and new media means that it is difficult to predict what new technical skills and competencies will be needed for participation in society as an individual, entrepreneur, businessperson, artist, musician, designer, or any type of job seeker. However, the relationship between visual arts and technology will certainly continue to grow closer as new technologies and forms of communication seek to become more streamlined,

entertaining, expressive, efficient, and universally accessible to the global, digital culture.

Taylor and Carpenter II (2007), and other researchers (Pink, 2007; Unrath & Mudd, 2011; Heilig, Cole & Aguilar, 2010; Spohn, 2008), refer to the ideas of business writer Daniel Pink, specifically in his book, *A Whole New Mind*, (2006), in which he posits that the world now increasingly demands leaders and creators who are “empathizers, pattern recognizers, and meaning makers” verses the technologically skilled code writers, contract drafters, and number crunchers (Taylor & Carpenter II, 2007, p. 84). Taylor and Carpenter II (2007) define “digital mediation” as “not one media form, but a series of convergences – combinations of technologies and forms of the real and unreal” (p. 87), saying that current students have lived entirely digitally mediated lives (p. 84), and that in addition to expecting faster-paced styles of instruction, and processing information differently (p. 84), they have a need to learn visual and media literacy, in order to interpret and communicate effectively within a culture that relies on powerful images, words, and sounds (p. 87). Taylor and Carpenter II (2007) are convinced from research that these literacies must be taught in art education:

We believe strongly that students must develop critical viewing practices of popular and visual culture and learn how to deconstruct cultural identity representation in the mass media if they are to become informed citizens of this democracy. (p. 87)

Tillander (2011) supports the idea that the arts and technology outside of the classroom have come together to create new art forms and visual skills that must be addressed in arts education. “As communication technologies offer a powerful union with creative and imaginative expression, the breadth of these technologies offers opportunities for creative synthesis and hybrid forms of information representations” (p. 40). In addition to acknowledging art education's obligation to teach visual literacy now that contemporary information technologies have allowed more of the general population to become “active participants and co-creators”, Tillander states that art instruction must consider frameworks that “promote agency and control” (p. 40).

Tillander goes on to emphasize the importance of an technology-inclusive arts curriculum by describing the work of artists in the real world (Harold Cohen, Katerie Gladdys, Krzysztof Wodiczko, Tim Tate, Mary Flanagan, Jill Magid) who explore new media with “innovative uses and misuses” of technology, uncovering “technology's hidden possibilities” (p. 41), concluding that innovation and creative design require an artistic process that promotes self-guided and peer-based learning (p. 41). The integration of technology into the art classroom encourages creative exploration and discovery of new uses of technology in regards to art and visual communication, and a purposeful inclusion of contemporary new media artists in the art curriculum brings relevance and legitimacy to the types of visual communication that saturate students' lives.

Choi and Piro (2009) also recognize that art education must be redefined by new literacies and 21st-century skills such as digital literacy, media literacy, inventive thinking, critical thinking, problem solving, collaboration, creativity, cross-cultural expertise, and “a continuum of social and personal skills”, and emphasize that “the engine propelling many of these shifts is globalization” (p. 28). Citing a report released by the Partnership for 21<sup>st</sup> Century Skills in October 2007, Choi and Piro (2009) find that “respondents believed that schools were not keeping pace with educational needs” including “the building of imaginative capacities” and other creative skills (p. 28). Also citing a poll by Lake Research Partners and the Arts Education Partnership in January 2008, the researchers found that “the common thread of these results is that Americans are optimistic about the power of imagination and believe this is a critical skill needed to deal with the challenges of the present century” (p. 29).

Choi and Piro (2009) also outline a project with which both researchers are involved, called the Rembrandt Program, which is a curricular fusion of visual art with social studies and technology (p. 30), and conclude with the following recommendations: the adoption of digital resources as primary, or equally as valid as textbooks, the emphasis of multiple perspectives when studying art works, a primary

focus on imaginative skills for creative and critical thinking, and digitally-based instruction with up-to-date and emerging technologies (p. 32). Choi and Piro also recommend that art educators emphasize the arts' unique ability to teach technological skills for the twenty-first century, with arguments such as “learning to parse new media forms is imperative for students to learn to function as citizen in the information age”, and “the arts will be not only desirable in helping us negotiate the digital age, but indispensable” (p. 32).

Flood and Bamford (2007), also explore the topic of digital culture and art outside of the classroom, proposing that since students are now experiencing more events through media instead of firsthand or from eyewitnesses, they must be taught to evaluate and analyze underlying messages and to understand how visual communication is manipulated:

when visual symbols are used instead of words to express ideas or evoke feeling or moods within us, it is important viewers are able to understand the messages...the role of images has become one of persuasion and instantaneous impression drawing heavily upon the social and attitudinal stances of viewers. (p. 97)

The researchers identify the main modes of communication in the digital world as linguistic, visual, audial, gestural, and spatial, saying “the arts along use all these forms interchangeably and simultaneously” (p. 100).

According to Flood and Bamford (2007), education currently ignores visual literacy, and as a result the general population does not know how to discern between honest or dishonest visual communication, identify the reasons certain images and symbols are used, or the ways in which cultural norms are reinforced and perpetuated (p. 101). In addition to teaching students these visual literacies, art education can teach students to “apply and manipulate current technologies to explore and investigate contemporary issues and ideas” (p. 101), which the researchers suggest will promote problem solving skills as well as “visual reasoning skills” (p. 101).

While exploring the possibilities of creating podcasts for art classroom instruction, Buffinton (2010), notes that podcasts are already used successfully by art museums and educational programs outside of the classroom in both physical and digital spaces (p. 11). Podcasts are used to create multimedia digital stories with audio, visual, video, and text-based content, often as a first-person narrative (p. 12). Other common uses of podcasts include lectures, radio shows, or tutorials (often serialized and automatically sent to a subscriber of the content). Today's students expect access to this type of archived content via the internet, whereas past generations would only have access to a radio show if they were able to tune in at the time of the broadcast. With the popularity of multimedia podcasts as a way to create, archive, access, and share information, it would be beneficial for students to learn how to create podcasts for themselves. Buffinton (2010) outlines the process complete with suggestions for maximizing the quality of the podcast and engaging the intended audience.

Reiterating the need for art education to embrace technology, specifically new media, Bastos (2010) finds that “imagery has come to characterize everyday life in a historically unprecedented way” (p. 4), and recognizes the importance of Web 2.0 technologies, which brought culture into the digital age by making the internet an interactive environment of content sharing and participation (p. 4). As research shows, there is no question that digital culture relies heavily on visual means of communication, or that students must be taught visual and media literacies in order to successfully participate in the digital, global, visual-based, multimedia-saturated environment in which they live. Therefore, art education is uniquely suited to the integration of technology into the classroom, and must become a core component of technology instruction.



### **Difficulties Associated with the Integration of Technology into Art Curricula**

While researchers agree that technology must be integrated into the art classroom, there is no consensus as to how this goal should be accomplished. Problems include the marginalization of the arts as a subject in the age of accountability and high-stakes testing, the attitudes of administrators and teachers toward art and technology, funding and accessibility to current technologies in the classroom, inservice and preservice teacher technology training, and support from administration and colleagues.

Goldman (2012) studied the use of hypermedia in the classroom, and attempted to understand teacher attitudes toward the use of technology, particularly in relation to arts education. Goldman (2012) collected data using semi-structured interviews with six participants including educators and published authors in either digital media or hypermedia learning (p. 39). Goldman found that educators with backgrounds in technology, such as video and film studies, were not intimidated when asked to use technology in the classroom (p. 50), and that educators with artistic backgrounds in technology placed a high importance on “the effort of remaining educated on new and emerging technologies” (p. 51).

If participation-based assignments using technology, such as discussion groups, are not graded, students do not participate (Goldman, 2012, p. 55), which is a reminder that teachers should not expect technology to be engaging by default. Technology is a tool that can be used skillfully to engage learners, but it is not guaranteed to engage them by virtue of being a digital task, especially now that students are competent in a range of emerging technologies. By the time a technology is deemed useful for the classroom, it has been around long enough that it is no longer novel to most students. In addition to an attitude of continually seeking up-to-date technological knowledge, art educators must have the time and support to receive training in teaching practices for advanced technological inclusion (Goldman, 2012, p. 51). Multiple participants in the study agreed that there is a lack of training in the

use of relevant technologies in instruction, one saying, “ 'I think we are doing a really poor job of training future teachers' ” (p. 52), another wondering, “ 'how do you train these folks to immerse themselves in this kind of environment and then to actually teach effectively using these tools' ”? (p. 52).

Goldman (2012) also notes that frustrations such as eyestrain, not understanding how to navigate the media, and restlessness from sitting and staring at a screen make hypermedia less engaging for some learners (p. 20), and that in order to benefit from access to hypermedia environments, teachers must be trained to focus on multiple learning styles and student motivation to “be able to see benefit or value in [hypermedia learning] activity” (p. 67). Finally, Goldman (2012) calls for future research to focus on successful learning outcomes from the use of hypermedia, in order to support the use of hypermedia and new media, since at this time there is “not an established practice or theory yet for educating technical strategies in the visual arts” (p. 67).

The challenge of teacher attitudes and willingness to explore technology is noted by Francis (1993) who observed in her case studies that “one challenge offered to teachers by non-linear, interactive databases is to develop an inquiry-based curriculum, supported by an investigative approach to learning” (p. 197), and that “many of the [preservice and inservice teachers] in the two sections of this study tended to superimpose their prior conceptions of learning and teaching onto the nonlinear multimedia classroom environment. This was particularly true of the mature professionals...” (p. 195).

To use Prensky's (2001) terminology, the teachers in Francis' (1993) study were “digital immigrants” (even the preservice teachers at that time), and they were trained in a linear, sequential approach to instruction and learning, which was at odds with the new technologies Francis introduced in the study. As Prensky (2001), Taylor and Carpenter, II, (2007), and Unrath and Mudd (2011) address, the problem of teachers relying on traditional instruction methods rather than incorporating

instruction informed by the nature of digital media, has not ceased to be an issue, and that as a result “the path that we, as educators, have traveled thus far in terms of our instructional practices still seems detached from the reality of what it means to be a young person in the 21<sup>st</sup> century” (Unrath & Mudd, 2011, p. 6).

Teacher attitudes are explored “as both a barrier and a facilitator” to the implementation of technology into the classroom by Radclyffe-Thomas (2008, p. 158), who found that even though research has started to address the integration of information and computer technology into education, “their creative possibilities have not been sufficiently recognised or developed” (p. 159). The researcher finds that this attitude of reluctance toward technology integration, as well as an ignorance of the creative possibilities of technology in the arts, stems from some teachers' uneasiness with computers, who feel that extensive student computer use is like cheating because “the computer does too much for the student” or “is a barrier to students' artistic expression” because it students tend to incorporate more found images than in traditional art instruction, and experimentation or exploration in early stages of a project might not be as obvious in technology-informed student work (p. 160).

Radclyffe-Thomas (2008) also cites initial hardware costs as a barrier to technology integration (p. 160), as well as teacher lack of confidence with technology, sufficient time to learn how to use technology, and understaffed technical support teams, which results in technical problems that lead to frustration and an abandonment of technology-based projects (p. 163). Often, “sole enthusiast teachers” are responsible for exploring and developing relevant curriculum in the digital arts (p. 163). These teachers are often hired to teach a narrowly defined set of digital media classes, available to only a small segment of the student population. These teachers might also serve as support and technical IT staff for colleagues (Ching-Chiu, 2011). A further issue of time constraints, is the fact that “to be valued by students, course-related websites need updating” (Radclyffe-Thomas, 2008, p. 164), so that

digital art teachers are often solely responsible for managing the school's art department web presence as well (Ching-Chiu 2011). Describing the “make-do manner” of the operation of “Cinderella” art departments, Radclyffe-Thomas (2008, p. 163) illustrates the problem of art education coming last on the list for access to relevant technologies, “working with resources unsuited to the specific requirements of their curricula” (p. 163).

Unrath and Mudd (2011), who call the 21<sup>st</sup> century students “ikids”, identify the main factors keeping art instruction from changing to match the needs of these students: funding issues, high-stakes testing resulting in the marginalization of the arts and interference with instruction time devoted to art curriculum, the fear of the unknown, and comfort in doing things the way they have always been done (p. 11). “We all know that if we always do what we've always done we'll get the same results. What is becoming increasingly clear is that these results are no longer adequate” (Unrath & Mudd, 2011, p. 11). The researchers conclude that unless educators want to make holding onto the past an instruction goal, they must update the tools and style of learning to match the tools and style of thinking of the digital age (p. 11).

Houston and Grana (2005/2006) identify the issues involved with technology-based learning in the arts as primarily a struggle to keep up with the increasing pace of technological invention and innovation. The researchers found that students must learn to effectively and efficiently utilize new technology in order to be prepared for the job market, and say that otherwise they will enter the workforce with a “dangerous disability” (p. 32). Furthermore, access to technology alone is not enough to improve student learning or technological proficiency; teachers must “actively use technology” in instruction to create an “enabling environment” that “values experimentation” (p. 33). Houston and Grana (2005/2006) are convinced that this environment must encompass a school entirely:

The lack of a clear institutional vision, the lack of leadership, the lack of critical mass, and the lack of incentive are the most important factors that explain the lack of faculty participation in instructional technology integration projects... there is often a discrepancy between those who decide what educational technology will be used and those who are charged with implementing it. (p. 33)

Houston & Grana (2005/2006) have identified another issue with the implementation of technology-based arts instruction, which is a lack of vision and support from administration. This lack of support could manifest as providing funds for technology purchases but no training or incentives to integrate technology, or as purchasing technology without consulting those instructors who will use it resulting in ill-equipped classrooms for the content area needs, or finally, as lack of adequate IT maintenance staff and support.

Wilks, Cutcher, and Wilks (2012) offer “an analysis of the generalized and particular barriers that can exist in the implementation of digital technologies into visual arts classrooms” (p. 55), and cite a primary issue as a lack of vision on the part of art educators to explore the abilities and limits of technology, such as realizing how much relevant digital media can be produced without an Internet connection (p. 56), or using technology to have students create art work, rather than simply as a tool to enhance a lecture or demonstration (p. 61). As other researchers have noted, prohibitive costs of purchasing enough of the specific equipment needed for arts classes (such as digital cameras and high-quality printers), as well as equipment failure and delays in maintenance are common issues arts educators encounter in integrating technology in the classroom (p. 61).

A final perspective is offered by Beveridge (2010) and Luehrman (1999); due to scheduling issues with arts instruction time in the school day, many students receive little to no K-12 art education. Beveridge (2010) writes that as a result of the pressures No Child Left Behind puts on administrators, “it is a common practice for seventh- and eight- grade students to lose their only elective class if they fail the state test”, since those students must take remedial classes during elective time (p. 5). The lack

of a strong K-12 arts education is explored by Luehrman (1999), who conducted a surveys of principals about their attitudes toward art education, and found that “a large group of Missouri public school principals had few, if any, art classes during their years of schooling” (at a time *before* the scheduling constraints brought on by NCLB) (p. 268). Current students may have even less exposure to the arts in school, an unsettling suggestion, since Luehrman also found that principals with more art experiences, specifically being exposed to works of art often and taken to museums, placed a higher value on art education. It would follow that students who are exposed to arts instruction integrated with technology will place a higher value on creativity in technology later in life, a skill which is widely acknowledged to be essential for the 21<sup>st</sup> century (Pink, 2007; Radclyffe-Thomas, 2008; Dinham et al., 2007; Gouzouasis, 2006; Unrath & Mudd, 2011; Bastos, 2010; Flood & Bamford, 2007).

Research shows that art and technology are strong partners and core players in the forward march of digital culture, innovative new technologies, and means of communication. Art educators have realized the importance of incorporating technology into art curricula; however, issues arise from the reality of implementing the goal of technology integration, starting with administrations that overlook the arts in regards to funding, access, support, training, and instruction time for the arts. The attitude of arts teachers is also a factor in the success of technology integration, in addition to other concerns such as insufficient IT technical support and maintenance staff, the high costs of hardware and software specific to art instruction, and the struggle to keep relevant technologies in the classroom and in lesson plans as digital culture rapidly produces new ways of communicating and new ways of designing visual communication.

### **Implications for Pedagogical Practice**

As the literature review has shown, the implications of research into the relationship between art education and technology for pedagogical practice in arts education is transformative. Art education must be redefined to remain relevant in the digital age, turning from a traditional curriculum and traditional focus on the physical aspects of art production to a digitally-informed, concept-based art instruction that addresses issues of globalization, networked identity, creative collaboration, visual appropriation, and visual and media literacy as a 21<sup>st</sup> century skill set. In this section I will also discuss some practical suggestions for pedagogical practice found in the research.

Prensky's (2001) assertion that current students prefer learning through games rather than “serious” work provides an example as to why art education must be willing to change its reputation from a serious, technical, and lofty subject, to an invaluable, explorative subject that teaches art and design knowledge, visual literacy, and creative thinking through interaction and engagement of technology and culture. Digital innovation requires a sense of play and exploration that is currently downplayed in art education, in an effort to be taken more seriously as a core subject with rigorous standards and objective, quantifiable outcomes.

The main challenge arises in the narrow definition of art held by legislators, administrators, educators, and the general public. Art is still generally viewed as an elite subject, an add-on, and an unnecessary set of skills that have no relevance in the real world. Ironically, there is perhaps no time in history when visual art has been as immersive, useful, and powerful in culture. It is a problem of definitions; art education is defined too narrowly, and currently only addresses a small part of art's scope in the world. Technology has transformed the way images are used in our culture, and so it must also transform art education.

Educators who have realized how technology must transform instruction are incorporating new

literacies into their pedagogy. Tillander (2011) found that some educators have taken it upon themselves to add verbs to Bloom's Taxonomy, naming the result *Bloom's Digital Taxonomy* and including words such as blogging, programming, uploading, and bookmarking (p. 45). A case study by Szu Hsin and Hui Ching (2008) concludes that student learning is improved with multimedia and digital media instruction, compared to traditional textbooks and worksheets, and that arts instructors should not hesitate to integrate new media methods into their teaching practice. Prensky (2001), and Taylor and Carpenter II (2007), also support the idea of bringing new media into instruction, since current students respond best to multimedia-infused, fast-paced learning.

Taylor and Carpenter II (2007) also offer guidelines for K-12 instruction: 1) guiding students in the development of critical viewing practices for digital media, 2) an “ongoing and relevant” incorporation of digital media, rather than as an add-on or as a specific unit of instruction, 3) a curriculum content focus on digital images, experiences, and communication that students actually use rather than a curriculum limited only to specific digital media procedures or techniques, and 4) instruction should recognize digital art work's “relationship to earlier media forms” and to cultural questions and solutions (p. 93). The researchers conclude that even though it is not clear what art education will look like as it adapts to the age of “immersive digital culture” (p. 93), that the scope of art education must be expanded to reflect our “digital condition”, and should include a focus on critical viewing practices (p. 94).

Mayo (2007) offers practical suggestions for technology integration, such as: focusing on teaching exploration rather than specific technical details of software (p. 49), teaching students flexibility in navigating interfaces (p. 49), integrating traditional materials into post-production (p. 49), using the internet for visual research (p. 50), emphasizing a “culture of responsible use” (p. 50), incorporating technology-informed dialogue into discussions (p. 50), and showcasing new media



contemporary art alongside traditional artists (p. 50). Mayo's suggestions are supported by researchers who point out that the digital generation of students think and learn differently, expect a fast-paced, non-linear approach to instruction, and are comfortable experimenting with software programs to learn how they work (Prensky, 2001, Taylor & Carpenter II, 2007).

The necessity of embracing Web 2.0 technologies to enhance student learning is noted by Gooch and Saine (2011, p. 92), to promote creative thinking, critical analysis, and interpretation of information found in digital media and digital culture. The researchers link the arts to technology learning and argue that the technology-based arts skills should be introduced into other subjects as well, suggesting that “teaching students about the power and depth of visual images and the incorporation of technology could lead to better, more motivated writers” (p. 92). While this research positively links art and technology education, Gooch and Saine (2011) take the stance that art and technology curricula will not survive budget cuts or the fight for instruction time. Instead, the researchers suggest that there “should be more of an emphasis on integration of the arts and technology into the classroom” and that “art is no longer something to be done as a special and separate activity, but will need to be incorporated throughout daily classroom activities” (p. 93). Even though this suggestion would further decrease time devoted to visual arts instruction, decrease the value placed on an arts education, and decrease the quality of arts instruction, with art taught by teachers of other subjects rather than art educators with expertise in visual communication, Gooch and Saine (2011) feel it is the best solution to “achieve the goals of bringing visual arts and technology to the center where they belong” (p. 98).

While Gooch and Saine (2011) do not offer an encouraging perspective for art educators who seek a higher place for art as a core subject in terms of resources, budgets, and instruction time, the research does produce an argument for school administrators to encourage collaborative efforts from art education teachers and language arts teachers (in particular) toward integrating more art and visual-

based technology into classrooms where the teachers may not have the knowledge to integrate 21<sup>st</sup> century, new media skills effectively. This goal might be achieved by hiring art education faculty who are part-time art education instructors and part-time arts-integration advisors and collaborators in new roles such as “arts and visual multimedia integration specialist” or “digital and visual media literacy specialist”.

Ching-Chiu (2011) suggests that an environment of administrative support and teacher collaboration is essential to art-technology integration. In Ching-Chiu's (2011) case study of Newark High School, the digital media art teacher was a source of knowledge and expertise for colleagues. This research also supports the implication that art and technology instruction should incorporate high levels of co-exploration on the part of teacher and students to learn new technologies. This is a transformative implication for art education, where even in a creative setting where experimentation on one's own is encouraged, the teacher traditionally dispenses knowledge and serves as a resource, instead of constructing it with the help of the students and serving as a facilitator to the access and navigation of resources and new technologies.

Digital culture has transformed the minds and educational needs of 21st-century students, and art education must undergo a transformation as well. New media, emerging technologies, digital culture, and digital, visual, and media literacies must become a focus in art curriculum and instruction.

### **Conclusion**

Art education is at a crossroads as educators struggle to redefine and revitalize a subject that is marginalized by legislators who pass and uphold accountability legislation and continue to support the primacy of high-stakes testing, and by administrators who, under the pressure of smaller budgets and desperation to meet testing standard goals, cut funds and instruction time from art departments, and

treat access to elective classes as a reward or punishment instead of a right for all students. Even as schools purchase more hardware and software with the goal of teaching students in a technology-infused environment, art education is overlooked as a technologically relevant subject. This oversight stems from ignorance about the essential role visual communication and digital multimedia content play in new media technologies and in digital culture as a whole.

The necessity of providing art teachers with technological resources and support is often overlooked as well, due to art teachers' attitudes toward technology, including a lack of discussion of digital media artists, a prejudice against digital media, feeling that traditional art materials and processes are better, more true, or nobler representations of creative expression, and preferring traditional, linear, step-by-step, slower methods of instruction to the fast-paced, non-linear exploration of information and media encouraged by a digital environment.

Research does not suggest a one-size-fits all solution to the problem of “How should art education integrate technology?” The future of art education requires a greater investment in the subject by those in control of schedules, budgets, and access to technology. If the administration of a school is supportive and positive about the role of technology in art, then art educators are able to address the necessary changes in instruction and curriculum. The ways art educators address technology integration will depend on the individual instructor's familiarity with digital and new media, but it must be a goal to become at least an observer, if not a full participant, in digital culture in order to understand the role of visual communication in students' lives outside of school. Art educators who are working to integrate technology must be willing to collaborate with students in constructing knowledge of the digital world. The globalized digital culture is complex, vast, and characterized by ever-evolving relationships between media and uses of digital media and visual communication; one teacher could never hope to be an expert in all the ways students interact with such a culture. It has become

necessary to bring students into the conversation about how digital content is to be found, collected, organized, analyzed, discussed, and created.

Art education must be elevated to a central place in education as whole, if students are to be prepared for the global, digital world in which they will live, communicate, consume, create, and work. While students are often more comfortable exploring new technologies on their own than their parents and teachers, they still need instruction in visual and media literacies in order to succeed in a digital age. Students also need instruction in how the digital world and the physical world intersect, since they experience local, national, and global events primarily through digital multimedia communication. Finally, there is great power in digitally-based visual modes of expression: the power to persuade, critique, inform, raise awareness, campaign, and entertain, is such that anyone, even a student, can potentially reach a global audience with their message. Art education is of vital importance in the digital age.

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