

# Creativity, Technology, Art, and Pedagogical Practices

**A**s I started preparing and writing this article, a colleague inferred that everything to be said about creativity had been said 10 years ago. In the shadow of such preconceptions, I want to organize some thoughts on the relationship of contemporary technologies and creativity. I start by considering various definitions of creativity along with underlying questions of how we live, how we think, and how we learn with new technologies. I soon realized that the relationship of the expressive nature of new technology with creativity is complex and requires a renewed examination of how these apply to art education.

Creativity serves an important role in culture, education, and the workforce as it "provides the impetus for any act, idea, or product that changes an existing domain or discipline into a new entity" (Csikszentmihalyi, 1996, p. 28). In the 21st century, information technology is forming a powerful alliance with creative practices in the arts and design to establish new domains in information technology and creative practices. According to Mitchell, Inouye, & Blumenthal (2003):

the start of a creative act is the escape from one range of assumptions—a context—often with the aid of another context seemingly at odds with the first but that provides a new way of viewing what we already thought we understood. The arts do this for IT, and IT does this for the arts. (p. 31)

Likewise technology processes, tools, and interfaces rekindle an interest in creativity and its expression, as exemplified by the many online activities that are engaging creative innovation. An example of creativity's effect and expression is the massive hyperwall display that pulses in sync with downloads, and showcases the 20,000 iPhone® applications (Marsal, 2009). The display illustrates not only the underlying insurgence in the creation of iPhone applications (over 200,000 applications at this writing) by the public, but is also reflective of a popular interest in adapting new technology creatively for personal use (Figure 1).

In living with contemporary information technologies, more and more people are becoming active participants and co-creators with interfaces—expanding into development of tutorials, blogs, wikis, and social bookmarks. These personally meaningful activities emphasize sharing and collaboration through transparent formats. As a result, art educators should recognize that creative and cultural education extends beyond classroom curricula and into contemporary everyday life and consider possible creative resolves in more formal education environments.

Today's technologies motivate and offer an opportunity to engage with systems and an array of "objects to think with" (Pappert, 1980) and as a medium to elucidate multiple possibilities dynamically (Carpenter & Taylor, 2003; Graham, 2004). In these contexts engagement is not a material object in the traditional sense, but a shift to a technological process as an 'object' of interest and play, as well as an interface that moves beyond the computer to a culture encoded in digital process and form (Manovich, 2001; Pappert, 1993; Turkle, 2005). As the previous iPhone wall example showcases, shifting from material object to process is becoming increasingly more evident in our lives as consumers are becoming producers. Additionally, digital technologies are changing what it means to create and what is promoted as cultural innovation. For instance, we must consider new frameworks that promote both agency and control (Karaganis, 2007). These frameworks range from social network representations (e.g., Twitter, Flickr, Facebook), to filtering techniques (e.g., Google and Bing search engines, Animoto, Wordle), and digital rights management (e.g., creative commons, open source software). 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. The following discussion explores a range of assumptions about creativity, art, and technology and the role that they play in pedagogical practices.

## Assumptions and Definitions about Creativity and Visual Arts

Definitions of creativity often change as a result of a specific cultural climate and create challenges with the conceptualization of creativity research as it relates to visual arts. *Creativity* is typically used to refer to the act of producing new ideas, approaches, or actions; while *innovation* is the process of both generating and applying such creative ideas in a specific context (Davis & Rimm, 2004; Horowitz & O'Brien, 1985; Piirto, 1998; Sternberg, 1999). As a process, creativity has been defined as application of synthetic, analytic, and practical thinking (Sternberg & Williams, 1996).

Creativity research is often contentious, and LaChapelle (1983) calls attention to the shift from definitions such as problem solving and elaboration as strategies, and argues that we take a closer look at how creativity interfaces with sociological contexts. He questions the composition and characteristics of groups as they establish a social structure of values, norms, and

MICHELLE TILLANDER

codes that characterize a creative construct. He contends that the greater the degree of boundary breaking of normative values and codes, the greater the degree of creativity elicited by a cultural group. For example, contemporary artists often engage in *code switching*—namely, learning new values and codes, and questioning old values and codes through critical art practices that often collude, repurpose, and re-engineer newer technologies. I would argue that it is critical to reflect on sociological aspects of creativity as well as considering how boundary breaking, code switching, and technological environments might hinder or facilitate creative use of technology in art teaching and learning. One approach is exploration of new media artists and their artwork to expose not only the innovative uses and misuses, but to additionally uncover technology's hidden possibilities.

Cross (2002) explores creative cognitive processes of three exceptional designers from different design domains and discovers commonality among their approaches. One common observation is that creative design often comes about when there is tension between a problem's goal and the criteria used for its solution. This can happen when designers are constrained within a framework of design principles and explore a design space holistically to foreshadow different outcomes, and then restructure problems in a distinctively personal way. In terms of pedagogy, when designing a curriculum I look at young people's engagement with new media beyond the framework of my classes to gain new insights on what motivates self-guided learning and peer-based learning. This reflection offers insights for restructuring teaching strategies. Designers engage creativity to balance multiple constraints and interpretations to arrive at a desired solution. As an example, the next paragraph describes a lesson that demonstrates the use of metaphorical thinking, divergent thinking, and synthesis as a holistic approach for students to frame and creatively express themselves through their artwork.

Cross' process can be seen through both teaching and learning experiences in which I engage high school students in critically examining the shifting forms and meanings in digital advertisements. Using the works of artists Nancy Burson and Mariko Mori, my students explored issues of identity, metaphor, and the fluid interface of digital imaging in advertising; the students then framed the lesson in terms of their personal experiences. In considering the meaning-making process holistically, students were prompted with questions that considered curriculum, art, and technology as disciplines and identity. For instance, how do artists organize their knowledge and skills? What theories govern knowledge and visual representation? How are personal and audience outlooks grounded? Answers to these questions, along with students creating digital, non-representational, and representational self portraits, focused on the use of metaphor, analogy, and identity to expose many layers of underlying tensions between traditional forms and digital representations. As the students visually made meaning through their art, they grappled conceptually with conflicts among skills and ideas, skills and context, the role of school and inspiration, the order of ideas and outcomes, and the relationships among visual information, form, and process. (See Figure 2.)

Figure 2. *Untitled*, digital image, by high school student Brittani Kelzenberg.



Figure 1. iPhone wall. Since the writing of this paper the number of iPhone apps over past few months has gone from 20,000 (August 2009) to 200,000 (February 2010).



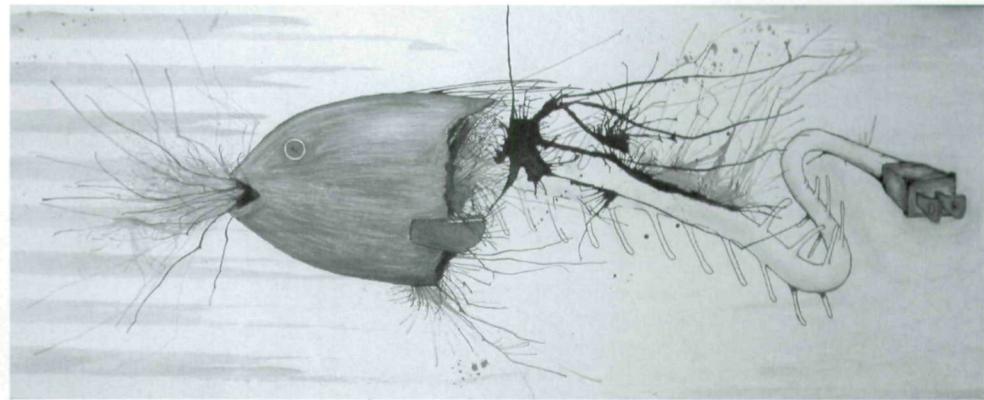


Figure 3. *Unplugged from Technology*,  
ink, color pencil, and watercolor, by  
high school student Ben Boshart.

Likewise Csikszentmihalyi (1996) shifts thinking about creativity from problem-solving to problem-finding, further arguing that, "It is easier to enhance creativity by changing conditions in the environment than by trying to make people think more creatively" (p. 1). Our assumptions, constructs, and varying definitions of creativity that shape teaching creatively, teaching for creativity, and teaching as artistry, create tensions and dilemmas for educators especially in schools with a centrally controlled approach to pedagogy.

### Technology, Art, and Things as They Could Be Otherwise

It is interesting to note that as the computer began to be used for and with art, questions as to what constitutes tools began to surface for early computer art pioneers. For example, Harold Cohen, an artist and early pioneer in computer-generated art, developed an autonomous art-making machine (AARON) as an initiate for artificial intelligence (McCorduck, 1990). This work caused him to wrestle with creative innovations such as machines generating or initiating autonomous behavior (Cohen, 1973), along with differences between traditional artist tools and the computer as a tool. He describes a computer that has its own feedback paths, conducts its own investigations, and modifies its own behaviors from feedback on what it has done. These ideas—that people can create in tandem with computers—confront historical Western constructs of creativity and originality, and in having no precedents we need inquiry on how thinking and knowing are impacted when creating in tandem.

With Cohen's early research came many assumptions that moved to a broader and more holistic understanding, thereby impacting definitions of technology. More recently, we have come to define technologies through a variety of means such as inventions or machines, development of ideas or epistemologies, changing social practices, or a combination of these (Gitelman, 2006). With these broader definitions of technology comes a continual requirement to re-examine and expand our personal and pedagogical definitions of technology. For example, Gitelman's definition of *media* not only encompasses technological forms and their associated protocols of communication, but also realizes communication as a cultural practice that brings "different people on the same mental map, sharing or engaging with popular ontologies of representation" (p. 7).

Thus technologies are viewed as complex, and uniquely grounded in social and cultural contexts with room for creative exploration and context. This requires developing a balance among creative expression, knowledge, and skills. In educational settings, this balance must also include fostering creative development for students across all learning styles, and various social, cultural, and economic barriers. For example, in one high school, I introduced works of new media artists and then designed a lesson plan to conceptually include the students' everyday experiences with technology into their artwork.

This intentionally broad definition of technology and its application resulted in artworks inclusive of social experiences, and inspired expression through traditional art forms about technology as well as artworks involving new media. By combining multiple perspectives of differing domains—art, digital media, self, culture, and society—with reflections on the contours of these networks, one student communicated that technology almost forms our culture, and is defining where contemporary art fits in our world. In revealing this idea through a cultural analysis of technology and art, a student can move beyond understanding art and technology as isolated entities and gain alternative perspectives and critical insights on the constructed boundaries of technology and art education. By creating possibilities and exploring interpretive frameworks, students gained insights on how artistic and aesthetic expressions can contribute to an understanding of digital cultural worlds. One digital artwork juxtaposed digital text and digital images to discuss the topic of abortion. Another example used an ink-and-pen drawing (see Figure 3) to whimsically explore how we are like a 'fish out of water' when we are *unplugged from technology*.

It is naïve to consider a radical break or to overemphasize the unique possibilities of entirely new digital worlds. What are often overlooked are artworks by young people who creatively adjust to, explore, and illuminate responses to information technologies. In one high school, the technology themes generated by students involved concepts of old technologies as precursors to new technologies; issues of public and private spaces in regard to surveillance technology; the idea of losing clarity while gaining immediacy; being a fish out of water without technology; and technology's role in creating ideal beauty. These themes metaphorically link agents of change in a network—and view technology as more than just a tool.

### Technology, Media, and Material Meaning

Technology and new media are not created or consumed in isolation from older media or in an isolated cultural context (Bolter & Grusin, 1999). Rather new and old media repeat each other. Similarly, we can look at tradition and digital approaches for a blended learning approach, often harnessing the best of both environments. We also can compare strategies in traditional and virtual learning environments to see how one might inform the other. For example, in her master's project, Lloyd (2009) interviewed and *observed* art educators in traditional (face-to-face) and virtual (online) teaching environments. In this research Lloyd does not isolate the cultural context of traditional and virtual environments, but explores both environments independently and collectively to challenge teaching strategies and paradigms. For example, she finds that a common set of factors are important in both face-to-face and virtual classrooms; these include personal interaction, building community, reflection on types and frequency of strategies, and an ability to encourage personal discovery through the environment.



Figure 4. *Stroller Flaneur*, video installation with map, by Katerie Gladdys. Reprinted with permission of the artist.

*Understanding how students interact with content through creative explorations, such as those in the art classroom, becomes even more valuable in today's technological culture.*

Similarly, Burton, Horowitz, and Abeles (2000) extend understanding of experience with art practices and ideas by considering our relationship to material and artists' relationships to their artworks. Specifically they call for "re-presentation" (p. 333) through the agency of a particular material, where experiences are reflected, entertained, constructed, and deconstructed as the artwork comes into being and the world and the self are known differently.

In the work *Stroller Flaneur* (2009), new media artist Katerie Gladdys challenges the viewer's visual relationship with his or her environment by taking the viewer into a re-presented reality that is augmented and activated by technology (e.g., cameras on the stroller). Through editing and juxtaposition of video and audio clips, the artist forces the viewer to consider the immediate environment and the subtle differences between interactivity and engagement by reconciling two sets of stimuli (Figure 4). Likewise, art educators need to continually consider the impact of the interaction and engagement with technology in a variety of educational environments. That is reconciling the use of technology with its culture influences and implications on new teaching strategies.

As we consider the agency of a particular material, we are confronted with questions such as: What are the agencies of a particular medium (e.g., new technology interfaces)? Where is materiality replaced by process? For example in Season Three of *Art: 21—Art in the Twenty-First Century* (2005), exploration of contemporary art and artistic insights probes underlying assumptions of creativity to break conventional barriers and arrive at a new way of seeing. In one *Art: 21* episode, artist Krzysztof Wodiczko creates large-scale, slide and video projections of images and performances on buildings and monuments. He disrupts our traditional understanding of the functions of public space and architecture by performing visually in and on the structural artifact of the institution.

Another example is Washington DC-based artist Tim Tate (2009) who blends the traditional craft of glass with new media technologies as a framework for his electronic reliquaries. His sculpture, *Page 100 of Each Volume of the 1954 World Book Encyclopedia* (Figure 5), captures the culture of the book through video footage of page 100 of each volume of the *World Book Encyclopedia* from 1954. Tate's sculptures encase glass objects and a tiny video screen in bell jars to engage the viewer in an experience with the contemporary artifact as ephemeral video footage. By combining the narrative of the reliquary with miniature looping digital video footage, Tate engages old and new interfaces to explore themes such as memory and our intimate relationships to artifacts. Thus new media technologies in conjunction with traditional materials can be used to explore new forms of imagining, perceiving, and representing. Through these new forms we must not privilege technology, but consider the body's relation to information aesthetics in reconfiguring bodily experience and reconceiving materiality through virtual and abstract codes of information (Munster, 2006).

Although exposing art education preservice teachers to a variety of technologies for teaching can be invaluable, it actually is their personal creative synthesis among technology tools, teaching strategies, and content that offers lasting and invaluable approaches for engaging learning. Additionally, understanding how students interact with content through creative explorations, such as those in the art classroom, becomes even more valuable in today's technological culture. These responses creatively push and pull ideas while focusing on the old and new possibilities created by these technologies. For example, the introduction of new media artworks often challenges educators about their assumptions of rule-based curriculum—that often focuses on drawing, painting, sculpture—and students about their assumptions of artistic means of expression.

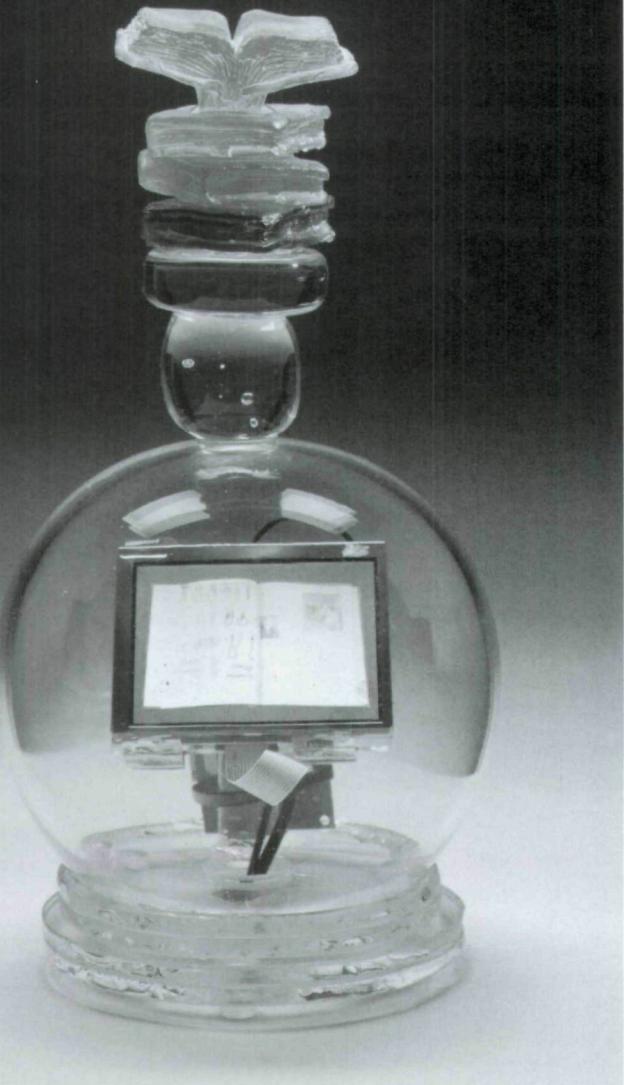


Figure 5. *Page 100 of Each Volume of the 1954 World Book Encyclopedia*, mixed media, by Tim Tate. Courtesy Fuller Museum. Reprinted with permission of the artist.

*Art educators should not only be exploring new technology tools, but should be exploring and observing these tools simultaneously with their preservice art educators.*

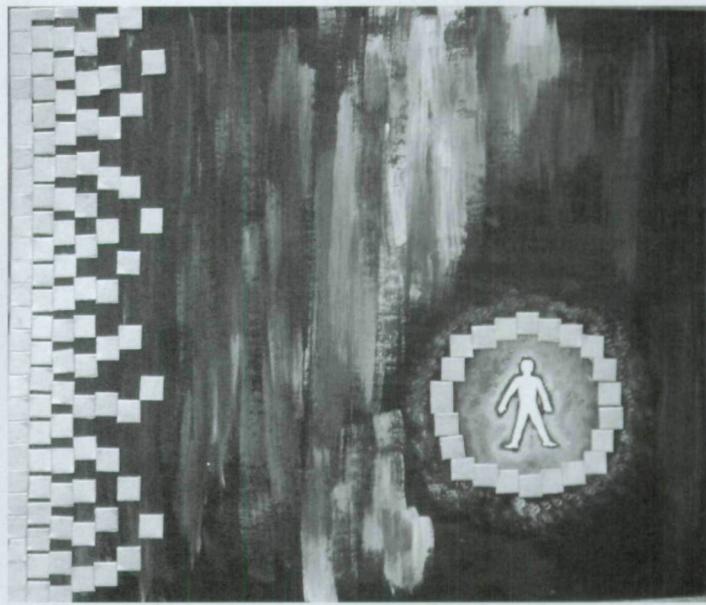


Figure 6. *Untitled*, mixed media, by high school student Vangel Quilon.

Contemporary conversations and research on young people and technology continues to demonstrate that young people are not passive in their encounters with contemporary media (Donovan & Katz, 2009). In 2006, The John D. and Catherine T. MacArthur Foundation launched a grant-making initiative titled *Digital Media & Learning*. In the initial set of exploratory grants, focus was on technology practices of youth outside formal environments of public schools. This initiative supports research about considering how communication, learning, and technology are converging and how digital technologies are changing the way young people learn, play, socialize, and participate in civic life. Specifically, several of the research projects explore how digital media and digital networks may lead to various innovations and unexpected outcomes, including a range of unintended learning experiences and unanticipated social encounters (McPherson, 2008).

Art educators cannot ignore online communication and how social differences operate in a digital culture. This is especially important as popular culture and discourses are heavily saturated with visual images. As a specific intervention, artist Mary Flanagan intentionally breaks the mold of traditional gaming environments that often embody antagonistic and antisocial themes and visuals (e.g., violence, crime), and overly competitive game interaction and goals. Instead, she developed an educational computer game (*RAPUNSEL*) to teach underprivileged girls computer programming through a design philosophy that includes new interaction models and new role models in computer science, thus creating challenges in a playful world (Flanagan & Nissenbaum, 2009). This is an example of how an online community of learners can influence technology as a tool for learning and creative expression.

### Technology and Creativity in Pedagogical Practices

Today effective teaching requires creative solutions to the dynamics of content, pedagogy, and technology. For example, the Apple Classrooms of Tomorrow Project (ACOT, 1985; ACOT<sup>2</sup>, 2008) is long-term research project sponsored by Apple Computer, to explore how learning and teaching change as teachers and students have access to interactive computer technologies. ACOT identified stages (entry, adoption, adaptation, appropriation, and invention) through which teachers progressively engage technology (Dwyer, Ringstaff, & Sandholtz, 1991).

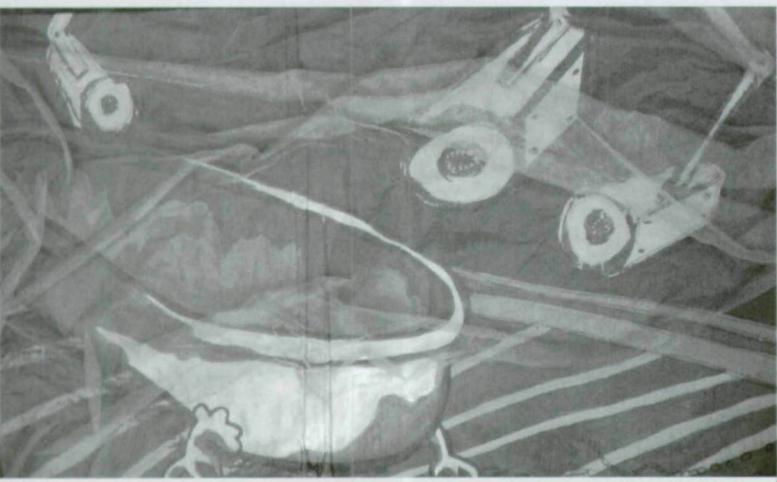


Figure 7. *Untitled*, acrylic paint, canvas, and tulle, by high school student Megan Christensen.

right

Figure 8. An art teacher's video reflection embedded in a research paper.

As teachers have become more comfortable and proficient with technology it is the stage of *invention* that offers teachers an opportunity to be creative, subvert original intentions of the programmer, and "repurpose technology" (Floden & Ashburn, 2006) for learning and meaning making. For example, educators and students are using Google Earth as more than a map. They are shifting from a passive use of a tool to an active engagement by constructing and designing virtual tours linking educational content (e.g., virtual tours of art museums). As another example of the inventive stage, educators are considering an archeological approach to new media (Tyner, 2009). For instance, art educators and students can explore the evolution of technologies (i.e., printing press, typewriter, and slide projector) as a way to interrogate new media (i.e., blogs, Twitter, Facebook) with a focus on the subtleties of using communication as a cultural practice through students' actual experiences. This positions educators to repurpose strategies for teaching and learning—especially as each new generation of students investigates and uses technologies for its own creative purposes.

While contemporary new media artists offer engaging insights on technology, we should encourage artworks by young people that creatively adjust to, explore, and illuminate responses to contemporary technologies. Their responses can creatively push and pull ideas while illustrating constraints and new possibilities created by those technologies in real world experiences (Tillander, 2008). Artists often exploit a technology's hidden potential. In a recent research project, I observed high school students exploring issues such as old technologies as precursors to new and public and private spaces in regard to surveillance technology (Tillander, 2008). Specifically, one high school student critically considers how technology impacts our lives. Through a mixed media artwork (Figure 6) the student expresses her position about communication technology: *we gain immediacy while losing clarity*—namely, the balance of ubiquitous communication versus the transformations resulting from digital interfaces. Similarly, another student created a painting (Figure 7) that whimsically positions the viewer to consider how surveillance technologies change the notion of public and private space by juxtaposing an old-fashioned bathtub with surveillance cameras. This student drew inspiration from Jill Magid's work *Evidence Locker* (2004), in which surveillance

display. Choosing what is important and how to illustrate is always a dialectical process in Graeme Sullivan's response to the Graduate Research in Art Education Conference, "imagine the critical literature review process and the procedures you use to construct your theoretical frameworks supporting your study is to think like a curator" (Sullivan, 2005). I believe that "finding the source of research in (your/the) writing" (Rollings, 2005, November 7) is a way to start inquiry. Through reviewing my responses on these topics, I fo issues that relate to my interest and notion in art education. My reflection and writing comes from my experience as an art teacher. There are some ideas addressed through my reflection and writing that for my framework of issues in art education. These aspects include socio-cultural environment, individual identity

and educational practice.

I put the big map of art education under the framework of socio-cultural environment. Unfolding the map, I re/researched the identity of roles and drew the role of students and teachers on this map. The roles and their relationships between each other are interesting invisible lines of inquiry. Addressing the action of roles and the practice of theories is used to describe the scenery of these locations.

The online dialogues that contain seven topics are like many fragments of the art education map. These pieces are my data sources. The process of synthesis is like playing jigsaw puzzles. Through the synthesis, I want to answer the following questions: First, what are the similar/common issues that appear through different topics? Second, how to locate different topics in art education? And last, what is the significance of these issues and their locations in the art

cameras  
are turned on her to  
repurpose and investigate how tools and  
processes (e.g., surveillance) are ubiquitously integrated into  
contemporary everyday life.

Art educators should not only be exploring new technology tools, but should be exploring and observing these tools simultaneously with their preservice art educators. Specifically, how technologies function in our daily lives and how artists might repurpose them for art education should be explored. This creative process activates new ways of seeing by challenging conventions, and thus can be applied to education to creatively approach content, technology, and teaching. For example, *Bloom's Digital Taxonomy* (Churches, 2009) is a practical classroom teacher's wiki that illustrates an inventive revision of *Bloom's Revised Taxonomy* (Forehand, 2005) to account for new behaviors and actions emerging as technology advances and becomes more ubiquitous. Specifically it links technology processes—blogging, podcasting, media clipping, hyperlinking, tagging—to each of the verbs in the higher order thinking skills taxonomies originally developed by Bloom, Englehart, Furst, Hill, and Krathwohl (1956).

Emerging conceptual spaces created by new technologies require us to develop possible frameworks that guide our pedagogical thinking. For example, Leão (2008) illustrates four tasks directing her teaching as an educator of the arts and new technologies that offer creative possibilities for art educators. She argues for thinking about pedagogical experiences as works-in-progress, creating a system that simultaneously records learning processes, recognizing that all our actions have an educational impact, and constructing a value system in collaboration with students. Leão's tasks offer art educators a framework to re-vision and dynamically model creativity through

their own creative experiences, processes, and analyses. For example, the recording of learning processes can be strategized and achieved through student blogs, digital portfolios, wikis, and social networks. This can be illustrated by embedding short reflections into a text document, resulting in video experts guiding learning processes and remaining accessible by clicking on an image (see Figure 8).

## Conclusion

In closing, I continue to imagine pedagogical experiences with technology as a creative works-in-progress, "between what computers can do and what society will choose to do with them" (Pappert, 1993, p. 5), and to continue exploring how processes and artifacts of contemporary culture motivate creativity. I think about exploring how artists, students, and teachers using technology force the renewed examination of creative expressions in art education, especially how their understanding of creativity, technology, and pedagogy informs one another. Finally, I imagine possibilities of calling attention to the potential of problem finding and problem solving for restructuring and enhancing transformations of creativity, technology, and pedagogy in art education.

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### AUTHOR'S NOTE

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