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CULTURAL INTERFACE AS AN APPROACH TO NEW MEDIA ART EDUCATION

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by

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ABSTRACT

Issues of new media within art education practices are heightened by the pervasive and often invisible infusion of digital technologies and reliance on the Internet in everyday work and leisure spaces. This dissertation is a study of how a cultural interface approach to digital new media was introduced, implemented, and understood by teachers, with a range of technology backgrounds, and their students in the real-world environments of three public high-school art education classes. Participants in this study examined digital new media artworks (art and technology), culture (values, beliefs, and assumptions), and everyday experiences (lives of students and teachers) as they converge in digitally mediated environments. The cultural interface approach through the convergence of new media art, culture and lived experience with new technologies offers opportunities for conversations that explore how new media technologies reconfigure culture as well as how culture creates the environment for the creation of new technologies. As technological change continues to occur, this approach offers art education an opportunity to be informed and take action both critically and responsibly in exploring the reconfiguration of education in empowering ways.

For this research, new media digital art is characterized as a cultural interface involving technology-experiences situated in communication processes, rather than in objects. This research [re]positioned new digital media art as a cultural interface. The term “cultural interface,” described by Lev Manovich (2001a) as “human-computer-cultural-interface” (p. 70), has implications for how art education can conceptualize

technology. [Re]framing new media art in art education as a *cultural interface* facilitates an approach that considers digital media as a portal to cultural conversations.

A cultural interface approach facilitates the generation and sharing of multiple perspectives, analyses, and interpretations among artists, teachers, and students as producers and consumers (prosumers) of digital experiences (e.g., software applications, Internet interactions, and social and immersive digital environments) that situate emotions, feelings, memory, and knowledge into our understanding. Ultimately, the examination of these experiences as artistic praxis where identity, community, and culture is affected by new media technologies offers insight into how learning is impacted.

This research involves my engagement in an inquiry process with a diverse set of participants and sites. The research design explores *emergent* theory instead of *predictive* theory and engages in a critical, reflexive analysis involving a cultural perspective of technology. The analysis is conducted through an Actor-Network Theory (ANT) lens and examines the interfacing of expressions, experiences, and inscriptions of technology as empowering *translations*. Through this lens, *translation* takes on a specialized meaning where a relationship provokes entities into coexisting. The analysis is presented in a narrative fashion, describing the settings, characters, unfolding plots, and analysis of the data. The multilayered, metastory that I create consists of what I observed and interpreted from Actor-Network Theory and social theory art education perspectives and grounded in participants' expressed perceptions. The narratives consist of orientations, complicating actions, evaluations, resolutions, and coda.

This dissertation shows how a cultural interface approach can assist educators and students in understanding issues related to digital learning environments. The approach challenges cultural assumptions for understanding technology; engages critical thinking to expose complicated digital technology practices in culture; interrogates simultaneously natural, social, and discursive practices; and explores connections to the lived experiences of students. The field experience suggests that this approach promotes critical inquiry, self-directed acquisition, and multiple interpretations. The study reveals several examples of adaptations that art educators made and the subsequent strategies used to integrate new media art within their environments.

This study shows how Actor-Network Theory (ANT) can be used to recognize stages (inscription, translation, and framing) in the process of introducing change in practical educational environments. Further, the study reveals patterns of social orchestration and resistances that surfaced—unique to each site—and provides key points in the translation process that shaped the learning/teaching strategies for each site.

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CHAPTER 1

The increasing availability of digital technology is leading to epochal changes in education. Education based on an industrial model is giving way as society interfaces with technology and its expanding forms of digital media (new media). These changes are becoming evident as U.S. schools are impacted by the changes to the social and educational infrastructure. Learning has changed as sensory-rich media and distributed processing have enhanced the infrastructure of connectivity, networking, and dynamic information. This infrastructure alters the way we connect and interact, how we express ourselves, and how we collectively engage in intellectual and cultural processes. These changes due to new digital media are spawning new modes of representation and styles of discourse as technology interfaces with pedagogical methodology.

Digital technologies are implicitly intrinsic in our everyday activities, and they move with us as an extension of ourselves. In traditional computing environments, such as those that emerged in the late 1990s, educators could choose to interact with computers. Even though the idea of ubiquitous technologies emerged more than a decade ago, the recent progress in wireless communication, computing power, and portable devices has accelerated the inclusion of these digital technologies in educational environments. In the early 1990s, ubiquitous technologies were described as "those that weave themselves into the fabric of everyday life until they are indistinguishable from it" (Weisner, 1991, p. 65). Today, the digital is inherently embedded in our physical environment, is seamlessly integrated into our everyday tasks, and is increasingly mobile

and interactive in our culture. Lyytinen and Yoo (2002) look at the shift toward ubiquitous computing that involves our natural movements and interactions with environments, which are both physical and social. We can now physically move technology (the computer) with us, resulting in the technology becoming "ever-present devices that expand our capabilities to inscribe, remember, communicate, and reason independently of the device's location" (Lyytinen & Yoo, 2002, p. 64).

As digital technology continues to permeate our environments, traditional school systems will have to transform their practices to reflect a society that empowers the potential of its children engaged in those environments. Contemporary art educators need approaches to examine and synthesize concepts and processes across the intersecting spheres of technology, knowledge, and culture. This synthesis includes conversations about contemporary visual arts and artists, the dynamic role of the visual arts and contemporary technology, and teachers' and students' lived experiences in the technological environments that surround them.

Teachers using technology in the classroom often have the tendency to reinforce existing teaching practices (Cuban, Kirkpatrick, & Peck, 2001) by "grafting technologies into existing teaching methodologies … [to] function as high-tech updates of timeworn practices" (Anderson & Balsamo, 2008, p. 245). Anderson and Balsamo (2008) advocate a model that is organic in conception and focuses on the development of pedagogical strategies inextricably fused with the technologies and social practices familiar to students of the digital generation. Additionally, students engaging fluidly with new communication devices rarely consider how these devices and software interfaces influence their capability to *inscribe*, *remember*, and *communicate* both inside and

outside of the educational arena. These issues can be explored in the visual arts curriculum not only through digital imaging tools and digital input and output devices, but also inspired from explorations of new media art and artists. And most significantly, new technological and cultural issues can be explored through new media as they relate to creativity and ways of knowing (e.g., encounters with different kinds of digital interfaces). In considering the seamless technological environments and their impact on learning, we need new approaches that critically analyze the current economic, political, and cultural revolutions taking place within contemporary cultures. I, along with teachers and students in three high schools, examine new media digital artists (art and technology), culture (values, beliefs, and assumptions), and everyday experiences (lives of students and teachers) as they converge in digital environments.

Approaching New Media as a Cultural Interface

The concept of *cultural interface*—as grappled with by teachers and students in their art classes at three different high schools participating in this study—emphasizes that technology is more than a cultural artifact. The concept indicates that teachers' and students' lives are not only mediated by the technology that surrounds them, but their lived experiences are also part of a networked translation. Mediation implies transfer and that separate entities are transformed, typically understood as humans rather than objects being mediated. Cultural interface implies acting together in ways that affect all actors (human and non-human actors) in a particular network. This in-between point of contact is the translation that forms the new cultural environment. To approach new media as a cultural interface is to focus on cultural translations and transformations of a network of connections between technologies and people.

This study approaches digital technologies as a cultural interface, a practice derived from Lev Manovich's (2001a) theory of "human-computer-cultural-interface" as the boundary where technology (new digital media) and culture (beliefs, values, and assumptions) converge (p. 70). That is, new media conceptualized as an interface is a cultural process bridging human, machine, and hybrid forms—resulting in a combination of sensory and semiotic relationships.

A visual culture approach is not new to art education as evidenced by several authors over the past twenty years (Bersson, 1980; Hicks, 1989; Sylva, 1992; Cartwright & Sturken, 2001; Tavin 2001; Freedman, 2000, 2003; Duncum, 2001, 2006; Knight, Keifer-Boyd, & Amburgy, 2005; Markello, 2005). Teaching to interpret technology's socio-cultural meanings has also been explored by several art educators (Freedman, 1997; Colman, 2005a). Additionally, recent research on postmodern principles (Gude, 2004, 2007) and alternative approaches to curriculum in art education (Walker, 2001) continue to expand on visual forms of communication media and the individual and social formations that they enable. Our experiences of culturally visual content through visual objects, image-production, and reception embrace a variety of forms where content and codes migrate from one form to another. With visual culture and technology in mind, I began this study with a definition of cultural interface from new media literature, particularly from Lev Manovich (2001a). As Manovich states the "work's interface creates its unique materiality and a unique user experience" (pp. 66-67) where interfaces become integral to the content. As a result, I expanded on Manovich's idea and developed it as a curricular and pedagogical approach to the study and creation of new

media art, which is not developed in Manovich's (2001a) definition of a cultural interface approach to new media art.

A cultural interface approach as a curricular and pedagogical approach in art education offers an interplay of technological cultural discourses, forms, and themes. This arena offers a site of critical inquiry for substantive pedagogy in art and technology education. Further, I redefined a cultural interface approach to the study and creation of new media art from my analysis framed by a process-oriented theory, in which I focused on translation of a cultural interface approach by the teachers and students in this study.

Manovich's (2001a) premise of technology as a cultural interface has implications for how art education can conceptualize new media technology. "In short, we are no longer interfacing to a computer but to culture encoded in digital form" (p. 70). The emphasis in art education on interpreting and creating new media art is thus directed to the interface where different systems of representation interact together such as virtual/real, code/meaning, and inscription/embodiment. This research expands on Manovich's theory by applying this idea as pedagogical strategy for art education. Specifically, this research challenges the most common ways that technology is currently approached in art education, which is as simulations of familiar art-making tools such as paintbrushes. The purpose of the study is to explore pedagogical and artistic approaches to new media as a cultural interface, as an alternative to the technical training-driven method of current k-12 use of digital technologies in art education curricula.

In recognizing the challenges of technology's impact on existing forms and practices throughout society (including art and art education), I attempt through a cultural interface approach to use digital new media to start discussions about these impacts. This

dissertation does not advocate a single model, but recognizes the evolving characteristics of new media and seeks to open these discussions.

Additionally, by considering how our felt experiences (McCarthy & Wright, 2004) and behaviors are changing with newer media, a cultural interface approach serves as a critical space for considering and synthesizing innovative activities and strategies for learning environments important for success in the 21st century. This is an approach to thinking about new media that moves creators and consumers of digital information (research participants) beyond the mechanical and technical use of digital devices to the processes of adaptation of these digital devices. This approach challenges our notion of art and communication.

In considering an alternative pedagogical approach, this study explores new media artworks and students' lived experiences involving technology, and questions how a cultural interface approach impacts art educational practice. For this research, new media artworks are projects that use emerging media technologies and are concerned with cultural, political, and aesthetic expressions. The emphasis is on communication structures and information processing in response to changes taking place in society. Specifically, this research uses new media art, which explores digital interfaces that exchange information in *spatial, temporal,* and *interactive* digital environments. Although a cultural interface approach can be applied to classical art processes, this research focuses on new media practices and the issues these practices raise relative to art education and contemporary life.

The new media artworks chosen during this research were in response to the educational and contextual environment of each site, and the unique communication

possibilities of new media. Namely, the selection considers the technologies available at each of the research sites along with participants' technology experiences within and beyond school environments. This study displaces digital artworks and teaching strategies, which constrain the computer as merely an extension of classical art techniques. Instead, the study focuses on a selection of artworks and projects which explores the technology experiences of research participants and the characteristics of new media, and which facilitates ways to explore communication, knowledge processes, and cultural conventions.

By observing visual arts students in my high school classes who were engaged with new media technologies over the past twenty years, I recognized that technology influences learning in many ways. Digital new media artists, like the students with whom I have taught, remix critically, playfully, and imaginatively through real, imagined, and constructed processes of art and technology at the interfaces of digital technology, communication, and culture. This dissertation argues for exploring the cultural interface of digital new media, and challenges art education to move beyond the dichotomous definitions of art and technology. It calls for an art education that focuses on critical explorations of the cultural contexts of teachers' and students' lived experiences. It calls for a cultural dialogue shifting from *how to use digital technology* to *how digital technology is used*.

Within the tensions of *how digital technology is used,* art educators can facilitate multiple perspectives, analyses, and interpretations among artists, teachers, and students as producers and consumers of digital experiences. Ultimately, the examination of these

experiences as artistic praxis explores identity, community, and culture as affected by new media technologies.

Art education is often plagued by an emphasis on process-driven approaches as content in curriculum. Process-driven approaches to technology used in art making are in part a result of adopting technology into existing art educational paradigms. The reduction of art education to skill-driven processes and complex software mastery results in a deficit of critical and cultural understanding of contemporary artwork. The existing paradigms do not take advantage of the characteristics of young people as seekers of information, nor their desire to investigate and innovate with the prevalent media in their everyday experiences. In this study, I guide students and teachers in three public school art education classrooms to use an approach that facilitates critical and cultural inquiry of digital communication technologies. The collaborative process, analysis, and subsequent development of the findings of this research offer insights into approaches to new media technologies in art education. The tension and the balance of this research offers possibilities for a substantive art educational experience, provides a transgressive space for learning (Akins, Check, & Riley, 2004), challenges the cultural assumptions embedded in understanding technology (Garoian & Gaudelius, 2004), investigates strategies for critical thinking about technology processes (Colman, 2004), and exposes complex technology practices in visual culture (Sweeny, 2004b).

Issues of new media within art education practices are heightened by technology's pervasive and often invisible infusion into everyday work and leisure spaces. It encompasses broad issues, such as digital communication's effects on perception, interpretation, interaction, and signification in contemporary society. This research

positions itself within current art education and digital technology issues regarding content, aesthetics, classroom practices, and factors influencing use. Additionally, it considers culture in collaboration with evolving technology and the increasing importance of digital media in social and educational spheres.

Cultural studies also have political and ethical dimensions. Cultural studies are needed because of the social struggles of people's material existence within cultural practices and social relations (Bérubé, 2004). Thus, cultural studies are political endeavors, and new media understood from a cultural studies' perspective with the use of the concept *cultural interface* is no exception. *Cultural interface* has varied meanings, and there are no easy steps for negotiating a cultural interface approach within a determined system such as the classroom. A cultural interface approach has ethical underpinnings and becomes politicized through the negotiation of understandings and actualized approaches enacted by the research participants.

> A cultural practice does not carry its politics with it, as if written upon its brow for ever a day; rather, its political functioning depends on the network of social and ideological relations in which it is inscribed as a consequence of the ways in which, in a particular conjuncture, it is articulated to other practices. (Bennett, 1998, p. 222)

In this way, a cultural interface approach becomes a political activity by using the analysis and critique of culture as an intellectual strategy when conceived of as texts in the making, and educational practices responsive to a cultural way of life

Technology's rapid changes and shifting of knowledge, perception, mediation and representation of culture through expressive forms demand different educational

approaches from art educators, and a reorientation of technology within art education. A critical analysis of new digital media within this context offers alternatives. A cultural interface approach contrasts with a tool-based approach. The tool-based approach is restrictive and often ignores socialization when taught without questioning the values and beliefs embedded in the technological tools and programs. This study investigates whether a cultural interface approach circumvents technological challenges often confronting art educators. For example, one challenge is the minimal representation of new media art in textbooks, art education programs, or art history (Delacruz, 2004; Lu, 2005; Orr, 2003; Tillander, 2004). By engaging a cultural interface approach and exploring the resulting pedagogical strategies, this research offers insights into using a cultural interface approach involving technology in art education.

Digital New Media Art: Challenges for Art Education

Through their artworks, artists often challenge existing paradigms and cultural beliefs that are embedded in their worlds. Contemporary artists through their exploration of new media devices and processes reveal the changing relationship between technology and culture. New media art for this research is about the *new*, i.e., new technologies, new cultural forms of communication, and new innovative thinking. New media art is not only characterized by contemporary technologies, but also by the artists creatively and critically exploring changing cultural issues due to new media devices and processes.

Several cultural issues surface from new media art and present an opportunity to explore accessibility, alternative conceptions of time and space, and digital concepts and materiality. These issues confront the boundaries of traditional art categorization, thus challenging pedagogical models such as Discipline Based Art Education (DBAE) with its

four categories of production, criticism, aesthetics, and history. Like much contemporary art, an engagement with newer media art projects questions modernist notions of aesthetics and art. For example, new media art predominantly exists outside the ideologies of institutions like museums and schools that typically reinforce and solidify definitions of art as original, unique, visually provocative, expressive, and of value beyond a function such as pedagogical or persuasive.

Lovejoy (2004) argues for understanding the field of digital new media because of the growing impact of digital technologies on the changes occurring in the role of the artist as social communicator. Her approach explores how digital tools catalyze new perspectives on art and influence the way artists see, think, and work. During the early production of the computer, "artists began to challenge the computer to go beyond the formal tasks it had up to then performed, and found it could be used as both tool and medium" (p. 79). In considering the use of the computer as a medium, Lovejoy (2004) then asks us to consider technological processes of "simulacra, simulation, hyperreality, intertextuality, and interactivity" (p. 3) to probe and explore art and its relationship to technology. These conditions operate abstractly as if they were "visible, workable things" (McCullough, 1996, p. 28). Therefore, as new media continues to provide us new worlds of design and production, we need to explore critically and creatively "individual outlooks toward a medium, improvisation, and practice" (McCullough, 1996, p. 190).

The exploration and engagement with new media is often difficult for art educators because many k-12 art education programs center on a material-based paradigm. High school art curricula often focus on formal and technical skills driven by explorations of media with titles such as *Two-dimensional Media*; *Three-dimensional*

Media; Visual Elements; Foundations in Art; Drawing; Photography; Printmaking; PhotoShop; and Digital Imaging. As Freedman (2003) states, "high school art curriculum often includes learning objectives with a narrow focus on media skills or the elements and principles of design" (pp. 111-112). Additionally, the National Visual Art Standards reflect a Discipline-Based Art Education (DBAE) bias that often focuses on an understanding and application of technique and process, and knowledge of structures and functions.

Furthermore, art educators' minimal exposure to newer media art concepts, as well as art educators' beliefs, values, and assumptions about technology and art, create many obstacles for substantive engagement. Further, these artworks and projects exist outside traditional venues and aesthetic realms. As a result the teaching of new media continues the use of this framework that promotes the dependence on an artificial separation of instructional content. This is exasperated by art educators' inexperience and access to conversations about new media and new media art. Art educators can circumvent these issues by exploring cultural concepts within digital new media.

The Horizon Report (2006) is significant to schools and education because it identifies challenges facing higher education due to emerging technologies, and outlines several key trends of technology's impact on teaching and learning. The report describes areas of emerging technology that will have significant impact in higher education. Specifically the report is important in that it identifies trends affecting the practice of teaching, learning, and creativity, and then ranks those trends projected to be most important for campuses to watch. For example, the academic significance of digital

works is highlighted for its impact on tenure, promotion, hiring, and other academic processes.

The key trends identified in the Horizon Report (2006) include processes of dynamic knowledge, mobile and personal technologies as a delivery platform, personalized content and services, and collaboration. Reflecting on these trends and exploring new media art conceptually, socially, and interactively offers an inroad to considering issues related to social computing, personal broadcasting (creative expression), mobile devices, educational gaming, augmented reality and enhanced visualization, and the phenomenon of context-aware environments and devices. These reflections evoke questions and conversations about cultural issues as related to creative and critical sensibilities to new media design and production.

Like the key trends being explored by the Horizon Report, new media artists explore issues of representation that are specific to new media devices and environments. These artworks are interactive, immersive, convergent, and embedded in new media and contemporary sociocultural processes. New media digital art represents and re-conceives art as a cultural interface experience. For this research, new media art is characterized as art that involves technology-experiences situated in communication processes, rather than in objects. The interaction with new media artwork has both performative and networking aspects reflective of technology in the contemporary social/cultural environment.

The exploration of digital new media artworks from a cultural interface approach reveals multiple ways to consider new media. For example, art educators could engage a cultural conversation about technology to mobilize ideas through: (a) *multimodality* (Kress, 2003), which is the exploration of media forms and relationships different

modalities for creating meaning expressing media forms and relationships and the multiple ways we come to know; (b) the concept of *remediation* (Bolter & Gromala, 2003), which is the relationship between newer and older media; (c) *embodiment* (Keifer-Boyd, 2007b), which is the exploration of the social being and new media; and (d) *contextual development* (Sandoval & Latorre, 2008), which is the use, concepts, and interpretation of technology in particular contexts within lived experiences.

Just as new media artists blur the boundaries of art and life, art educators might consider the characteristics reflective of technology experiences of their students as possibilities for exploring technology in an art curriculum. Through conceptual, social, and interactive experiences, new media artists often critically expose a sense of being part of this digital and Internet life of contemporary times. While there are uses of digital media that do not overtly challenge our understanding of art, technology, or life, art educators can learn to guide critique of such work by developing familiarity with Net art and other new media artworks and by applying a cultural interface approach to the study and creation of new media art. The next few paragraphs exemplify critical new media artworks and projects discussed as *cultural interfaces*, and organized around three concepts prevalent in contemporary discourse about art: (a) conceptual, (b) social, and (c) interactive experiences (Grau 2006; Hansen 2004; Paul, 2003).

The conceptual approach of new media artworks dislodges the materiality of art by evoking a database aesthetics, memory, desire, virtuality, and collective (inter)actions. As a first example, *Connection* by artist Mary Flanagan, is a network computer application. *Connection* searches your hard drive, collects pieces of digital data, and places them on a centralized server. The centralized data is collectively translated into an

animated, three-dimensional map. Mary Flanagan describes this as a "visible, virtual, networked collective unconscious." *Connection*'s use of the Internet as a collective memory space expands inquiry about the nature of memory in a digital network. A second example is an artwork entitled *3.8: alpha translocation* by the artist collaborative Tsusnamii.net. This artwork tracks and captures artists' physical locations using Global Positioning Systems (GPS), and translates their real locations into virtual locations on the Internet (i.e., Web sites). This artwork shifts our view, providing an alternative perspective in terms of virtual spaces.

Margot Lovejoy's *Turns (2002),* is a third example of a conceptual experience. The artwork is an installation in a physical space, as well as an interactive Web site that collects and shares a participant's life turning points (e.g., weddings, deaths, etc.) through social collaboration. The participant's individual experiences are added to the artwork, which cause it to evolve. These experiences are seen in different visual relationships through organizational lenses of the interface such as time and ethnicity. In a similar example, the artwork *Verbarium* (1999) by Sommerer and Mignonneau creates a site where the viewer/user engages in collaborative and distributed multiple knowledges. In the *Verbarium* interface, the user/viewer types text into a text box, which is then translated into a visual representation and combined into a collective of other viewer/user expressions. These artworks dislodge perceptions of where art is seen, challenge our notion of art as an object, shift discourses to participant interactions as the process for an evolving artwork, and engage new media interactions and experiences.

The social experiences of new media are often seen in new media artworks that incorporate examples of remixing and sampling popular culture. These artworks activate

and engage social processes of digital practices such as remixing, sampling, surveillance, data processing, and immersive technologies (Leeson, 1996; Rush, 1999, 2005) and social networking. For example, Paul Miller (aka DJ Spooky That Subliminal Kid), exemplifies the remix sensibility in *Rebirth of a Nation* (2002), a series of performances in which he reworks D. W. Griffith's controversial 1915 film *Birth of A Nation* while assembling an improvised soundtrack out of layers of sampled sound. New media artists employ and remix culture through social devices (e.g., games, toys, mobile phones, personal digital assistants, and global tracking devices) of popular culture. For example *Child as Audience* (2001), by Critical Art Ensemble, consists of a CD-ROM with instructions on how to hack into and alter the popular video games by *GameBoy*. Similarly in *Velvet Strike* (2002), Anne Marie Schleiner, Joan Leandre, and Brody Condon stage interventions by changing the interface of *Counter Strike*, a popular networked urban battle computer game.

As further instances of social experiences in new media art, Deitz (2002) and Ascott and Shanken (2003) define "telematic iterations" as processes of digital communication that uniquely alter time, distance, nature, and their respective relationships. Additionally, Green (2004) and Mayo (2004) describe Net art as artistic expressions that reorder the economic, political, and social constructions of the Internet. For example, since 1994 the Internet collective *Etoy*, has developed online art projects like the artworks *digital hijack* (1996), *TOYWAR* (2000), and *etoy.DAYCARE* (2002). Through these online projects, Etoy uses paradoxical actions that generate performative interventions online to critique corporate culture. Mimicking a business model, *Etoy* through the etoy.corporation Web site, raises funds for projects and sells stock to its

shareholders with the stock certificates serving as art objects. In their mission statement, *Etoy* states that it is a "corporate sculpture" that "crosses and blurs the frontiers between art, identity, nations, fashion, politics, technology, social engineering, music, power and business to create massive impact on global markets and digital culture" (etoy.corporation, 2006, ¶ 4). In *Telegarden* (1995), artist Ken Goldberg uses the Internet to alter our relationship to distance by extending our reach beyond physical respective location. *Telegarden* offers people from around the world the opportunity to view and interact with a garden filled with living plants by controlling a robotic arm via online instructions.

The social construction and perception of identity through digital environments is a reoccurring theme explored by new media artists. Examples include early artworks like *Warhead* (1982) by Nancy Burson and contemporary artworks by artist collectives like *Mongrel*. In the new media artwork *Uncomfortable Proximity* (2000), *Mongrel* altered images on the Web site of Tate Britain, one of England's leading art museums. By combining portraits by British painters, including Thomas Gainsborough, William Hogarth, and Joshua Reynolds, with images of their friends and family, the collective created their own version of art history—conjuring an alternative vision of British identity. In another example, the Internet art project *Mouchette* creates multiple fictitious online personas through e-mail accounts, personal Web pages, and social networking spaces. The art project appears to be the work of a thirteen-year-old girl named Mouchette. As the site is explored, it becomes clear that Mouchette is a fictional character—demonstrating the instability of online identity.

Interactive experience found in new media artworks involve exchanges between artists who set events and meanings in motion, and an audience, which further shapes the culturally conditioned experience—something between a hypnotic world and a gaming world. There are several ways that artists consider the cultural interface of contemporary digital interfaces. For example, digital interfaces can be created for a specific artwork such as the *Life-Writer* (2005). *Life Writer*, by the collaborative team Sommerer and Mignonneau, uses an old-style typewriter and digital interface that generates genetic algorithms. The piece comments on the action of the typewriter and the action of creating digital life forms. When the user types text, letters are projected onto the paper. The typewriter roll paper is used as a projection screen. When the participant pushes the carriage return, the letters on the screen turn into small artificial creatures. These creatures move fast or slow depending on the code of the genetic algorithm. They eat the text that is then typed, they reproduce, and the cycle continues until the paper surface becomes full. The user's interaction becomes part of the open-ended artwork where user-creature and creature-creature interaction become essential to the creation of digital life.

The artwork can be constructed around specific pre-existing digital interfaces like the Internet (e.g., *The Dumpster,* 2006) or make use of newer technologies (e.g., *Pedestrian,* 2002). *The Dumpster,* by Golan Levin, Kamal Nigam and Jonathan Feinberg is a visualization of romantic breakups from teenager blogs. Participating viewers are invited to "mine" the data. Mining data refers to looking at and organizing information to reveal patterns.

> The basic idea is that the currently selected breakup (the yellow one) acts as a search into the complete set of 20,000 breakups. All of the other breakups then re-

> color themselves according to their similarity with the selected one. Similarity is judged according to a weighted combination of a lot of different properties. … [Properties are color-coded to identify] breakups with inferences about the emotional state of the author, whether cheating seemed to be involved, etc. (Levin, 2006, ¶ 1)

From millions of online teen blogs, *The Dumpster* (Levin, *et. al.*, 2006) extracts 20,000 specific romantic relationships in which one person has 'dumped' another and graphically displays their similarities and differences.

Pedestrian (2002), a collaborative project by Shelley Eshkar and Paul Kaiser, is a twelve-minute video that projects an aerial view of moving pedestrians—represented as digital avatars (urban archetypes)—that move across the space enacting narratives with no beginnings or endings. *Pedestrian* is often projected outdoors into environments that are similar to those created within the digital space. The artwork uses motion capture technology to record eight people's movements as data. The data is then manipulated, recombined, and mapped onto three-dimensional digital models as human figures the artists call "bipeds." These bipeds are covered with digital renditions of skin, hair and clothing to represent a range of urban types. The software (called *Biped*) choreographs the disorganized, unregimented everyday movement of hundreds of moving biped figures. There is an accompanying soundtrack of urban noises create by musician Terence Pender. These new media artworks and projects, and their varying use of digital interfaces, provide an arena for considering and questioning technology use through *spatial, temporal,* and *interactive* digital environments. A cultural exploration extends mechanical skills-learning by considering and questioning a digital artifact's

becoming—by representations shaping cultural signs—beliefs, and by practices and their developments as socio-cultural processes in contemporary society. This cultural exploration of new media art, coupled with students exploring their personal use of new media, is an example of the cultural interface approach used by teacher and student participants in this research.

Additionally, interactive experiences of new media artworks shift interaction from passive audience reception to active participation. In the new media artwork *My Boyfriend Came Back from the War* (1996) by Olia Lialina, visitors click through frames on a Web page to reveal images and fragments of text. Although the original text and images of the story never change, the way the story unfolds through the texts and images is altered by each visitor's own navigational journey through the Web site. In another example, *One Word Movie* (Brogle & Zimmermann, 2003), the user supplies words, which are collected and organized to create an animated movie. The project blurs the boundaries between traditional cinema and digital database sampling, and remixing, and hyperlink. *One Word Movie* also offers a different view of online culture by making visible patterns of word-image associations. These artworks reflect how properties of new media dynamically alter the narrative.

Experiences with digital new media artworks projects such as those previously described, locate critical inquiry and personal actions and emotions as essential and integrated processes in questioning how we organize knowledge, form cultural practices, participate in social spaces, and understand corporeality, identity, politics, and power in the context of contemporary digital new media communication. Critical inquiry, as a type of interaction, implicates the participant in internal and external systems of epistemology

experienced through a digital interface. Further, interaction experienced through personal action and emotion engages an aesthetic realm of the digital interface, and shapes cultural signs, beliefs, and practices (Cubitt, 1998; Martin, 2005). These interactions translate aesthetics, content/concepts, and theory through approaches to digital interfaces as cultural interfaces.

In summary, this section briefly introduced critical digital new media from a cultural interface perspective as used in this research. The framework by which the works are presented is reflective of the evolving nature of new media—i.e., in a state of change. Just as technology's pervasive infusion is altering our everyday experiences, so too technology is challenging art categorized according to medium, tools, and techniques, as is evident in schools of art with courses and areas such as ceramics, painting, photography, and printmaking. Manovich (2001b) suggests that since the 1960s, the "rapid development of new artistic forms—assemblage, happening, installation, performance, action, conceptual art, process art, intermedia, time-based art, etc." is replacing the old typology of artistic mediums (material and representational as sign and referent). He suggests that we need a new aesthetic model that shifts away from a medium-based paradigm toward a new model that bridges the old and new perspectives as one continuum. He suggests developing and using a post-media aesthetics that includes the following concepts: "how a cultural object organizes data and structures user's experience of this data," "what kind of user's information operations a particular medium allows for," and "*information behavior*," which describes a particular way or pattern of "accessing and processing information" (p. 4). Manovich's suggestions, and the conversations of critical new media artists, challenge us to question assumptions

about digital interfaces, and consequently technological artifacts and processes, as part of the teaching and learning dynamic.

Qualitative Research

This qualitative research study offers naturalistic inquiry (Lincoln & Guba, 1985) in three different educational settings. Qualitative research's in-depth and "thick description" provides a "way for us *to* expose a culture's normalcy without reducing its particularity*"* (Geertz, 1973a, p. 14). This research is situated in three classroom contexts (Mishler, 1979), and a range of participant expertise and knowledge (Eisner, 1991). Additionally, this research uses pedagogy derived from expression and elaboration of personal sensibilities and translations, rather than from an imposed framework (Lather, 1991) and a premise of qualitative methods of emergent, rather than pre-set categories (Wolcott, 1994, 1999).

Qualitative research is formative and generative in learning from experience—a dialectical interplay between collaboration, research, practices, reflections, creative expressions, and insights. For example, the negotiations that emerge through developing curriculum and team teaching are traceable in email correspondence. In this qualitative inquiry, participants record their experiences through reflections on changes evidenced in their practice. Through engagement with new digital media art, this research involves participants' reflections on *ontology* (a theory of being), *epistemology* (how knowledge is acquired), and *methodology* (how we do things). All participants were involved in cycles of planning, acting, observing, reflecting, critically analyzing, and problematizing to assist in redefining issues, ideas, and assumptions concerning art education and technology.

Action research as qualitative inquiry is not a single methodology. Rather it includes a range of inquiry approaches, activities, and methods that evolve as part of a sequential process. The purpose of action research for this study is to connect intellectual knowledge and moment-to-moment practices, and to consider how reflective and educational activities (e.g., observations, reflections, and planning) shape art educators' communities (McTaggart, 1991; Reason & Torbert, 2001).

As a value-laden mode of inquiry, action research is seen as political in nature and absent of theory (Marshal, 1999):

> Research is also "political process" in many ways. Who researches and how; whose experience is researched and how that is named or categorized; what discourses gain currency and hold power; what forms of inquiry and writing are favoured by "mainstream" power-holders; and much more are political issues. "Creating knowledge" is political business. Living practice is thus politicized. (p. 158)

Action research is also considered problematic in the eyes of positivist ideologies (Kemmis & McTaggart, 2005), because action research challenges the objective world of scientific entities and views knowledge as constructed through beliefs, values, assumptions, perceptions, and social experiences.

The aim of this study is to consider possibilities and limitations of the following combinations: (a) art education, technology, and new media, (b) 9th to 12th grade art educators and (c) university researchers. The intention is to use a design that engages a reflective practice, thus contributing to another understanding of the cultural environments in which art education exists. The relational character of learning and knowledge, and the negotiated character of meaning, imply a relationship with culture for

personal exploration and exploration of ideas. “In all of its nuances, complexities, and promises, action research coalesces with a variety of new methodological and theoretical genres giving incentive to ask and act” (Stout, 2006, p. 197). Additionally, in the action research process, dialogue, observations, passions, successes, and failures all engage one another.

This dissertation’s research design—a cultural interface approach—attempts to minimize both reductive determinism and uncritical symptomatic understandings (e.g., technology self-generalizing social conditions as the norm). Instead, this research considers the complexity of the lived world; the researcher as observer; participants including technology as actors in a complex network; the iterative nature of interpretation through the cultural interface of the network; and the validity of these interpretations.

Analysis Lens and Ontology Informed by Actor-Network Theory (ANT)

This dissertation uses qualitative analysis with Actor-Network Theory (ANT) framing the arguments and analysis of data. An important aspect of this combination is the recognition and analysis of ideas between the nodes in a network. One example is the analysis of the “negotiations between the material world, historical associations, and people” (Martin, 2005, p. 284). In studying these negotiations, an action research design informed by Actor-Network Theory brings about the challenge of balance between dependence and independence, between inquiry from the inside and inquiry from the outside, and between knowledge creation and problem solving. One way to analyze these negotiations is to “identify logic and signification through studying the process of an object’s becoming—the particular things or combination of things depicted by an object and the logic behind their depiction by the object” (Latour, 1987, p. 21). During analysis

of such negotiations, we often encounter connections with other objects that tell us the logic behind their representations. Often one way to understand the reasons for various representations and their development is to follow the trajectories of particular limitations and possibilities of what each community within a networked system sees as important. This can be seen in this research by tracing the discussions between outside researchers and inside art educators, the lessons and strategies negotiated as part of the research, and students' translations as a form of problem solving through their artworks and reflections.

This dissertation examines the interfacing of expressions, experiences, and inscriptions of technology recognizing the influence of empowering *translations*. As Latour (2005) states, "There is no society, no social realm, and no social ties, *but there exist translations between mediator that may generate traceable associations*" (p. 109). ANT offers a means for staying sensitive to the differences in artistic, technological, and cultural dimensions in a *translation* of accounts. Through an ANT lens, *translation* takes on a specialized meaning where a relation does not transfer causality, but encourages and provokes two entities into coexisting. In considering ANT, this research design persuades participants (three art teachers, students in their art classes, and myself) to critically investigate new media digital artworks and digital media discourses (e.g., *Burson, Mori,* and *Spooky*) in their local sites (e.g., school cultures, technology, and curriculum).

The ontological position that knowledge is a social construction, and that ANT positions technology as an actor, provides a way of making sense of the world rather than discoveries about the world. Qualitative action research and ANT include issues of reciprocity in a heterogeneous network of aligned interests. However, unlike action research, ANT is not concerned with the emancipation of the researcher or practitioner,

although it may provide details for understanding the success or failure of particular innovations. Rather, ANT extends ethnographic analysis of translations between multiple entities (Tatnall & Gilding, 1999), which include both humans and technology seen through a single register—avoiding a dichotomy or the tendency to consider one as context for the other. ANT extends social constructivism because hybrid materials and social performances, not social factors alone, explain change and stability. ANT wrestles with socially located, non-innocent political performances that make a difference in understanding contexts of human and non-human interaction (Law & Singleton, 2000).

ANT analysis traces a *generative path;* namely it focuses on *how* entities are generated, not on *what* entities are generated. Consequently this study regards the way new media art is adopted as a translation. These translations can then become part of a repertoire for consideration in art education. The *innovation translation* approach of ANT (Law, 1992) was considered during the analysis of data (i.e., reflections and artifacts):

> Every entity, including the self, society, nature, every relation, every action, can be understood as a "choice" or "selection" of finer and finer embranchments going from abstract structure–actants–to concrete one–actors. The generative path that is thus traced gives extraordinary liberty of analysis compared to impoverished "social vocabulary" that was used earlier—and is now in fashion again. (Latour, 1996b, p. 373)

Through *inscription*, *translation*, and *framing,* ANT reflects on the processes or "network tracing activities" (Latour, 1996b, p. 378) significant to new media implementation in art education. ANT-tracing activities allow for critical reflection and analysis that include (a) implicating the self in the processes, (b) including new media art as a critical substantive

content in art education, and (c) observing processes of culture as a pedagogical approach to new media art education.

Research Questions

The use of a cultural interface approach with digital new media destabilizes tool training and offers new considerations as translations to expand technology content for art education. The term *cultural interface* has implications for how art education can conceptualize technology. Reframing new media art in art education as a *cultural interface* facilitates an approach that considers digital media as a portal to cultural data. In considering this approach, two main questions emerge for analyzing the data:

1. In what ways have the discourses, activities, and inquiry processes of a cultural interface approach altered participants' perceptions, interactions, and interpretations of art, art education, and new media technology?
2. What processes of patterning, social orchestration, ordering, and resistance are involved in shifting new media art education to emphasizing cultural content—such as the cultural interface of new digital media, digital signification systems, and digital communication?

The first question engages participants in dialogues (discourses), activities (lessons and artwork), and reflective discussions (inquiry processes) through a qualitative, naturalistic approach. The results from the cultural interface approach are examined through the participants' perspectives on art, pedagogy, and new media. The second question analyzes the changes to the network when a cultural interface approach is introduced as an educational alternative. The analysis focuses on the interfaces

between digital new media and art education, and on the interfaces between technology and society.

In order to address these questions, I guided participants in selecting and engaging digital media artworks. Participants explored new digital media artworks along with the content within these artworks, and developed approaches to new digital media in art education. These approaches were analyzed to address the research questions. The analysis consisted of a reflective inquiry-driven approach that considered multiple participant perspectives, interviews, dialogues, and artifacts.

Researcher and Participants' Roles in the Study

As the researcher-facilitator, I served as a participant and change agent whose reflective practice emerged from within this research. I took part in the strategies, actions, and inquiries of participants, and also deconstructed the analogous strategies, actions, and links generated by my own account. The participatory process served as a heuristic device to learn about my methods when studying participants and their methods. Through the content of new media art and as a facilitator, I guided participants in exploring new digital media in relation to their situated context. My guidance included building resources for community, participating collaboratively in all phases of research, integrating knowledge and actions to benefit all participants, recognizing and operating with a community's identity, promoting co-learning, supporting cyclical and iterative processes throughout the research, and disseminating findings to each participant. Three art educators, as participants of the research, and their students volunteered in the exploration of technology as a cultural interface. The art teachers came from a variety of technology environments, and although versed in the use of technology, they were not all

teaching the use of technology. Selected teacher participants were interested in investigating approaches to technology and developing innovative curriculum and strategies exploring the cultural content of new digital media in art education. Therefore, one focus of the study was to reflect on the participants' previous approaches to technology that would influence their translation of a cultural interface approach. The research involving participants spanned several months, and included identifying and exploring content, developing and implementing a plan of action, and reflecting on action for analysis.

Gathering, Managing, and Analyzing Research Data

The data analyzed from this research consisted of documentation, critical reflections, and responses to activities and artifacts created by participants. All participants gathered and managed data, which included interviews, observations, visual artifacts, and reflective journals. The data were processed and archived in compliance with The Pennsylvania State University Office for Research Protections (see research forms in Appendix A). The data were shared among participants to sharpen the analysis by incorporating their views and engaging them in reflective and analytical processes.

The analysis uses triangulation of the data obtained through naturalistic inquiry, reflective discourse, observation, and artifact documentation. The analysis presents emergent, inductive, and iterative connections (Crano, 1981; Green & McClintock, 1985). Triangulation, sorting for themes and patterns, and data coding reveals findings grounded in the data (Glaser & Strauss, 1967). The analysis was considered complete when critical categories were revealed, relationships among them established, and then integrated to inform grounded theory.

Presentation of the Findings

This research creates a polyvocal (Lal, 1999) text throughout the processes of gathering and analyzing data. The final research text contains three situated studies exploring new digital media as a cultural interface in response to questions posed by the research. The text includes participants' reflections and insights during the ongoing process and final body of data. The co-evolutionary process of participatory action research, ANT, and new media art [re]frames issues, ultimately leading to possibilities and limitations of pedagogical practices that are conscious of technocultural contexts.

Implications of the Study

This research offers insights expanding the current content of technology in art education. Specifically, by infusing an awareness of technology and cultural issues into both the content and practice of art education, students and teachers can expand their artistic dialogues and practices. This research provides an opportunity for students, teachers, and researchers to articulate *their* interpretations as a way to filter the diverse and contradictory information surrounding us in a contemporary digital society. Additionally, the use of ANT in the research process offers creative and substantive ways to analyze data; i.e., it includes the continual permutations of actions, as opposed to the static "action steps" often cited in policy plans (Paige, Hickok, & Patrick, 2004).

This research positions new digital media art as a valuable component of an art educational experience, expanding the context of students' technology use and purpose. Digital new media blurs the boundary by removing the separation between viewer and participant. Digital new media is a specific focus of this study because of its innovative ways of expressiveness, where the content and form are often inseparable, and because of

its societal pervasiveness, and art educators' desire to find approaches to guide their students to create with digital media and to critique new media art. This study initiates and guides art educators toward developing innovative approaches for content with new digital media art, art education, and new media cultural processes with implications for curricular content and pedagogy.

When considering technology innovation and its use, it becomes essential to put away the safe notion of *just a tool*. Although there has been research on new media technologies within art education (Francis, 1993; Johnson, 1997a; Mercedes, 1999; Orr, 2003), the rapid change of digital technology requires a continual study of its evolution. Sefton-Green (1999, 2000) and Turkle (1995) investigate children's engagement with technology outside the context of traditional education. They reposition the research outside formal educational settings into informal everyday settings. That is, they stage old dynamics in new settings as a way to move outside of the "black boxes." Likewise, I position a cultural interface approach as an opportunity to consider digital new media (youth culture dynamics) in art education (aged discipline). Technology integration within this revised approach becomes what Krug (2004) calls a "pressure point." My research juxtaposes students and art educators as researchers, and researchers as facilitators, at a "pressure point" of critical involvement.

Significance, Delimitations, and Limitations

The art educators in this study volunteered to participate and, therefore, were willing to change their curriculum and pedagogical approach. Their predisposition toward seeking new approaches to technology is a contextual factor and an important aspect of the study. The context for each teacher differed, according to how the teachers defined

their situations, and is presented as part of the *thick description* of the study. An analysis of the thick description assists in dissolving the how and why of the distinction between description and explanation, and considers the possibilities and limitations of a cultural interface approach. This process was iterative, as the researcher did not know in advance what patterns would emerge from data analysis.

The small sample of three art educators participating in this study limits the ability to generalize the research. However, qualitative studies are not intended to generalize conclusions, but to serve as exploratory studies gaining insight into specific contextual phenomenon. Qualitative data are difficult to report precisely and require thick descriptive methods, triangulation of data for analysis, interpretations based on coding, and justification of analysis through these descriptions (Geertz, 1973b; Wolcott, 1990). This research assumes that technology should be part of art education and that students use technology in their everyday lives. ANT provides a seamless network view between the social, the cultural, and the technological, and assumes that neither social institutions nor technologies move along inexorable trajectories.

Epilogue

Chapter 1 summarizes the research. Chapter 2 situates my central thesis within a literature review from 1995 to 2006, and focuses on studies concerning art education and technology, culture and technology, and digital new media artworks and discourses. Chapter 3 expands on the qualitative and action-research methodology, and ANT. Chapter 4, in narrative form, details the three site-specific environments, and includes observations and analysis. Chapter 5 refines and reflects upon the observations and interpretations, and provides implications for future research and conclusions.

CHAPTER 2

LITERATURE REVIEW

This chapter focuses on three areas of literature that pertain to my research: art education and technology research, culture and technology, and new media art resources. My dissertation research transects each of these areas to provide in-depth and comprehensive analyses in the discourse of technology in art education.

The purpose of this literature review is to locate in a wider context my central thesis that considers a cultural interface approach to technology in art education, and to develop and support the framework for the design, data collection, and analysis. This review identifies trends and patterns of relevant literature that contribute to understanding intersections of art education and new media technology as culturally situated.

The first section, *Literature on Art Education and Technology*, is the primary focus of this dissertation, and therefore encompasses most of the detail in the literature review. For clarity, this section is divided into background, search criteria, emerging themes, and a summary. A recent survey of the literature illustrates and acknowledges a need for "writings telling us more about how practicing teachers view or learn to apply electronic media" (Delacruz, 2004, p. 7).

The second section, *Literature on Culture and New Media Technology*, provides a contextual understanding and positioning of technology and culture in relation to my research. This section provides a conceptual argument for considering technology as neither utopic nor dystopic. My approach to the study and literature review moves beyond the often *media centric* approaches focusing on technology objects. More

specifically, the focus shifts away from *new* media technology objects and toward the cultural discourses that surround these technologies.

Finally, the third section**,** *Digital New Media Art—Resources*, provides a context for conversations exploring digital new media art. This section provides a set of resources that was used in this study concerning new media art creative productions and cultural conversations. "The relevance of artistic practice for cultures in transition, overwhelmed by the forces of globalization and grappling with new forms of cultural identity, is challenged" (Scholder & Crandall, 2001, p. 2). However, at the same time, these practices provide a space for critical discourse about the changing modes of representation, perception, and identification, and the tensions and interactions that exist within these cultural frameworks of new media art and technology.

Literature on Art Education about Technology

This section of the literature review encompasses publications about technology in the fields of art education and education from 1995 to 2006. This section begins with a brief background of the literature surrounding the policy rhetoric concerning educational technology, beginning with the establishment of national technology standards in the United States. A review of reflective research—questioning technology and its location in art education by Gregory (1996) and Delacruz (2004)—offers insights to reconsider perception of new digital technologies. As one example, Gregory asks us to consider art that challenges thinking, and Delacruz asks us to examine our working conditions. These perspectives influence the focus of the criteria used in this literature review for searching, analyzing, and exposing themes and categories that emerged.

Background of Literature on Art Education and Technology

With the emergence of the Internet in 1995 as a major force driving business, and to a lesser extent, education, policy reports began to present education technology as a "tool" of transformation in school reform (Culp, Honey, & Mandinach, 2003). During this period, policy and the research community shaped technology within education by the *transformative* ability of technology and schools. Schools unknowingly became emissaries for the values of technology, devoid of consideration of the sociocultural implications.

The tone of these reports also reflected the relationship between educational systems and practitioners in the field. Beginning with educational reform rhetoric of the 1980s and 1990s such as *A Nation at Risk* (1983) and *Goals 2000: Educate America Act (1994),* and continuing today with *No Child Left Behind Act (2001),* educational reform and policy rhetoric began to focus on the development of the information age as an alignment of education standards. The *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States* (1997) was indicative of early reform and policy toward educational technology in regards to hardware, connectivity, content, and teacher preparation. The goal was to "transform" education and provide justification for the "immediate and widespread incorporation of such technologies" (p. 113). Thus, school conditions were assayed according to their ability to support or impede the transformative use of technology.

As a result of policy initiatives, many important issues were masked and overshadowed. These issues included the importance of a technical infrastructure, sustained leadership supportive of a vision for effective technology use, and the offering

of opportunities for sustained and in-depth professional development. The economic aspirations of the *Goals 2000: Educate America Act* (1994) further fueled the contentious debate between what constitutes education and what constitutes indoctrinated training.

Gregory (1996) cautioned us to "eradicate the notion that a computer is a vortex for learning, replacing it with the more compelling vision of a computer as a catalyst for learning" (p. 51). *New Technologies in Art Education* (1997) edited by Gregory and published by the National Art Education Association (NAEA) embodied the complexity of the philosophy in the late 1990s. The book opens with a summary statement of the president's educational technology initiative toward "realizing the promise of educational technology" (n.p.). The collection of authors presents alternative visions beyond the purely technical approach. They provide an overview of new electronic technologies in art education and illustrate how these technologies can encourage "innovation" in art education (p. 2). Additionally, this book highlights several perspectives, all suggesting a need for critically questioning the uses and implications of *new* technology. For example, Congdon (1997) argued for policies more reflective of technology's implications; Francis (1997) raised issues about multiculturalism and interdisciplinary inquiry as it relates to interactive multimedia; Gigliotti (1997) questioned aesthetics and interactive technology; and Morbey (1997) raised issues of gender bias within the technological culture.

Similarly, Jackson (1997) and Johnson (1997a) saw a need to move beyond the purely technical approach. Jackson saw beyond the role of the non-critical, purely instrumentalist transformative uses in schooling, and called for a critical pedagogy for new media that promotes a counterbalance to transformative philosophy infusing practice. Johnson reviewed 80 articles and dissertations that describe aspects of curriculum and

computer art and graphics representing various assumptions of what curriculum is or should be, but which provided few rationales. By questioning whether the types of curriculum orientations that have been used in art education are reflective of the discipline of digital art, Johnson suggested re-stating the question as: What is in need of transforming? Thus, art education begins exposing the undercurrents of the impact of broad treatments of technology in educational reform and policy in regards to hardware, connectivity, content, and teacher preparation.

Additionally, Gigliotti (1997) saw a problem with those who continually insist on the importance and autonomy of the individual artist, market-driven factors, computer-technology production, and the repeated emergence of indoctrinated training. Gigliotti (1998) further investigated the influence of U.S. Congressional school reform on practice, and the resulting conflicts for artists, art educators, and students working within the arts. Gigliotti's argument questioned the single focus of the *Goals 2000: Educate America Act* (1994) as a blueprint for "prosperity" and "world leadership" (p. 89). Because of the resulting conflicts and singular focus, she offered a rationale for shifting from the tool-driven production in technology training associated with a market culture, toward a more culturally integrated model.

Jackson (1997), Johnson (1997a), and Gigliotti (1998) recognized the pervasive elements of technology and cautioned us to consider the ramifications beyond pure implementation. These considerations included engaging a critical approach to new media, recognizing curricular implications, and understanding political and economic forces. The rapid acceptance of technology infusion, fueled by public and educational

access to computers and the Internet, overshadowed a critical cultural analysis influencing the educational arena.

Thus, within the early years of this literature review (1995-1999), the research community did not make these critical issues a primary focus of study. Instead, there appeared to be a disconnection between the process of innovation in public schools and the articulation of technology as a new transformative element in the education process. Put more bluntly, there was a break between the constructed idea of technology's promise and a lack of a critical understanding of how technology actually gains a foothold in the school environment.

Research in more recent years (2002-2004) acknowledge the need for an integrated approach to place technology in the context of situated educational challenges (Partnership for 21st Century Skills, 2003). The initiative of the *Partnership for 21st Century Skills* explores moving education out of the 20th century model by expanding core subjects through learning and thinking skills, Information Communication Technology (ICT) literacy, life skills, and 21st century assessments. These processes include critical thinking, communication, creativity and innovation, collaborative and contextual learning, and information and media literacy. The ICT literacy skills include the ability to use technology to develop content knowledge and skills as part of the process of *how* to learn, think critically, solve problems, use information, communicate, innovate, and collaborate. This new rhetoric promotes a set of 21st century skills in the form of several strategies, including consideration of ongoing professional development, broad consensus and shared vision, high profile leadership, standards, curriculum and assessment that are aligned with 21st century skills, effective communication, and

aggressive implementation. With an emphasis on aligning standards, jobs selected by economic planners, and on computer-based programs, pedagogical issues become a secondary issue for many teachers, furthering an economic and technological means to an end.

The International Society for Technology in Education (ISTE, 2005) provides a set of performance indicators that are aligned with standards categories (e.g., basic operation, social, ethical and human issues, productivity tools, communication tools, research tools, and problem solving and decision making tools) to advance the effective use of technology in education. Their goals are for teachers and students to identify capabilities and limitations of contemporary and emerging technologies. More directly, the goals are to make informed choices, to analyze advantages and disadvantages of wide-spread use, to advocate for legal and ethical behaviors, to understand resource capabilities, and to evaluate technology-based options. When the focus of technology in public schools is perceived by educators as technical expectations, much teaching and learning does not get past the basic skill standards (Sandholtz & Reilly, 2004) to engage pedagogical issues that connect technology to curriculum.

As technology integration continues to be a "pressure point" (Krug, 2004, p. 4), art education has begun to question and consider adoption (Rose, 2002) as an integral part of pedagogical practice. As the processes of adoption and adaptation are more clearly understood, the seven contextual dimensions Krug (2004) cites, as suggested by the Milken Exchange on Educational Technology (learners, learning environment, professional competency, system capacity, community connections, technology capacity, and accountability), become a complex network for gauging educational technology's

impact in educational settings. Curriculum, pedagogy, communications, research, administration, and policy concerning technology in art education could employ a fluent, critical position about technology (Krug, 2004). This position could be one that engages innovative use of the complex network associations of practices and theory beyond the often-demarcated boundaries of skill-driven approaches.

In addition, more recent research acknowledges the need for understanding and exploring the adoption and adaptation of technology within the k-12 environment (Delacruz, 2004; Obiokor, 2002; Orr, 2003, 2004). With this in mind, the next subsections explain the criteria for searching and exploring the art and technology literature, revealing emerging patterns and issues through research and scholarship in art education and technology.

Searching Criteria for Literature on Art Education about Technology

This literature review includes a critical review method that considers several questions. What categories have emerged from a ten-year survey of this literature? What issues and questions have art education practitioners and researchers raised? How do these categories inform our understanding of technology in art education? What categories are emerging from the literature that might bring a contextual understanding of art education's relationship with technology? What shifts from 1995 to 2006 have emerged for art education research? The review of this literature provides a context for understanding, for critical evaluation, and for action in relation to art education and technology.

Delacruz (2004) surveys the literature exemplifying unmet promises of technology for enriching the practices of teaching art over the past twenty years. Her

framework for these writings presents the categories of "descriptive," "prescriptive," and "promotional processes," and explains the "possibilities" and "values" associated with using technologies within the classroom (p. 6). Delacruz's university-level art education courses expose the following two additional issues: the adaptation of technology to meaningful classroom practice, and suitable staff development. Her analysis of discourses about technology in art education argues for considering the lived realities of the classroom environment by providing appropriate technology workshops that meet teachers' needs in terms of knowledge and skill level. Most importantly, she sees a need for pre-service teachers to assess working conditions in their practicum. She proposed that we assess whether the classrooms in which students are observed or taught have network access and support personnel, and whether teachers negotiate in the development of technology policies. Delacruz calls for technology in art education that "accommodates teachers' values, working conditions, time constraints, and school cultures" (p. 17). Many of these issues surface in Delecruz's research and feasibility study. Her research challenges the rhetoric of the transformation philosophy prevalent in the educational policies of the 1990s.

Rather than building upon the descriptive, prescriptive, and promotional lenses used by Delacruz (2004), this dissertation literature review analyzes search results for emerging patterns and themes. The use of multiple keyword searches began the systematic approach for this literature review. For example, the fluid, strategic, and emergent use of technological terminology in art education over the past ten years required several keywords to produce a comprehensive search. As terminology is often culturally located, sometimes exclusive to a subject, it is appropriate as part of the

cultural interface process to consider terms such as *computer*, *digital*, and *new media* as interchangeable keywords for literature search parameters. As a result, the search parameters encompass several keywords emerging from a preliminary investigation of art education and technology literature.

The literature searches were conducted using the online databases WORLDCAT, PROQUEST, and JSTOR. Journals, books, and dissertations were included in the search criteria. First, all journal articles included in the review were selected from peer reviewed print and online journals. Second, the searches were limited to and focused on technology within art education from 1995-2006. Third, the review included some early policy issues as well as more recent initiatives, all of which bring some understanding to the cultural milieu of the rhetoric. The review excluded literature about non-digital technologies and research outside the context of secondary and higher art education. Newspapers and book reviews were not included. Additionally, I limited the search to the English language and United States school context.

In the United States in the past ten years, 82 articles, 80 books, and 68 dissertations have been written with a focus on technology, computers, digital new media, and art education. The search results suggested several patterns, from which four categories emerged to help organize this literature review: (a) explorations of computer- and Internet-assisted instructional design and learning theory in Art Education, (b) aesthetics and digital media connections, (c) critical resistances and challenges in art education and technology, and (d) factors influencing adoption and adaptation of technology in art education.

These categories frame the variations in the understanding and use of technology in art education over the past ten years. The categories are not isolated, but are my constructed conceptions, assumptions, and structures of integrated technological and cultural forces within art education. The categories provide a layout for the art education and technology literature review section of this chapter, and assist in framing the action research with three 9^{th}-12^{th} grade art teachers.

Explorations of Computer- and Internet-Assisted Instructional Design and Learning Theory in Art Education

This subsection explores emerging discourses of technologies and pedagogy associated with instructional design and learning theory. Beginning in the mid 1990s, when the Internet began its infusion into public and educational institutions, researchers conversations considered students engaged in contemporary digital learning environments. These included online and Web-based instruction, the Internet as a resource, distance education, hypertext, and multimedia. However, I saw minimal use of online environments, hypertext, or multimedia instructional technologies in the three art-education research sites of this study. The development and use of technology in k-12 school environments, combined with the development of technological communication processes, has stimulated research in recent years. This stimulation exemplifies the need for art education, within a contemporary educational visual cultural climate, to explore research in technology-assisted instructional design and learning theory as they relate to visual culture.

A comprehensive analysis involves exploring technology within existing art education curricula and school cultural frameworks (Evans, 1997; Johnson, 1997a,

1997b; Meyer, 2005; Rogers, 1997). With the pressure to become computer literate and the promotion of transformational ideology of technology policy, art educators have had concerns with improving design skill, strengthening aesthetic awareness, reforming communication processes, and integrating the new languages of visualization offered by computer-based technologies.

Evans (1997) took a critical look at the relationship of technology and art education by investigating access, use, and budgetary issues. Rogers (1997) looked at instructional design and the art educators' methods for incorporating computer-based technology into their complex content domains. Johnson's (1997b) research about computer art in education looked at the conventions used by computer artists, thus taking the research outside the domain of the classroom environment and then back in again. Johnson's research offered a perspective of how the existing framework of Discipline-Based Art Education (DBAE) is used, thus revealing that computer art education was influenced by the same underpinnings that influenced curriculum. Similarly, Meyer (2005) explored the *Documenta 11* exhibition's accessibility to art education by processing and rethinking the exhibition within the existing framework of traditional art education that attempts to neutralize social content in art. This perspective related to Johnson's research of understanding technology in the context of the existing frameworks of situated curricula and new media artists' practices. Moreover, Johnson's (1997b) and Meyer's (2005) research revealed that art educators in k-12 schools incorporated technology in ways that were comfortably situated in the cultural practice of their teaching environments and ideologies.

Several publications and areas of research in art education over the past ten years have offered insights into the following questions: Does research recognize the dynamic nature of the technology processes and concepts, and the intersection of historical and new paradigms (Boj Tovar, 2004; Orr, 2003)? Does the research inquire into what is unique about digital new media technologies for art education conversations (Mayo, 2004; Sweeny, 2004a, 2004b)? The National Art Education Association (NAEA) publication edited by Gregory (1997) began addressing these questions by exploring programs of promise and the innovative uses, issues, and implications of new technologies. In considering this research situated within the transformative philosophy, Gregory selected authors to investigate *new options*, *new explorations*, and *new visions*. Roland (1997) and Broadus-Garcia (1997) looked at the potential of distance learning and telecommunications, while Keifer-Boyd (1996), Bickley-Green (1997), Gleeson (1997), Schwartz (1997), Avila *et al.* (1997), and Stokrocki (1997) considered instructional technologies and teacher education. Additionally, Koos and Smith-Shank (1997), Francis (1997), and Congdon (1997) respectively scrutinized the implications of technological developments, the rhetorical implications of the electronic superhighway, and technological interactivity and accessibility. Of particular and unique interest within this text, Gigliotti critically argued how the "tool" approach misapprehends the pervasiveness of computer technology and creates assumptions about design and use. Her research and argument looked at interface design in technology as an "important avenue for artists and educators to effect changes in levels of accessibility" (p. 124). This questioning began to expose not only the physical aspects of the interface, but also engaged the more veiled issues that affect the cultural interface through assumptions, beliefs, and values.

Contemporary communication technologies offer an arena for research because of the natural relationship of image, text, and sound. Art education has the opportunity to engage in a full range of visual technology research discourses from practice exploring instructional technology design uses and learning theory (Di Marco, 2002; Kwon, 2004; Yang, 1998; Yeoh, 2003). Within instructional design, these discourses include unique attributes of systems, such as online (Eber, 1997; Hsu, 2004) and Web-based instruction (Chou, 2003; Park, 2003), using the Internet as a resource strategy (Choi, 2002; West, 1998), distance education (Lai, 2002), and hypertext and multimedia (Lim, 1996; Philpot, 1996; Taylor, 1999; Taylor & Carpenter, 2002). Developments in digital communication will necessitate continued research in digitally integrative and assistive processes from within practice. The challenge will be to include curriculum technology issues regarding larger cultural systems, such as the social and cultural implications concerning information and communication technologies.

Hypertext and multimedia technology research offers art educators opportunities to integrate computer technology into art education, especially as an instructional strategy for promoting multiple ways of knowing that are directly linked to visual imaging. Research with interactive computer technology, such as hypertext in art education, facilitates thinking about technology processes and associations among complex, abstract, and counterintuitive assumptions. A variety of research initiatives explores approaches to hypertext technology involvement in the complex process of relationship, interpretation, application, reflection, and self-knowledge. Several studies have specifically focused on hypertext and its use in “computer-aided inquiry,” combined with

curriculum design and pre-service art education (Carpenter & Taylor, 2003; Keifer-Boyd, 1996, 1997a, 1997b; Tavin, 2003; Taylor, 2004).

As k-12 schools engage with online learning environments and mobile learning devices (from response clickers to podcasting), instructional design and learning theory in art education will continue to expand in the realm of practice and research. These issues will continue to have implications for understanding integrated technologies involving text, image, and sound as contextual, personal, and cultural forces. Additionally, the understanding of the powerful context of interactive representation of knowledge (Sonvilla-Weiss, 2005) and visual displays that serve as visual and statistical evidence (Tufte, 2001, 2003; Zachry & Thralls, 2004) will fuel important research in art education.

Several topics were not expanded upon within this literature review because my research did not focus specifically on online learning environments. These topics include art education exploring the Internet (Roland, 2005), distance education (Lai, 2002), online museum environments (Kruse, 1998), and the Web as an interface (Lai & Ball, 2004; Mackey, 2001). However, all of these areas will continue to grow as evidenced by proposed implementation of online course management systems at two of my three research sites. The need for a more comprehensive understanding of virtual technology instructional and learning environments within art education and contemporary visual culture will continue as these environments become ubiquitous within k-12 educational environments.

As an example of current research and discourses, the 2006 College Art Association conference (Easterly, Elkovich, Rosas, Salmond, Schreiber, & Seaman, 2006) explored several issues that bring contemporary cultural practices of technology

into the instructional design and learning theory conversation. Chaired by Rosas, the panel explored some of the methods and questions currently being asked in new media art curricula. These discussions and presentations extended the research beyond tool use, implementation of instructional design, and learning theories. The panelists (Easterly, *et. al*., 2006) highlighted a variety of substantial methods for engaging students with new media discourses inclusive of rich critical and cultural conversations on characteristics of art and technology. Several recurrent themes emerged through the presentations of each panelist. The most notable themes included exploration of discourse of the medium; the dynamic nature of new media art and pedagogies; student relationships to new media technologies; and the need for critical cultural inquiry.

These issues exposed the dynamic nature of new media for its functional, sociological, and cultural discourses. The panelists expressed the need for understanding students' relationships with technology and reflecting on new media's unique connection to the context of everyday experiences. As exemplified by the presenters, the new media and art discourses provided by their academic programs embrace technology in the context of a medium. New media art discourses in higher education programs provide a transgressive space for learning, challenge the cultural assumptions embedded in understanding technology, and investigate strategies for critical thinking about technology process. These issues move beyond the skill and tool framework that I found to dominate k-12 art curricula when technology was included (Tillander, 2004). More importantly, higher education examines the new media discourses, whereas k-12 embraces the form.

The ubiquitous nature and performative qualities of technologically-mediated interactions through the latest interfaces (physical and cultural) can potentially provide perspectives on the impact that such interactions may have in shaping culture. New technologies will continue to influence how students see and create art, what students need to know, how students learn, and how we teach. Therefore, continuous research is needed concerning educational designs, learning theories, and how art educators implement technologies in the art classroom. This includes making connections not only to technology for education design interfaces, but also to contemporary cultural interfaces of students' lived experiences within the technological environment.

Aesthetic and Digital Media Connections

The digital aesthetic permeates contemporary life through media forms such as photography, film, digital media (e.g., iPod, DVD, and cell phone), and the Internet, producing a corporeal experience that is situated within the human-machine dichotomy. The term and concept of "interface" creates an additional tension. The term implies a separation between mind and matter as well as a metaphor to rejoin the two. Digital visual experiences offer insights into the complexity of the aesthetic experiences emerging from information cultures and these interfaces. The research in this area often uses traditional aesthetic ideas and Western paradigms such as (a) exploring the aesthetic difference between responses to computer images and to non-computer generated images and experiences (Bowen, 2004; Lin, 2005; Lu, 2000; Pabla, 2000); (b) descriptive analysis of computer generated art (Woodward, 1996); and (c) visual culture influences on Web-based design in art education instruction (Krug, 2002; Temple, 2005).

Mercedes's (1998, 1999) research specifically addresses aesthetic issues within visual culture and the concerns brought about by the advent of digital media. She shifts the focus away from the traditional Western aesthetics of academic critics, curators, art historians, and academic systems. More specifically, she argues for the implementation and application of a feminist aesthetic, and presents it as a new aesthetic paradigm for computer-mediated art. She characterizes a feminist aesthetic in new media art as not gender neutral, instead valuing the object as constructed, not inherent, and she "overturns" the more-less dichotomy. She shifts the focus to context, content, meaning, and relationship (1998). Focusing on a philosophical approach, she investigates the ways in which computer-mediated art refashions or remediates existing Western aesthetic theory.

Similarly, contemporary new media works and theories are challenging the usefulness of prior aesthetic theories. Explorations and research in the area of themes associated with digital media aesthetics include: database aesthetics, distributed aesthetics, information aesthetics, telematic aesthetics, and the materiality of information (Hayles, 2002; Lovejoy, 2004; Manovich, 2001a, 2001b; Miller aka DJ Spooky, 2004; Munster, 2006; New Media Art Net, n.d.). According to Hayles, materiality is defined by both "how the work mobilizes its resources as a physical artifact" and "the user's interactions with the work and the interpretive strategies she [user] develops" (Hayles, 2002, p. 33). Materiality, as well as the other themes, has surfaced only peripherally in art education publications (Keifer-Boyd, 2005a, 2007a; Richards, 2005; Sweeny, 2005). As these theories are still in their infancy, their potential impact on teaching and learning environments is not yet fully understood, and is often very abstract and conceptual. Art

education aesthetic research concerning digital technology issues is often connected to educational software/hardware, digital theory, and interactive and mass media studies (Bruce, 2002; Goldfarb, 1998; Helmbrecht, 2004; Kafala, 2000; Shaw, 2000).

Kafala (2000), like Mercedes (1999), challenges the traditional aesthetic frameworks informing visual information and thinking processes. He argues for a "simulationist aesthetic" expanding the three-dimensional (3D) game aesthetic where *form* meets *content* in concrete cultural practices that include the design and use of interactive media. For art education, this researcher signals an understanding that aesthetic theory and approaches are not singular, but reflect a culturally specific context of meaning and value. Specifically, for Kafala the learning outcome in *learner to object* and *object to object* interaction is a paradigm of "folding" and "unfolding" (Kafala, 2000, p. *v*). For Kafala this is a different relationship between figure and ground, vertical and horizontal—one that ruptures the Cartesian system for evaluating space in digital environments. Artifacts and events that inhabit 3D cyberspace include the surface and temporal inflections. Therefore, the domain of meaning is realized through audio, tactile, and visual representations at the interface, thus requiring different evaluative criteria for 3D, digitally animated objects. For art education, the evaluation of objects and events in 3D computer environments will require considering their interactions, inflections and transformations.

Critical Resistances and Challenges in Art Education and Technology

Research examining critical resistances and challenges to technology has begun to reveal expanded and dynamic articulations necessary to effectively consider art education in the contemporary context of digital technology. Examples include questioning the

market culture model of technology policies, reimagining identity in digitally mediated environments, challenging cultural assumptions about technology, and problematizing digital visual culture. Because k-12 technology curriculum will continue to respond in its inclusion of specific skills needed in a technology-rich environment, curriculum design should support the examination and study of technology and its impact on society as well as the ideological underpinnings of instructional practices and potentials.

Reflective critical practice is difficult without a shift in the understanding of technology from a tool-based process to a cultural process. This is evident in Scholz's (2005) criticism:

> Despite the widespread emergence of new-media arts programs and strong student interest throughout North American universities as well as in Finland, Singapore, Thailand, China, Germany, and Australia, surprisingly little public debate about the goals, structure, and topical orientation of these programs is taking place. (p. 95)

The issues raised by Scholz's argument include the demands of undergraduate students for vocational training; isolation of new-media art in the university lab; lack of advanced critical understanding of new-media artwork; meaningful use of theory; and the media-specific structures of most departments.

From another unique context, Sharpe (2003) implies that students are not being exposed to contemporary alternative practices using technology. Sharpe writes,

> … most students arrive to new technology classes imagining creating art using technology must mean either using the computer to do old art practices (i.e., image-making, 3D modeling, animation, or special effects for film) more effectively, or to do computer-related communication media. (p. 153)

Building on her assumption that the younger generations are all techno-savvy, Sharpe offers a process for teaching critical or alternative practice by using technologies not yet available to everyone, such as the newer wireless, mobile technologies. By investigating and developing pedagogy through her seminar entitled, "Pace/Place/Interface" (p. 155) that explores issues such as the "psychogeography" and "derivé [drift]" (p. 158), Sharpe enables a critical practice of mobile technologies as they are engaged in social spaces. The shift from viewing technology as a tool to seeing it as a cultural process (i.e., a cultural interface), expands the conversation for art education.

Witwicki (2003) relates a similar observation and recommends that, "educators must show how to think about computers rather than simply how to operate them" (p. 180). Witwicki's statement translates a strategy for art educators in what Weibel (1996) posits as a move toward an understanding of the construction of context-controlled event-worlds. Weibel considers the stages of technology adoption and adaptation in addition to the dissipative structures that digital new media promote. He argues that as technology alters our traditional notion of both visual and aesthetic ideas, the image changes into a "context-controlled event-world" caused by the dynamic properties of the system. For Weibel, these properties are the way information is stored—the adaptive quality of the image object and the behavioral patterns of the image. This reveals an epistemological (theory of knowledge), ontological (the nature of being), and axiological (the study of nature, types, and criteria of values and value judgments) convergence. It creates a place where tropes and metaphors collide in a "dynamic model of covariance between observer, interface, and environment," and where a dynamic convergent and dissipative cycle continues in flux (Weibel, p. 350).

Similarly, Colman (2005a) draws on this contextualist approach, saying that there is no best "one way," and that contemporary new media artwork problematizes the tropes of "progress," "new," "radical," and "revolutionary" embedded in utopian perspectives (p. 298). Although arguing that artists and educators who use technology often only highlight the technology itself, she also argues that the fast-paced development of technology is influencing a balance between conceptual ideas and software proficiency. Coleman cites three artworks as cultural activism facilitated by Internet technology: *King Cross Phone In* (1994) by Heath Bunting, *Lexicon* (2002) by Any Deck, and *Teleporting to an Unknown State* (1996/2001/2004) by Edwardo Kac. These artworks educate and challenge viewers regarding accepted assumptions about ubiquitous technologies. In particular and respectively this includes the collision between physical public space, everyday life, and communication technologies; the transparency and codes affecting user participation and interaction; and the sense of community and collective responsibility. Thus, these artworks engage a critical deliberation of technology for art education.

Colman's (2003) investigation of pedagogical strategies encourages college students to think critically about their perceptions and use of the Internet. Art educators continue this critical deliberation by examining the positions, practices, and principles concerning the engagement of technology and cultural processes within learning environments, and consider how technologies can be integrated to support and enhance pedagogical practices. For example, several authors publishing in *Studies in Art Education* examine art education, technology, curriculum, and practice (Garoian & Gaudelius, 2001; Mercedes, 1998; Taylor, 2004); investigate new technology in art

education at the college and university level (Burton, 2001); and ask whether computer-facilitated technologies can enrich the practice of teaching art (Cason, 1998; Galbraith, 1996).

Additionally, the 2004 *Studies in Art Education* issues focus on technology integration to enhance learning in and through the visual arts. Krug's (2004) editorial begins by asking art educators to adopt a fluent, critical response to how electronic technologies transform leisure and work environments. Specifically, within the context of a critical response, several authors from this issue offer some pedagogical implications. Lai and Ball (2004) examine theories for researching multicultural arts courses delivered completely online, and recognize the cultural constructions that the interface creates. Akins, Check, and Riley (2004) suggest that digital technologies might provide a transgressive space for learning, subverting authoritarian pedagogy, and encouraging the exploration of identity. Additionally, Garoian and Gaudelius (2004) challenge the cultural assumptions embedded in our understandings of technology's relationship to art, the body, and human life. Sweeny (2004b) identifies several theoretical lines of sight in curriculum and pedagogy, new media theory, and contemporary sociology as possible approaches for art education and technology.

Similarly, this research invites the exploration of identity, wrestles with assumptions about technology and art, and encourages taking a critical position as users, producers, and consumers of technology and its interfaces. This research also acknowledges the boundaries dissolving toward a more complex, dynamic view of social structures as continually reorganizing, interrelated networks, nodes, links, and flows such as those found in Art Education 2.0 (Art Education 2.0, 2007).

Factors Influencing Adoption and Adaptation of Technology in Art Education

The tool- and skill-driven approaches to technology in art education, often central in a curriculum, have been used extensively because of experience and support. These approaches often dilute the rich critical and cultural conversation characteristic of art and technology—and consequently stall the adoption and adaptation of technology into art education. If we can move beyond objectification, we can see technology as a "less predetermined sequence of learning events and more as a creative, social process" (Freedman, 2003, p. 146). The definition of *content* must go beyond "understanding of hardware and software … thought of as media and infused into curriculum with other media" (p. 146).

Haynes, Mandel, and Robillard (1998) call for a philosophical discourse in their five-year proposed curriculum reflecting the disciplines of epistemology (theory of knowledge), ontology (the nature of being), and axiology (the study of nature, types, and criteria of values and value judgments). They stated, "Our thesis is simple: in the age of electronic media, the artists need much more than training in the technologies of the 'image world' in which we live" (p. 187). Extending their arguments, I recognize the need for a comprehensive understanding of technology in art education connected not only to the tool process, but also to the sociocultural context.

The devices or tools themselves do not constitute a medium. To the contrary, a medium appropriates the techniques, forms, and social significance of the tool. A medium never operates in isolation; it exists in context with other media as well as in social and cultural contexts. However, the devices combined with social and cultural functions do constitute a medium. Sonvilla-Weiss (2005) explores redefining knowledge

construction in response to the interactive representation of contextual knowledge and the accelerating of the "iconic turn" through mass media and scientific visualization. These interfaces offer spaces where the intersection of art, technology, and society become substantial content for art education.

Sefton-Green's (1999) anthology illustrates creative work from within formal art curriculum and complementary educational sites that exposes a social and cultural context of new media**.** This anthology, with chapters by 12 authors, responds to the lack of research concerning creative ways for understanding the use of technology by students in a social and cultural context outside institutional frameworks. The anthology provides a dynamic nexus for understanding technology impacts and adaptations. These insights are based on students situated in contemporary technology, particularly these students' consumption of mass media and use of technologies available in leisure activities. This collection is a unique and early exploration of educators' and students' cultural participation through reflective practice of using technology in and out of traditional school environments. According to Cunningham and Rivett (1999):

> It may be that as ICTs begin to impact on the education system so teachers at all levels will have much to learn from each other and an equal amount to contribute to defining new modes of teaching and learning in the future. (p. 135)

Providing another space in which to explore the unique context of technology in art education, Sefton-Green's (1999) anthology acknowledges the potential of contributions at multiple levels to define new modes of teaching and learning. This approach reformulates research by engaging student and teacher practices in informal learning environments.

Over the past ten years, research has been conducted concerning conditions as well as assumptions, beliefs, teacher knowledge, interpretations, implementations, and perspectives of newer media technologies facing students and art educators in k-12 practice (Heise & Grandgenett, 1996; Hemmerla, 2000; M. Johnson, 1997a; Lu, 2000; Obiokor, 2002; Orr, 2003; Rogers, 1997; Rose, 2002). There is a need for critical practice to understand technology in our everyday lives, as well as the impact we have on visual culture as both creators and consumers of technology. A number of authors have taken a cultural studies approach to exploring the impact of film and video as cultural production and consumption media (Freedman, 1997; Gal-Ed, 2001; Sheridan, 2002; Stewart, 2002). Similarly, in the context of policy issues (Hobbs, 2005; Sutton, 2002) and past research, there are questions that ask for a more integrated and situated understanding of technology integration in the k-12 environment. By asking "how to address the needs of teachers already in the field" (Delacruz, 2004, p. 9) and "how to engage new technologies in authentic ways that accommodate teachers' values, work conditions, time constraints, and school cultures" (Delacruz, 2004, p. 17), we begin to see the complex relationships of research, implementation, and innovation within the art education community.

Art education is beginning to move beyond transformative rhetoric and to ask, "What do we really know about technology and art education" (Orr, 2004, p. 1)? Recent research in education has also begun to critically explore computer-based activities as improving the quality of students' learning (Barnett, 2001; Chisholm, 1994; Sandholtz, 2001), expanding students' knowledge base as a meaning-making process rather than as knowledge reception (Jonassen, 1995, 1999), and creating interest and motivation in school (Atkinson, 1999, 2000; Järvelä & Niemivirta, 2001). The use of technology in

education has begun to experience a paradigm shift away from a skills-based method of instruction and away from the strong focus on the transformative agenda of early policy initiatives. Instead, research and educational practice is moving toward a learner-centered model of teaching and learning, and toward determining how technology supports knowledge construction, exploration, learning by doing, learning by conversing, and learning through hybrid intellectual partnerships between human and machine.

In considering the impact of the powerful policy rhetoric in the late 1990s, it is interesting to note the historical transformation of research conversations in art education**,** which includes topics such as the following:

- teachers' perceptions about technology (Cato, 1997; Lu, 2000; Wang, 2000),
- content-based models connected to actual teaching practices and school cultures (Bac, 2002; Donnell, 2004; Fitszimmons, 2003; Hemmerla, 2000; Orr, 2003; Rogers, 1997; Rose, 2002),
- day-to-day classroom practice (Burton, 2001; Roland, 2006; Rose, 2002),
- understanding interpretation and implementation of technology (Obiokor, 2002),
- specific questions that focus on the critical spaces of the Internet (Chou, 2003; Keohane, 2003; Lai, 2002; Park, 2003; Sweeny, 2004a; Temple, 2005), and
- curricular content and pedagogical strategies (Boj Tovar, 2004; Keifer-Boyd, 2005b, 2007a; Sherman, 2001).

Orr (2003) examines several significant factors affecting adoption and adaptation of technology in education—including attitudes, perceptions, and practices—to understand

the relationship between the discipline of art education and technology. She analyzes the art educator's beliefs, revealing the following five concerns: (a) the function of technology in the classroom is limited, shaped, and encouraged by school cultural environments; (b) there are benefits and drawbacks to technology use; (c) technology skills are necessary for those secondary art education students who wish to pursue a career in the arts; (d) technology integration is creating new roles and practices among art educators; and (e) the role and function of technology in secondary art education classroom is that of a tool. These issues call attention to many underlying challenges, including art educators' experiences with technology, administrative support, and an understanding of traditional art media as influencing the role and function of new media technology in art education.

The integration of technology in art education is often a source of frustration, anxiety, and a feeling of being left behind (Rose, 2002; Tillander, 2004). These challenges are further revealed in the concepts of "polarity thinking" and "emotional scaffolding" that emerge in the findings of Rose's (2002) research. Polarity thinking is a perceptual construct in which concepts are understood to be antagonistic, thus delaying self-actualization, collaboration, innovation, and change. Emotional scaffolding creatively and critically supports learners by valuing the role emotional intelligence plays in learning. Rose concludes that curriculum theorists interested in technology integration in the schools need to recognize the importance of caring ways to engage information, skills, and technology resources. Orr (2003), Hemmerla (2000), Rogers (1997), and Rose's (2002) research expands our understanding of the challenges related to the level

of instructional use of technology within practice by weighing the beliefs and emotions associated with practice as a part of personal understanding for engaging technology.

Summary of Art Education and Technology Literature

Art educators Freedman and Stuhr (2004) disclose four conditions of the contemporary world and argue for a critical awareness for art education. In one of these four conditions, "daily interaction with newer media, particularly visual technologies," they posit a move toward visual culture that emphasizes new media (p. 814). Exploring the relationship of art and technology with visual culture, several art educators have compelled us to reexamine our presuppositions about art and education, society and the ways we come to know about art (Duncum & Bracey, 2001; Freedman, 2003; jagodzinski, 2005; Keifer-Boyd, Amburgy, & Knight, 2003; Keifer-Boyd, 2005a, 2005b; Neperud, 1995; Nyman, 2002; Richard, 2005). This is not a radical break with past technologies, but a reflection on digital culture as a critical space in which to consider historical and philosophical context. Technology, visual culture, and aesthetics have continually influenced each other through the processes of invention, development, transfer, and adaptation (Misa, 2004; Rabinovitz & Geil, 2004).

Ultimately, the content and implementation of technology must go beyond understanding through traditional art methods. Because technology pervades our daily lives, art education must consider moving beyond teaching technology as just another way to make art. In order to make these changes, art educators must facilitate an understanding of the four topics constructed from this literature review: educational design and learning theory, digital aesthetics, creative and critical resistances, and factors influencing technology use. The categories that emerged from my review of research

literature over the past ten years provide the support for a framework for art education and technology. This framework gives art educators a place for professional growth as well as an approach to consider content within the k-12 environment.

The working conditions and access varies so greatly within the k-12 environment, as observed in my past experience and shown in my recent research that it will be difficult to speculate on the future. These variations include an infrastructure of access, support, resources, leadership, and opportunities for innovation. In a positive light, this will require art educators to creatively develop and contribute to redefining strategies for teaching and learning, and then to implement courses of action initiated from unique situations, which are most valuable to students' needs. This will require an understanding of the nuances and challenges of using technology in the classroom, making practice engaging and employing classroom management strategies for teaching with technology. Example strategies include social networking, personal and collaborative communication, project-based and inquiry learning with multimedia, online content and processing, digital storytelling, and visualization and representation. What will be of value to both k-12 and university art educational technology research are processes for art educators that are simultaneously reflective and critical and that reengage technology through encouraging integration, innovation, and networking.

As developments in technology and policy recommendations continue, technology integration in the practice of k-12 will continue. Similarly, considering technology as "just tools" that one can utilize while teaching art obscures the implications of technology as a cultural interface. To go beyond this paradigm, art education must engage in a continual negotiation for understanding digital interfaces in a cultural

context. Digital and cultural issues will need to be integrated processes for future art educational practice and research, exploiting what and how technology is influencing the way we see and know.

Literature on Culture and New Media Technology

New discourses and research in the areas of information and communication technology about social and cultural contexts are beginning to emerge. These expose the implications of the merging of cultural and technological industries (Lievrouw & Livingstone, 2002, 2006). Research that looks across terminology, descriptive and explanatory tools, illustrative cases, and assumptions about everyday life provides many points of entry for conversations within art education. In this section, a few books that investigate some of the theory and practice of exploring the inter-relationship of social and cultural practices to technology are highlighted.

Several publications in the late 1990s emphasized that the tools of technology are not all-important and do not act alone or independently. This will ultimately change the way we think and learn, changing education and curriculum (Owen, 2004). The tools such as desktop icons ultimately come to represent the collective set of assumptions, interactions, and representations of knowledge. Exploring technology as a cultural interface in art education avoids the technological determinism or utopian views associated with the dichotomies of human and machine. This approach acknowledges the challenges such as causality, dependency, and progress, which have shaped the understanding of the relationship between new media technology and contemporary culture.

According to Daryl-Slack and Wise (2002):

> Cultural Studies' emphasis on the radical contextuality of phenomena under study and its use of articulation as both analytical tool and model of practice put it in a position to critique the assumptions embedded in technological practice and to contribute to the ongoing development of a more dynamic approach to new media technology. (p. 485)

Therefore, to use a cultural study method for understanding art education and technology engages technology and art as a discursive and political matrix (Hennion, 1995; Monahan, 2001, 2005). Specifically, for Hennion, a sociology of art is a sociology of mediation. The experiences reflect actors' illusions about their own beliefs. This facilitates active participation in both the production and consumption of technologically mediated visual information. These connections promote engagement with beliefs, institutions, communication, and a range of cultural practices embedded in a way of life.

Searching Criteria for Literature on Culture and New Media Technology

The searches in this literature section were conducted through several online databases, including WORLDCAT, PROQUEST, and JSTOR. Journals, books, and dissertations were included in the search and were supplemented with literature from cultural studies concerning technology. First, the term *socioculture* was used as a key word in combination with *technology* and *education* for situating the social context of culture and technology. Second, the content areas of technology, socioculture, and education were limited to the years 1995-2006. During this period, 9 articles, 30 books, and 36 dissertations matching the search criteria were found. The search results offer insights into the changing interests and landscape of technology and cultural forces.

Defining Culture and New Media Technology

Culture is difficult to define as it encompasses many dynamic processes. The constant change in culture is reflected every day in our habits, values, beliefs, artifacts, living spaces, and institutions. An adequate theory of culture must include the "ideal," "documentary," and "social" constructs (Williams, 1961, p. 57). As a social definition, Williams (1961) defines culture as "a particular way of life, which expresses certain meanings and values not only in art and learning but also in institutions and ordinary behaviour" (p. 57). By considering culture as a process and a construction, "we have to break from the common procedure of isolating the object and then discovering its components and focus on discovering the nature of a practice and then its conditions" (Williams, 1981, p. 16).

Additionally, defining *technology* can also be difficult. Dusek's (2006) approach, which uses three paradigms of defining technology, provides accessible definitions for the art teacher/collaborators with whom I have worked. Three characteristics of technology that punctuate a context for its understanding are "technology as hardware" [which is as tool], "technology as rules, and technology as system" (p. 31). Extending the object world of technology (tools) into the world of culture provides a contextual understanding of technology in our everyday lives, including those of education. Defining technology away from "thingness" toward a notion of articulations (Deleuze & Guattari, 1987; Morley & Chen, 1996) and assemblage (Deleuze & Guattari, 1987; Latour, 2005) encourages exploration as a cultural movement. Technology as articulations and assemblages draws attention to the way practices, representations, experiences, and effects express particular dynamics.

These dynamic articulations are what Hall called "lines of tendential force," which attract attention to their tendency to remain articulated (cited in Morley & Chen, 1996, pp. 141-142). This definition provides the most useful perspective for defining what it means to study technology in relationship to culture. Articulations are links or associations around people, places, artifacts, and ideas that become constructed knowledge and are often accepted over time (Slack & Wise, 2005).

> In a culture so committed to the idea of progress, the development of more sophisticated technologies comes to exemplify the process of the continual reach of humankind toward perfection. The nature of the technologies matters less than their novelty, their sophistication, their ability to accomplish something faster and more efficiently than could previously be accomplished. … All this condenses into an overwhelming commitment to the equation of the development of new technologies with social and economic progress. (Slack, 1989, p. 331)

Searching for articulations can expose the cultural assumptions underlying thinking about technology and culture that we often do not recognize—such as those between technology and progress.

These definitions of culture and technology provide an approach for moving away from the material and social dichotomy that often exists with the interface of human/machine interaction. The dynamic and ubiquitous engagement with the developments of the Internet and virtual networks in the late 1990s collapsed the human, digital, and machine boundaries. As Stocker (1997) stated, "the Information Revolution was, from the very inception, a matter of intense concern to art and culture, which not only reflected the process of change but were also fundamentally transformed and

redefined by it" (¶ 1). It is here that the tensions surface at the *interface,* where the metaphor attempts to connect and separate simultaneously. When the machine is envisioned as an object, the interface acts as a physical link, reinforcing the human/machine boundaries; therefore, the social and cultural implications are obscured.

Connections and associations that emerge from our definitions and our cultural environment can be supported or destabilized by our engagement with technology. Therefore, by struggling with definitions of technology and culture, and by altering our lenses (Postman, 1993), a cultural interface approach provides a process (i.e., ideas and actions) and insights into the nature and situated context of the debate. Coming to know through a "tool using culture" (Postman, 1993, p. 25) sets up a divide between tools and our belief systems or ideologies. As contemporary society engages with technology's ubiquitous tools, the tools become "integrated into the culture in ways that do not pose significant contradictions to its [technology's] world-view" (p. 25). Therefore, acceptance of a single view inherently imposes constraints that limit multiple views and limit how digital views disrupt cultural analysis.

Observing the increased use of the word *technoculture*, Johnson (1997) argues that technology and culture are colliding. Additionally, he argues that the new digital interfaces present information in a new way and are reconfiguring our relationship to the world. These reconfigurations are working through various levels in the interfaces: "Bitmaps" as contemporary information space; "Desktop" as metaphor affecting views of social life; "Windows" providing multiple viewpoints; "Links" providing parallel contexts; "Text" as old fashioned words on a screen; and "Agents" as software interfaces influencing cultural desire. Johnson offers a view of how the digital presents information

in a new way, and predicted that this process would extend beyond the scope of the computer interface:

> The artisans of interface culture … have become some new fusion of artist and engineer—interfaces, cyberpunks, Web masters—charged with the epic task of representing our digital machines, making sense of information in its raw form. (p. 7)

Johnson (1997) explores the interface as a medium and exposes several themes that serve as hybrid templates. These themes include spatial depth versus psychological depth, society versus the individual, mainstream versus avant-garde, one interface versus many, metaphor versus simulation, and fragmentation versus synthesis. Johnson developed these themes because he felt that we do not have a language to describe the interface without reducing it to a decision of "is it easy to use or not" (p. 217). For Johnson, the themes attempt to present oppositional forces in order "to think about something that is too big to think, and the devices we build for ourselves to complete the thought" (p. 240). He concludes that, "Our interfaces are stories we tell ourselves to ward off the senselessness, memory palaces built of silicon and light" (p. 242).

Intersection of Culture and New Media Technology

Several authors' arguments begin to explore how digital communication technology is not only a transfer of information via tools, but also how it influences an integrated understanding of social, political, economic, and cultural interfaces. The transition of technology into society begins with its use, or what we might consider the *is it easy to use or not* stage. The ramifications of technology's uses are not fully understood in this beginning stage. For example, as industry began to capitalize on the

public engagement with digital technologies, the hardware and software industry, through inquiry, strove to make the systems more user-friendly. This process of inquiry began exploring not only the technical hardware [tool] but also the software (e.g., social software[1]) that is shaping and being shaped by the social, cultural, economic, and political environment. "The classic Western model of the individual as an autonomous, inwardly oriented entity is being dropped in favor of a hybrid, networked subjectivity, whereby we comprehend ourselves as a dynamic interface in a social communication network" (Stocker, 1997, ¶ 7). These social processes become the key to developing technology that is more likely to be viable economically and result in an exploration of issues such as identity, presence, conversation, and collaboration. These economic incentives promote inquiry of telecommunication processes from within and across all levels of society. These levels require understanding telecommunications as a dynamic entity of social processes involving public policy as well as private lives (Van Dijk, 1999).

Digitization, convergence, globalization, and interactivity became trajectories of exploration as digital media proliferated throughout society in the 1990s. An example would be the social and technical processes merging telecommunications and computerizations into networks (Castells, 1996). Research moved beyond studying the emerging forms of technology to include both audience use and engagement (Livingstone, 2003, 2004; Press & Livingstone, 2006). The research began to explore the

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[1] Social software is software that supports group interaction, encompassing processes that facilitate connections and/or collaborations through digitally mediated communication. Examples include email, text messaging, and podcasting.

effect of digital technologies on the impact of information and communication on society in the areas of globalization, multiple identities, network partnerships, and media habits (Flew, 2004; Lee, Leung, & So, 2004). The social systems of engagement proliferated through digital media such as email, instant messaging, simulated environments, blogs, and wikis, which provided rich sources for investigation. Additionally, cultural artifacts and events, such as digital entertainment, stimulated an analysis of the relationship of new digital media and society.

McBride (2005) calls for us to consider the intersection between technology and art as they are being framed within the classroom. She speculates that the current emphasis on technical skills exacerbate lack of critical pedagogy. Mediated digital communication provides an opportunity for insight at the intersection of visual representation and technology. This affords an opportunity for a critical and self-reflective examination of technology and cultural conversation as they are being framed in the classroom as part of the pedagogical process. The book's essays address the impact of technology (including distance learning) and new modes of visual representation on pedagogical technique. It emphasizes the importance of student reflective responses as they read images and texts. Consequently, pedagogy can move beyond limited constraints of "learning how to use digital technologies" to consider issues influencing learning. The book's authors embrace several approaches for using new media to teach in educational settings that often rely heavily on visual literacy.

Within the initial search parameters of this dissertation, I found several books that explore culture, digital new media technology, and philosophy. Several authors argue for the need to understand digital technologies—and their social, political, and ethical

implications—in historical, philosophical, and research contexts. These texts reveal how technologies reflect, as well as change, human life at the individual, social, and cultural levels (Daryl-Slack & Wise, 2002; Kaplan, 2004; Lievrouw & Livingstone, 2002; Misa, 2004; Murphie & Potts, 2003; Rabinovitz & Geil, 2004; Van Dijk, 1999).

Digital technologies are often characterized as breaking radically with past technologies, practices, and ideologies rather than reflecting or incorporating them. This makes theorizing very susceptible to a binary argument. To avoid this dichotomy, Van Dijk (1999) looks at social issues of new media. He calls for an integrated approach to understand interactive media, beginning with an assessment of the structural "more or less objective properties" of the medium (p. 17). These structural properties he calls "communication capacities," and these capacities "have particular potentialities and limitations which cannot be removed (inter)subjectively" (p. 17). The attributes of the properties are part of the infrastructure of the medium, what he calls the (inter)subjective characteristics of the medium.

Important to Van Dijk (1999) are the ways in which users perceive the capacities of the medium, and then how they are used. Van Dijk identifies four levels of interactivity as "interactivity between human beings, between human beings and media or machines, between human beings by means of media, and even between media or between machines (technical interactivity)" (p. 11). How people engage with a technical medium shapes their perceptions of that medium, providing another source by which to think about the characteristics of digital media. Similarly, Levinson (1997) and Bolter and Grusin (1999) emphasize the development of a new medium as "remediation," a reconstituting and rearranging of earlier aspects of media. Thus, new digital media are

not additive, or a break, but rather the evolution of technology in response to human ecologies.

To avoid a dichotomy, Lunenfeld (2000) makes another argument for identifying a dialectic of digital technologies, which reshapes the way we see and know the world. This dialectic elucidates more than the pros and cons of cybernetics, Net porn, Neo-Luddism, hypertext, and a host of other cybercultural phenomena—going beyond the one-sidedness of both utopian and dystopian visions of the digital. Lunenfeld uses the term "hyperaesthetics" to explore the ways that technology increasingly alters our understanding of self and the world in which we live as a temporal oscillation (p. 27). He compares theories of art and artmaking with growing real time aesthetics through theoretical comparison and interpretive modes of critical inquiry. He considers artistic strategies such as perspective, multiple representations, and media transparency to expose connections with ways of understanding contemporary technological conditions. Examples of these conditions include transparent hypermediacy (Bolter & Grusin, 1999), multiplicity, erasure, and networked identity. This examination both instigates and challenges discussions concerning the place of art education within a technomediated world.

Focusing on the aesthetic as a cultural approach to technology, Darley (2000) argues that the late 20th century was preoccupied with understanding digital technology's influence upon culture. He contends that this approach was highly speculative and future-oriented and did not consider history or the numerous forces shaping technology. In an interesting articulation, he argues for a means to understand contemporary visual culture at the aesthetic level. Specifically he focuses on spectatorship and the spaces of aesthetic

consumption. He critically explores technological-based visual forms in terms of mass digital visual culture and cultural-aesthetic contexts. These explorations include activities, responses, continuities, discontinuities, similarities, and the differences of technical forms and cultural aesthetic contexts. This is much like Actor-Network Theory (ANT), and is a similar approach to that of Law (1990) who insists that "the stability and form of artifacts should be seen as a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network" (p. 113).

Lull (2001) brought together sociologists and anthropologists to explore what culture means in a modern era. This selection of authors juxtaposes readings that broaden orientations toward culture and communication. In his position as editor, Lull emphasized practices and processes against an overly technical conception of communication technologies. Here we see a relationship to ANT in situations where humans and machines are being guided by participation in a symmetrical relationship. This is where meanings arise through the involvements in social practices or hybrid/socio-technical assemblages and through processes of negotiations between the material world and people.

Gary Krug (2005) argues against studying technology in terms of artifacts and people, but alternatively, for studying communication technology as an integral part of culture and lived experiences. This approach is much like ANT, in that it considers the complex infrastructure of the actor-networks. By tracing the evolution of technology, culture, and the self, Krug moves away from the superficialities of the awe and explosion of newer technologies to consider the complex networks of surrounding factors.

In summary, these authors analyze new digital media from technical, sociological, and cultural perspectives. These analyses afford an understanding of cultural content for consideration as part of technology within art education.

New Media Digital Art—Resources

For this research, the investigation of texts for new media digital artwork, critical writing, and theory went beyond the traditional parameters of a search for literature. This research required an exploration of hybrid online new media resources, artist exhibitions, and new media artists' Web sites.

> Tracking the effects of the technologizing of experience demands a cross disciplinary approach that undermines the utopian premise of progress and reveals reflexive and speculative work done in the fields of art, architecture, literature, photography, cinema, "smart machines," and the culture of everyday life. (Druckrey, 1997, p. 12)

The resources include discourses on theoretical conversations (Ascott & Shanken, 2003; Druckrey, 1997, 1999; Gene, 2002; Grau, 2003; Leeson, 1996; Malloy, 2003; Manovich, 2001a, 2001b), anthologies presenting a historical and cultural context (Greene, 2004; Paul, 2003; Rush, 1999, 2005; Wilson, 2002), and critical writings (Spiller, 2002; Wardrip-Fruin & Montfort, 2003).

Additionally, within the last ten years, numerous virtual resources have emerged. These resources provide valuable insights for exploring the discourse of new media digital art within a cultural context. In conducting this literature review, I explored and arranged these resources into the following categories:

- online digital media resource centers (*Ars Electronica , Multimedia Art Research Centers and Electronic Laboratories (MARCEL), medi@terra, and NewmediaFIX <nettime>),*
- online hybrid forums, journals, and organizations (*The Inter-Society for the Electronic Arts [ISEA]*, *Leonardo*, *Rhizome.org*, *Runme.org*, *v2 Organization*, and *Turbulence*), and
- online digital art exhibition spaces and repositories (*Artport, The Whitney Museum American Art Portal to New Art*, *Walker Museum, Gallery 9*, *The Database of Virtual Art*).

These online resources provide dynamic philosophies with a research emphasis.

> Media and technology are omnipresent in contemporary society, and the same technological developments that are changing communication, production, trade, urban culture and medicine, are also transforming the arts. Art which applies electronic media—especially digital or "unstable" media—reflects upon and takes into account the meaning, idiosyncrasies and boundaries of such media. In this process, instability is a creative force that is essential to the continuous re-ordering of the social/cultural, political and economic relations in society. Instead of providing us with an orderly, homogeneous worldview, unstable media present an image of a world that is inconsistent, heterogeneous, complex and variable. (*V2 Institute for the Unstable Media*, 2006, ¶ 3)

Ars Electronica, an online digital media resource center that began in 1979, is a festival for art, technology, and society. It continues today as a festival, and as a center for virtual online forums, resources, and archives that focus on digital art and media

culture. *Inter-society for the Electronic Arts* (ISEA), a non-profit international organization founded nine years after *Ars Electronica*, focuses on art, science, and emerging technologies. This organization supports the electronic arts through newsletters, online archives, and exchange environments, and serves as a regular gathering for the international art, science, and technology community.

Additionally, exhibitions and artists' Web sites (e.g., http://www.interface.ufg.ac.at/christa-laurent/, http://maryflanagan.com/default.htm, and http://jillmagid.net/index.php) provide a concurrent and contemporary context for exploring digital art and technology issues. These online resources provide a comprehensive archive beyond the museum sites that have emerged within the past ten years. Specifically, many artists write about their ideas, the theory, and the process involved with the artworks. Additionally, publishers often provide links in the books they publish. For example, Paul (2003) lists the Universal Resource Locators (URLs) of the Web sites in a reference section of her book. Likewise, the publisher provides, via its Web site, a dynamic link to these book references (Thames & Hudson, 2006).

This literature review reveals a set of digital media discourses. Some notable examples include understanding technology as a *medium* with interactive and participatory features; considering technology processes ubiquitously integrated into the culture of contemporary everyday life, such as public and private spaces; thinking about representation, bodies, and identity; exploring changing aesthetic and sociocultural experiences associated with digital new media. The underlying concepts of these resources, combined with emerging teaching practices evolving from new media art programs in higher education, offer discussions for integrating digital media into art

education. These resources not only provide a conversation about the discipline of visual images in art, but they also include connections to everyday uses of technologies as a cultural force. In summary, this section highlights examples of new media digital artworks, critical writing, and theory all of which offer conversations to develop a curriculum framework.

Summary of Literature Review

Over the last decade, art education researchers, cultural studies theorists, and new media digital artists have exposed complex issues surrounding technology and cultural practices. This review investigated literature in two areas—literature in art education about technology, and literature on culture and new media technology—and provided resources for new media art. These themes document the movement of art education away from the transformative focus circulating ten years ago, to a more analytical and contextual inquiry approach to understanding technology in art education. Exposing and organizing these conceptual themes from the past ten years assisted with the direction of this dissertation's research.

An exploration of cultural studies and technology brought additional insights to this dissertation. These insights emphasize cultural phenomena in an information society, which broadens the focus from a single object of study, such as art, and facilitates an analysis of art (i.e., digital new media art) situated in a cultural context. Cultural studies and technology, as well as an exploration of resources available about new media digital art, assisted with a framework for understanding and refining this dissertation's questions and design. With respect to all these areas, the literature exposed the impact of digital technology on cultural production and consumption, aesthetics, identity, and

communication—in addition to the complex relationship of educational policy and practice.

Although recent research has focused on k-12 teachers' beliefs, assumptions, and working conditions, little research has concentrated on understanding alternative and creative visions for exploring cultural issues associated with technology. Thus, there is a need for research from within k-12 practice that centers on where analytical and critical inquiries can best expose the potential and the restrictions of technology in art education.

Art educators will continually confront the challenge of integrating technology into their classroom and art curriculum. According to Castells (1996), "Because culture is mediated and enacted through communication, cultures themselves, that is our historically produced systems of belief and codes, become fundamentally transformed, and will be more so over time, by new technological systems" (p. 328). In a society organized around mass media and electronic information, ideas outside the technological system can be limited to interpersonal networks and disappear as a voice from the collective mind (Castells, 1996). In this regard, the personal priorities and choices made by k-12 art educators, the subtle shifts within situated art education practice, and the sites of conflicts for art educators, all become invaluable conversations within an interpersonal network of collaborative inquiry.

CHAPTER 3

RESEARCH METHODS

Chapter 3 elaborates on the research methodology used in this dissertation. Specifically, the chapter substantiates the selection of qualitative methodology and action research and then focuses more specifically on the Participatory Action Research (PAR) design. Additionally, Actor-Network Theory (ANT) is discussed as the lens employed for conceptualizing data as networked processes. Further, this chapter expands the context of a multi-site study, site participants, research procedures, and the role of the researcher. Next, this chapter details the design for gathering and managing of data, analysis leading toward grounded theory, and ethical considerations, limitations, challenges, and validity issues. Finally, the chapter concludes with a plan for the analytical and interpretative narrative approach used in Chapter 4.

Qualitative Research Design

Qualitative research involves the analyses and interpretation of texts, interviews, and observations with the intent to formulate meaningful patterns that provide insights into the subject of interest. Qualitative research leads to hypothesis-generation, whereas quantitative research leads to hypothesis testing. Qualitative research explores the complex, emergent, changing, and often paradoxical social nature of humans within specific environments.

Qualitative research design was chosen for this study because it offers naturalistic inquiry through case studies and provides opportunities to mine the experiences of complex teaching and learning environments (Lincoln & Guba, 1985). Additionally, qualitative research processes support the handling of in-depth, thick descriptions

(Geertz, 1973b) characteristic of studies situated in a classroom context (Mishler, 1979), and can be inclusive of participant expertise and knowledge (Eisner, 1991). Furthermore, qualitative design was chosen because it supports pedagogy derived from expression and elaboration of personal sensibilities, rather than an imposed framework. The design uses emergent rather than pre-set categories throughout the research processes (Lather, 1991; Wolcott, 1990, 1994, 1995, 1999). In particular, this research applies qualitative inquiry methods using action research (Kemmis & McTaggart, 2005; Reason & Bradbury, 2001) and the principles, contexts, and consequences associated specifically with PAR (McTaggart, 1991, 1997).

The primary characteristics of this research are educational environments involving the initiation of the inquiry process with a diverse set of participants (9^{th}–12^{th} grade art teachers and their students). The research design explores *emergent* theory instead of *predictive* theory and engages in a critical, reflexive analysis involving a cultural perspective (role) of technology. As a result, this research exposes the potential and limitations of digital media in art education by exploring a "cultural interface" approach that includes contemporary digital media discourses.

Qualitative research is an appropriate method for studies situated in practice, where conditions are dynamic. The process of teaching and learning is iterative, and it involves complex actants. Naturalistic inquiry places the researcher within the research process, requiring the research to recognize the untidy, dynamic, entangled, and unpredictable realities of culture, lived experiences, and educational practice. Intuitive, tacit knowledge, a *knowing-in-action* (Schön, 1983, 1987), allows for critical thinking

and reflexive inquiry action. Qualitative research makes visible the rich data from practices that are complex and changing, requiring flexibility and responsiveness.

This research contributes to understanding creative art educational practice in the 21st century within three professional working contexts. The research process is unique to each site—reflective of the three art educators within their respective schools and their cultural contexts. Therefore, discovery of the uniqueness of each situation as a network grappling with a cultural interface approach to new media art education forms the narrative of Chapter 4, while Chapter 5 presents a synthesis related to the research questions for this study. The engaged practitioners are three art educators, students, and the researcher, while additional actants include culture and digital media.

Contributing to the creative and active exploration of research within practice takes ethical and social responsibility. This in turn, informs an understanding of potential strategies and new curriculum developments from within the creative and cultural context of lived experience and art educational practice. The process of learning is iterative and is aligned with qualitative research, and offers appropriate strategies for this research.

Action Research

Action research as defined by Lewin (1948) is "comparative research on the conditions and effects of various forms of social action and research leading to social action" (p. 202) that uses a series of steps, "each of which is composed of a circle of planning, action, and fact-finding about the result of the action" (p. 206). Action research is participatory and democratic, offering an opportunity to open new spaces for communication and collaboration and acknowledging multiple ways of knowing. These are the processes by which this research unfolds.

In a world characterized by individualism and alienation, the processes of communication and participation, and collaboration become even more complex. The first step of action research is the formation of a communicative space that helps participants achieve mutual understanding and consensus about collaboration (Kemmis & McTaggart, 2005). This in itself becomes a form of action in encouraging participants to develop and sustain dialogue. As an action, it becomes a method of inquiry and education "with" people rather than "on" people (Heron, 1996). Often, the isolation of the teacher is a key inhibitor to education improvement (Sagor, 1992). Action research can move educators out of isolation and into collegial relationships to create their own focus for personal growth. Collaboration and communication can deepen the understanding and interpersonal support needed for creatively solving the complex problems of teaching and learning. In addition, collaboration and communication are important for educators as researchers and researchers as educators to facilitate pedagogy in which students take responsibility for learning and for the transfer of that learning into their lives outside of the classroom.

In today's high tech culture, communication technologies provide new and different forms of communication and collaboration. These new forms of communication enable the intermingling of diverse perspectives, and support a network of participants, each with different points of view. The Internet, for example, "provide[s] a rich space for both acting out and working through in the spirit of self reflection" (Turkle, 2004, p. 21). These new forms of communication are reflected in this study in how the participants negotiated in the collaborative process. Email provided both a record and a collaborative means for discussions between participants. It served as a tool for clarifying and

negotiating various views regarding which new media works to use with students, and how to introduce new media art into creative practice.

Litosseliti, Marttunen, Laurinen, and Salminen (2005) argue that the use of computer technologies for communication should concern structure and quality of interaction rather than effectiveness and delivery of content. Similarly, Hayles (2002) argues that in considering books and online writing forms, such as hypertext, the process requires "an integrated perspective in which all components became signifying practices" (p. 41). This research recognizes the signifying practices of specific strategies and skills involved with digital media, and extends the discussion into the art classroom by examining the interfaces of new media.

Action research reveals and transforms inquiry by bringing multiple spheres of knowing into view. Heron and Reason's (2006) theory of "how we know" extends co-operative learning beyond theoretical, propositional knowledge. They identify "experiential knowing," "presentational knowing," "propositional knowing," and "practical knowing" as four ways of knowing within the inquiry process (p. 145). Experiential knowing results from direct, face-to-face encounters with people, places, or things; presentational knowing emerges from experiential knowing in the form of expressive meaning; propositional knowing is knowing through ideas and theories; and practical knowing is knowing how to do something through skills and competence (Heron & Reason, 2006). Education is most compelling when these four ways of knowing are layered with each other. In this study, I considered these four ways of knowing by observing and interviewing students about their artwork and how they come to know. Students expressed both experimental knowing and presentational knowing by

examining contemporary issues in their surroundings and translating these concepts to their artworks. The use of metaphors and language as expressed in the artworks and dialogues provided a way to reflect on propositional knowing. Finally, the application of digital tools, and discussions on the tools used to create artwork (e.g., animation software), provided practical knowing.

Through these multiple ways of knowing, participants move through relationships with self to others. Thus, participation and multiple ways of knowing through action research "assert the importance of sensitivity and attunement in the movement of relationship, and of knowing not just as an academic pursuit but also as the everyday practices of acting in relationship and creating meaning in our lives" (Reason & Bradbury, 2006, p. 10). In this study, the roles of the research participants offer multiple territories for translation. A few negotiations across territories specific to this research were institutional settings, art educators' connection to their students, and the inside-outside position of collaborators. These offer opportunities for multiple ways of knowing, and thus contribute insights into the possibilities and limitations of a cultural interface approach. The spaces of inquiry and participation move across territories as processes of knowing-in-action, and are embedded in Participatory Action Research (PAR). Reason and Bradbury (2006) describe PAR as follows:

> [a] participatory worldview places human persons and communities as part of their world—both human and more-than-human—embodied in their world, co-creating their world. It is itself situated and reflexive, is explicit about the per-spective from which knowledge is created, sees inquiry as a process of coming to know, and which serves the democratic, practical ethos of action research. (p. 7)

The collaborative and inquiry processes that I used in this study are both personal and political, that is they are not fixed or clear-cut and must be decided upon. The curricular projects evolve as part of the action research process by bringing the relationship of art education and technology into question and by seeing what emerges. Again, according to Reason and Bradbury (2006),

> Good action research emerges over time in an evolutionary and developmental process, as individuals develop skills of inquiry and as communities of inquiry develop within communities of practices ... In action research knowledge is [a] living, evolutionary process of coming to know rooted in everyday experience: it is a verb rather than a noun. (p. 2)

The process fosters an inquiry approach both inwardly and outwardly, requires one to assess the effects of the outside world while acting, and is a reflective practice of continually adjusting processes.

Participatory Action Research (PAR)

With an interest in exploring emergent theory beyond predictive theory, I strove to generate a cycle of inquiry, action, and reflection. According to Stout (2006), "In all of its nuances, complexities, and promise, action research coalesces with a variety of new methodological and theoretical genres giving incentive to ask and act" (p. 196). Thus, as a personal and political act, this research process is a balance of personal knowledge, active knowledge, and creative innovation.

PAR involves asking participants what questions they want answered and what questions emerge from their specific practices**.** A continual issue in PAR research literature is whether the researcher should determine the questions to be asked, and then

decide to engage a community in a participatory and reflective approach, or whether the community should develop the research questions. The approach used in this study began with two research questions concerning processes and types of changes in participants' practice. Because I am a member of the art educational community and am conscious of the questions that arise from issues of art and technology, the questions evolved from my experience and understanding. Participants volunteered to explore and problematize cultural interface as an approach to digital media art. Consequently, I entered this study recognizing that many aspects of this research were predetermined and seemed antithetical in tone to the methodological position of PAR. Yet, the specificity of each site as a networked assemblage of people, facilities, assumptions, desires, rules, and timetables generated inquiries as data situated within the two overarching research questions. For this study, these inquiries focus on the processes involved and the types of changes occurring in implementing a cultural interface approach to technology.

I initiated the research questions and approaches, and they were subject to the structure and system of the participants' teaching and educational experiences. The participants volunteered to engage in this research because of their interest in pursuing the specific research questions of this study. Despite the fact that participants did not develop the initial questions, I pursued the participatory approach of PAR because its underlying principles emphasize the lived experiences of teachers within the context of their practice. PAR makes visible the subjectivity and activist stance of the researcher and participants, and in this study stresses a catalytic approach to insights relative to technology and art education practice. One of the initial reasons PAR was selected for this dissertation was the need for exploration of the dynamics between researcher,

teachers, and students as participants. The principles associated with PAR that are used in this research include collective reflection as critique; politics of communication; and participatory, conducted in-situ, epistemological, ontological, and reflective cyclical research (McTaggart, 1997).

Several characteristics of PAR are reflected in the research design of this study. First, PAR involves a spiral of planning, acting, systematic observing, reflecting, and [re]planning. Participants theorize about their practice through inquiry into relationships such as those between art and technology. Similar to the Spiral Model of software development (Boem, 1988), each cycle moves to the next level of elaboration concerning the network's objectives, constraints, and alternatives. In this study, PAR involves sharing visions of all participants, making deals relative to resources available, developing and validating plans, executing plans and monitoring their execution, and negotiating and revising plans. For example, in this research I developed a list of digital media artists for consideration as initial examples to use with students. After discussing the examples with the art educators, a final consensus was reached about which artists would be most appropriate for their students, curriculum, and resources available, and which would offer opportunities to consider the research questions.

Second, PAR is a collaborative process that involves an action research spiral or "action turn" (Reason & Torbert, 2001, p. 2). To make an action turn is to re-vision our view of the *nature* and *purpose* of social science. Since all humans are participating actors in their worlds, the purpose of inquiry is not primarily to describe and interpret the world, to contribute to the fund of knowledge in a field, to deconstruct taken-for-granted realities, or even to develop emancipatory theory. Rather, the aim is to forge a more

direct link between intellectual knowledge and moment-to-moment personal and social action, so that inquiry contributes directly to the flourishing of humans, their communities, and the ecosystems of which they are part (Reason & Torbert, 2001).

By analyzing personal practices, participants examine systems, ideas and assumptions about their respective practices. Consequently, through PAR, participants establish self-critical, inquiry-based communities. These characteristics in the fieldwork assist with illuminating and interfacing expressions, experiences, inscriptions of technology, participants' actions, and the art educational sites.

The dialectical process includes participants generating and evaluating ideas through creative cognition. It also includes digital media artworks that encourage creative opportunities and inquiry for participants to produce and critique art and technology concepts, forms, and cultural processes. As McNiff and Whitehead (2002) note,

> Knowing involves a dialectical process of making tacit knowledge explicit, becoming aware of embodied knowledge and drawing theories of practice, so that theory becomes embodied practice and embodied practice has the potential to emerge again as new theory. (p. 103)

Knowledge is never static or complete, and I regard learning and experience as processes. As an agent of change, PAR shifts the responsibility of the research from the external researcher to all participants, including the researcher who reflects on her actions and intentions. The dialectical process explores how artifacts, language, thinking, and theory generation inform the construction of practice. PAR processes are interpretive and critical—a living theory approach. Strategizing new media art through a cultural interface

approach goes beyond *informating* (Zuboff, 1988) by empowering critical, collaborative, and informed knowledge regarding technology in art education and in our culture.

In summary, Participatory Action Research for the fieldwork in each of the art educational sites of this research was both participatory and explorative for the researcher and for participants. By readdressing the issue of technology in art education from within each of the respective educational sites, knowledge became meaningful to the participants. The process validated local knowledge and was reflexive in questioning personal practice. Additionally, PAR was flexible and iterative, as participants focused and refocused understandings of what was happening, and what was valuable/important in the context of curriculum for their students.

Actor-Network Theory (ANT)

In order to understand how a cultural interface approach affects teaching methodology, we need to understand the interplay of technology and art education. It is not enough to understand the components of a method; one must also understand how the participants are part of a network and how the dynamic and self-changing properties shape the network. This section presents an understanding of some of the key issues in Actor-Network Theory (ANT) as it applies to this research study. Latour (1993a) argues through ANT that our mutual co-dependence on technologies defies the possibility of emphasizing the autonomy of technology as a discrete entity. Therefore, ANT provides an interpretive lens for the study of participants, environments, art discourses, art education discourses, and digital technology discourses as cultural interfaces.

Actor-Network Theory (ANT) is connected to research practices and methodological principles that developed from scientific and technological studies (Wise,

1997; Law & Hassard, 1999; Daryl-Slack & Wise, 2002). ANT originated in an attempt to overcome the problem of incorporating scientific and local sociocultural knowledge. The theory emerged within scientific studies as different from naturalistic and social constructivist accounts of science, which produce knowledge separately. Anthropological studies of laboratories and scientists in action provided the basis for framing methodological beliefs that guide empirical actor-network studies (Callon, 1986a; Latour, 1987).

Two articles by Callon (1980, 1986a), considered seminal articles of ANT research, provide insight into the central notions and concepts that became the foundation of early ANT. The earlier of the two articles began to frame issues associated with ANT, such as the socio-logic of translation and the ways in which entities "construct the system of social interaction" (1980, p. 211). In the subsequent article, Callon (1986a) elaborated on the socio-logic of translation by describing the processes of a 1970s project for developing an electric vehicle. The story describes all the elements, including the fuel cells, cars, money, government agency, city councils, engineers, and their respective negotiations.

Through the vocabulary of *actor, actor-network*, and *translation*, Callon (1986a) introduced the foundational concepts of ANT. For my research, the entities Callon called *actors* are the research project, the researcher-participants, digital technologies, public schools systems, the Internet, and art education. The term *network* is a metaphor that Callon used to describe how the actor-systems function and how relations between actors become organized, structured, and changed. Actor-network exposes heterogeneous and complex relationships and helps to focus on describing the range of possibilities and the translations that occur between them. An actor-network perspective encourages

descriptive analysis regarding the dynamics and internal structures of "actor-worlds" (Callon, p. 28).

Translations are situated, specific in context, and localized; in this way, they are unique. Within this research, the actual empirical cases, including the context and data, reveal the actors' perspectives and practices in the meeting point or disjuncture of art and digital media technology. These translations can be understood as on-going negotiations where the participant's relationship with digital technology is uniquely defined within our perceived network within networks.

An understanding of the actions in the three art educational sites is traced through the stages of Actor-Network Theory (ANT), which first defines an issue, next establishes roles and enrolls participants, and finally mobilizes allies. These processes through recontextualizations, translations, and interpretations catalyze new hybrid platforms of experiences and knowledges for understanding of new media digital technology in art education.

Callon's vocabulary and metaphors work on a meta-story level. This meta-level assists in understanding how the participants become participants, what it takes to be counted as a participant, and how participants and actions are connected. These processes also assist with understanding that ANT, like this research, is not a single thing or a unified coherent theory. Instead, both are a set of local actors and situated contexts where emergent translations expose the use of digital technology in art education practice. According to Law (1992), ANT is eventually referred to as "sociology of translation" (p. 1). Law stated further,

> The study object is to explore and describe local processes of patterning, social orchestration, ordering, and resistance. In short, it is to explore the process that is often called *translation*, which generates ordering effects such as devices, agents, institutions, or organizations. So "translation" is a verb, which implies transformation and the possibility of equivalence, that possibility that one thing (for example, an actor) may stand for another (for instance a network). (p. 5)

This sociology of translation, with many elements participating, negotiating, and resisting, offers a lens for a contextual understanding of the multiple narratives of art education and technology in public schools.

Law (1992) explores ANT as sociology of translation, expands the notion of networks, and argues that humans and non-humans are *network effects*. Law provides a description of networks as societies, organizations, and institutions that are material and heterogeneous. This, in turn, substantiates stability and instability and ultimately network effects by questioning "how" instead of "what." How do art educators engage the possibilities of digital new media art in considering digital media as a cultural conversation? How are educators limited when exploring digital new media artists as an approach to technology issues? How do 9th -12th grade teachers and students understand digital media? Law (1992) would argue that these kinds of questions concerning "the mechanics of power" are at "the heart of actor-network theory" (p. 1). This argument can be seen through the materiality and heterogeneity of art education and digital media. Specific examples of research concerning art education and technology scholarship (Lu, 2000; Obiokor, 2002; Orr, 2003) include understanding art education and digital media;

teacher and student philosophies, beliefs, and values about art education and technology; and school system infrastructures in relation to hardware and software.

This dissertation's use of ANT epistemological and methodological processes considers the invisible relations and negotiations shaping understanding, use, and translation of digital media in art education. This acts as a critical lens to bring understanding to multiple ways of knowing. The balance between inclusion and exclusion is not always clear and simple, but it is always political. The partiality and situatedness of this research leads to the understanding that there is no one way of talking about knowledge as a singular form. How can one be situated, positioned, and non-innocent yet join in partial perspectives? By responsibly knowing

> … how to have simultaneous accounts of radical historical contingency for all knowledge claims and knowing subjects, a critical practice for recognizing our own 'semiotic technologies' for making meanings, *and* a no-nonsense commitment to faithful accounts of a 'real world'… (Haraway, 1991, p. 187)

then we can begin to acknowledge the partiality of our own perspective, and the political dynamics and situated knowledges that guide the 'real world' as enablers, not as a barrier to knowledge.

ANT is a form of black box testing (checking what emerges, given a certain approach) to find issues that may be absent. ANT analyzes structure, function, and operation as processes. In doing so, the theory of ANT reveals the content and process of research issues by moving beyond understanding "prescriptive," "descriptive," and "promotional" (Delacruz, 2004, p. 6) conversations of technology in art education. Because it consists of both actors and actants, ANT allows complexity to be traced and

not diminished by categorization or assumptions (Tatnall & Gilding, 1999; Tatnall & Davey, 2002). According to Haraway, "The point is not to just read webs of knowledge production; the point is to reconfigure what counts as knowledge in the interest of reconstituting the generative forces of embodiment" (1994, p. 61).

ANT rejects prior ontological categories such as the dualistic nature-culture view. ANT challenges the social and explores everything as a hybrid of society and nature. According to Latour (1991), researchers need

> ... to avoid the twin pitfalls of sociologism and technologism. We are never faced with objects or social relations, we are faced with chains which are associations of humans (H) ... and non-humans (NH). No one has ever seen a social relation by itself ... or a technical relation–or else it is that of the key and the weights forgotten by everyone. (p. 110)

ANT wrestles with socially-located, non-innocent political performances that assume new hybrid social and material practices that are enabled and controlled by equally preexisting practices (Law & Singleton, 2000). Through these chains of associations and negotiations, the theory is like an open ended game of *Cat's Cradle*; the webs are not nicely bound but are punctuations in an interactive, collaborative process, "bringing understanding to the worlds we inhabit and those that inhabit us" (Haraway, 1994, p. 66). The *Cat's Cradle* game provides an analogy in which multiple participants keep a looping process of the string cradle moving. It is a process of switching from one to another with fingers-to-fingers, or player-to-player. It is a series of complex variations of actions resulting in string formations that keep the processes flowing. If there is a disjuncture in the process, the cradle collapses.

As part of a methodology, Actor-Network Theory describes relationships between human and non-human actors and social and natural relationships. ANT transcends the dualist construction of technological determinism and utopianism (a split between human and technology) and investigates an integrated, interfaced account. ANT imagines the performative relations of actants, worlds, and actors where the vision is split and joined—a vision that is more than one and less than many (Haraway, 1994). Additionally, ANT allows a symmetrical view of all actors and actants (researcher, classroom art educator, students, technology, new media art, art education, and colleagues in a community of practice) and their networks.

Through *translation*, *inscription*, and *framing*, ANT reflects on the processes or "network tracing activities" (Latour, 1996b, p. 378) significant to new media implementation in art education, not on the created objects. *Translation* is a process by which actors and actants articulate interests and actions. Translations are manifested as assertions that decipher observations, artifacts, and actions—in line with certain interests and desires. "… nothing is, by itself, either knowable or unknowable, sayable or unsayable, near or far. Everything is translated" (Latour, 1988, p. 167). *Inscription* is a process of an embodiment that establishes a set of relationships. Through inscription, entities "simultaneously embody and measure a set of relations between heterogeneous elements" (Akrich, 1992, p. 205). *Framing* is a process that implies a relationship between one or more entities. "A technological frame is intended to apply to the interaction of various actors" and "[is] located between actors, not in actors or above actors" (Bijker, 1987, p. 172).

Callon (1986a) describes *translations* in the following way: "Actor-world defines [entities'] identity, the role they should play, the nature of bonds that unite them, their respective size, and the history in which they participate" (p. 24). Every entity (including the self, society, and nature), every relation, and every action can be understood as a selection of finer-and-finer embranchments. ANT traces a *generative path* (i.e., embranchments) so that what is adopted, a *translation,* an *inscription,* and/or *framing* of the cultural interface approach, becomes part of a repertoire for consideration of digital media issues in art education. I use the *innovation translation* approach informed by ANT (Law, 1992) to analyze research data.

In general, ANT's tracing activities allow for a critical reflection and analysis of these translations that include (a) implicating the self in digital media processes, (b) including digital media art as critical content in art education, and (c) observing successes and obstacles of cultural interface as a pedagogical approach to digital media art. Specifically, for this research, the issues located in the data illustrate examples where participants had framed, inscribed, or translated ideas. The following are examples from the research study for each of the types of reflection and analysis above. For the first type of reflection, a teacher implicates herself by acknowledging the adoption of the NAEA definition of new media that frames technology as a tool.

A second example is seen in a poster featuring one of the site's program mission statement and philosophy (see Appendix B). This frames the program as one that emphasizes visual culture. Inscription refers to the way technical artifacts embody patterns of use: "Technical objects thus simultaneously embody and measure a set of relations between heterogeneous elements" (Akrich, 1992, p. 205). The artwork about

cell phones exposes how local cultural practices and identities inscribe a pattern of use that is often unexpected. This exemplifies the dynamic negotiation process of design. Examples of translation are discussed throughout the narratives in Chapter 4 where participants' beliefs and values concerning new media are inscribed through art.

In summary, ANT's heterogeneity reveals views of art education relationships within and between organizations, art educators' perceptions, technology, and new media art through the catalytic process of the PAR process. In considering ANT throughout this study and using PAR, this research considered digital media as a cultural interface resulting from associations and effects of human and non–human processes. Through the cultural interface, technological diffusion and translation occur both in responding to and creating art and curriculum and in the process of this research.

Multiple Sites and Social Processes

This section describes several factors that influence research methodology for a multi-site study. Although the fundamental research objectives of the study remain consistent over a set of sites, several factors influenced the unique approaches and activities used at each site. The administrative and contextual procedures that govern each site influenced the way the facilities, institutional policies, teachers, and students engaged in collaboration. These influences included the willingness of the teachers, and the extent to which they engage in various teaching and research roles and social processes, including personal relationships and group interaction. The emphasis on the use of technology as a cultural interface varied from site to site based on the sites' integration of technology into their schools and departmental educational objectives.

The impact of governance issues (i.e., administrative support, training, and understanding of the role of technology) on the research was evident from the beginning of the study. Permissions were sought from three school sites. After the art educators agreed to participate, I sent letters of introduction and project description letters to building administrators and school system administration to request permissions to conduct the research (see Appendix A). At this point, I was directed to specific school system personnel such as superintendents and directors of the office of research approval. The process for each district was different. However, each district required an approval by a review board. After receiving school district approval in writing, I began negotiating the projects at each of the three sites. The timeline of interacting with the participants spanned approximately four months and included identifying and exploring content, developing and implementing a plan of action, and reflecting on action for critical analysis.

A search for interested participants was conducted through conferences and personal contacts. The search material included a description of the questions the research study was interested in exploring; the plans to use an actual 9^{th}-12^{th} grade class, as well as the mutual benefits of participation. These benefits included, but were not limited to, personal and professional development and curriculum development for art and technology. As my experience working in public education has shown, participants' support is necessary because school systems often use variations of site-based management models. Once support for the project at each school site was complete, the process of securing permission from each of the school district's administration began. At this time, the permission documents developed for the study (see Appendix A), along

with a request to conduct the research and an explanation of the research, were sent to the school district administrative offices for research approval. All participating parties were kept in the communication circle during this process. Furthermore, I requested written letters of support from each school district's administration and copies of faculty handbooks to assure proper protocols for conducting research and working with teachers and student minors in the public school environment. Once this process was complete and letters were secured, the research participants began collaboratively developing and implementing the project.

Participants' Roles

The research process involved a series of stages. The following section discusses these stages, and their relevance to the PAR methodology and the collaboration process. Reiterating mutual benefits and establishing the roles and responsibilities of participants was the first step in developing and implementing the project. Each participating art educator began by investigating the parameters of cultural interface content and process utilizing digital media artists and discourse. Moreover, participants brought their understanding of the terms *cultural interface*, *digital media*, and *technology* in art education to our conversations.

I collaborated with the art educators by discussing and negotiating cultural interface strategies, then tailoring approaches to their respective teaching sites. At each site, we discussed the accessibility of digital interfaces of hardware, software, and Internet connections, and the respective use of their technology practices. Most importantly, these were discussed with the intent of merging existing approaches and content already established in class practice. With regard to each teaching environment,

we collaboratively established a timeline, discussed several activities and strategies for exploring cultural interface in art education, and explored and selected specific digital artists and digital media discourses relative to each site's needs. Once this was complete, we collaboratively developed a plan of action. Next, we mutually established the roles participants would occupy in relation to content, implementation of the plan of action and strategies for content, and the reflective and inquiry processes within each of the sites.

The participants' roles were discussed in relation to professional presence, research procedures, issues concerning classroom activities, and students' engagement with content and creative expression of their ideas. Research procedures included the participant interviews and reflections on the following issues:

- strategies for the site as a research space, including my presence and role as the researcher,
- responsibilities of the researcher, teacher, and relationship to students,
- meaningful actions to benefit students and teachers,
- agreements on collecting and using data,
- feedback from participants for analysis concerning this research, and
- sharing information for the benefit of teachers and students.

Role of the Researcher: Epistemological and Methodological Implications of Self and Identity

Part of the conceptual framework of this research is the implicit impact of the researcher on the settings, and the ability for self-reflection throughout the research process. The actor and network inherently influence each other—each is dependent on the other. As a researcher, I was positioned as both a resource and a catalyst affecting the

elements of study. Conversely, I experienced the dynamic unfolding of the interactions at each site as both an art educator and researcher, and these interactions made up the data upon which I reflected as an artist-educator-researcher. Haraway (1993) stated that the struggle for a philosophy of self-knowledge (i.e., meaning making and organizing principles) has never been greater as we make meaning from our lives in a mediated environment:

> Ambivalence toward the disrupted unities mediated by high tech-culture requires not sorting consciousness into categories of "clear-sighted critique grounding a solid political epistemology" versus "manipulated false consciousness," but subtle understanding of emerging pleasures, experiences, and powers with serious potential for changing the rules of the game. (p. 291)

Being aware of the context of my own production, I avoided starting with strong assumptions about what would emerge from the analysis. As a researcher using PAR, I was interested in the subtle understanding of experiences, powers, and rule changes that could emerge from participants' production of approaches. In the context of this research, this implies that participants would develop their own understanding of art educational strategies regarding a cultural interface approach to digital media art education.

As an art educator, I believe in exploring and reflecting on new forms of art, analyzing their discourses, and bringing engaging conversation about these issues into the classroom. Therefore, a creative and reflective art educational practice would require the art educator to critically analyze digital forms in art and new knowledges surrounding these digital forms as a dialectical interplay between practice and learning. As McDowell (1999) states, "All identities are a fluid amalgam of memories of places and origins,

constructed by and through fragments and nuances, journeys and rests, of movements between" (p. 215). As part of the reflective process, I requested participants to reflect on my research questions and translate them into strategies for their respective students. Additionally, I recommended that they negotiate the process within their classrooms, and I continually asked about issues that arose within the research questions.

As the researcher/facilitator, I was positioned as a participant and change agent whose reflective practice emerged from within this research. As the researcher, I took part in the strategies, actions, and reflections of participants. And, in a self-reflective practice, I, as researcher, analyzed the strategies, actions, and connections that I had generated. This reflective practice serves as a heuristic device to learn about our methods when we study participants, and learn about their methods while studying ourselves.

As a researcher, I used my relationships with participants as data, not just as a reflexive practice to improve my own action research, but also to bring insight to the cultural context of the site. As a researcher, I was aware that during the analysis phase, essential elements of the cultural context of this research would include author(s), location, format, audience, and a combination of social and cultural factors. This is similar to a typical post-structuralist position holding that the meaning of any work is itself a cultural phenomenon.

Research Cycle: Gathering and Analyzing Research Data

This section explains the research cycle, namely data collection, and analysis process. Specifically, this section describes the types of data gathering and analysis that are unique to PAR and ANT.

The Research Cycle using PAR and ANT

The research cycle of PAR, specific to this dissertation, involves collaboratively clarifying visions, implementing actions, and reflecting on actions and data. PAR involves the researchers, teachers, and students, and acknowledges that, "a major task of educational research is to generate knowledge about how educational knowledge is produced within and through relationships" (McNiff & Whitehead, 2002, p. xi).

These relationships and situational power differences become the nexus for cooperative rather than hierarchical structures by encouraging participants to take part in the research cycles of planning, observing, reflecting, critically analyzing, and problematizing. The process assists in [re]defining issues, ideas, assumptions, and articulations concerning art education and technology. The collaborative nature of this process "differs from solo work because it is accomplished, not first in one person's mind, and then in the other's, but on the loom between them, in the centre of their joint spaces" (Donaldson & Sanderson, 1996, p. 44). The research cycle of PAR enables participants to reflect on their experiences and rationalizations, and reveals through evidence the what, how, and why of doing. The collaborative nature of these processes within PAR empowers participants to act politically and explore their practices.

Through non-dualist accounts, ANT is similarly a resource for emergent action and hybrid art/technical entities that are distributed and redistributed between actors, actants, environments, and artifacts. As a research strategy, ANT offers a symmetrical lens for revealing different methodological spaces between object and subject in which nature and culture operate. These spaces are hybrid and are called by Latour, "a middle kingdom" or "work of mediation" (1993b, p. 77). These spaces offer insights into

dynamics, change, and innovation. Moreover, the spaces cultivate cross-disciplinary thinking and further encourage the development of strategies for conceptualizing our techno-cultural environments.

Triangulation

Triangulation was used in this study to analyze the interviews, reflective discourses, observational data, and artifacts. Triangulation involves cross-checking and cross-referencing the research data by considering different perceptions of the same event. Denzin (1978) identifies four basic types of triangulation: data, investigator, theory, and methodological. This research uses methodological triangulation, namely one which uses more than one method for gathering data (e.g., observations, interviews, artworks, reflective responses, and questionnaires). Thus, triangulation presents emergent, inductive, and iterative connections (Crano, 1981; Greene & McClintock, 1985). The process of qualitative triangulation reduces the risk of replacing useful existing practices with new practices, and engages in a process of cultural interpretation for cultural transformation (Grace, 1995, pp. 13-14). The use of multiple sources of empirical materials adds richness and complexity through cross-examination and deepens my understanding and the analysis. Reflective inquiry of triangulated data fosters the consideration of change in teaching strategies in terms of structure, substance, and strength in the context of the classroom.

The process of triangulation used in this study offers descriptions and interpretations of participants' multiple perspectives in specific contexts. Interpretive strategies find richness and possibilities in complexity, and oscillates back and forth with what Becker (1998) calls "imagery, sampling, concepts, and logic" (p. 9). These

strategies offer ways to wrestle with inconsistencies and conflicting findings. This is accomplished by the triangulation of informal interviews, reflective discourses, observational data, artifacts, and participants.

Gathering and Analyzing Data

This dissertation research used multiple qualitative strategies for collecting data to analyze for evidence. These strategies included informal interviews, email correspondence, field notes, and project artifacts from all participants. The school systems empowered the participating teachers to negotiate in the collaborative and data collection processes. With the exception of the interview data, collection was part of regular class activities. The data collected during the research from each site provided the evidence for analyzing the application of a cultural interface approach to digital media in art education. This data was collected, processed, and archived in compliance with The Pennsylvania State University Social Science Institutional Review Board. Participants' email programs served as communication software. Microsoft Word® served as a content manager and search tool, because it allows for the searching, commenting, highlighting, and storage of collected data (i.e., textual, graphical, and audio).

Overview of Data Analysis/Methodology

The complexity of this research project results from the collaboration of multi-role participants combined with subject matter dealing with cultural insights, beliefs, values, and assumptions. These characteristics, often unique to each site, made the data collection and analysis challenging. As a result, the methodology includes qualitative analysis and Actor-Network Theory (ANT), both well-suited for this type of research.

Qualitative analysis includes the following steps of grounded theory:

- identifying data arising from the impact between research and setting;
- looking for indicators of themes and patterns in the data collected;
- naming categories and coding them; and
- comparing codes to find consistencies and differences, which reveal further categories, patterns, and themes.

Additionally, through this investigative process, possibilities and limitations are guaranteed to surface when one looks for missing perspectives, as well as when one challenges assumptions. Grounded theory allows for the investigation of open and unclear issues. Thus, sorting for themes and patterns, and data coding reveals conclusions or findings grounded in the data. The analysis is complete when critical categories reveal themselves, relationships among categories establish patterns, and the qualitative process moves toward grounded theory to inform in terms of the research sites and discipline knowledges.

The data analysis of this study relied on communication between the field participants for further exploration of site-specific data and for validation of emerging patterns and themes. Sharing the data analysis with all participants sharpened the analysis by incorporating participants' views and engaging participants in reflective and analytical processes. Participants were an integral part of the analysis and editing process to review and check all textual material that they produced.

> One can think of "thin" and "thick" conception of access. Thin conceptions of access put the focus of access on the metaphor of a gateway through which prospective users enter—if they choose. Thick conceptions of access look at all the factors that actually affect who does and does not make that choice, and why;

> who can take advantage of access in an effective way and who cannot. Without the latter, the former is largely empty. In addition, thicker conceptions of access ask not only about "access for whom," they also ask about "access to what, and for what purpose?" (Burbules & Callister, 2000, p. 21)

Burbules and Callister's quotation above describes the levels of articulation that are explored in these art educational sites. The "thicker concepts of access" are complexly woven through the many aspects that are entangled within technology use in art education. The notion of access for this research moved beyond hardware and software to include cultural discourses. These articulations revealed themselves through the themes and patterns that emerged through the data from the research sites.

Coding Steps

The coding process used in this dissertation consisted of identifying and extracting ideas, and finding repeated concepts to form categories. Once the texts from the research were transcribed into a word processing program, its editing features were used to aid the "analytical coding" process (Richards, 2005, p. 94). Analytical coding uses interpretations and reflections on meaning as part of the process. This form of coding considers the meaning in context to create categories in order to express new ideas about the data for generating theory. I reviewed the text from the interviews, emails, and observations several times, and used the word processor's commenting and highlighting features to augment the texts and to record the coding. (See Figure 1.)

When a passage seemed relevant to the study, I highlighted and made an associated note using the Microsoft Word® comment function. At this point, repeated

concepts were grouped into categories that revealed patterns and themes. The categories were given names, such as *real world* or *personal connection*.

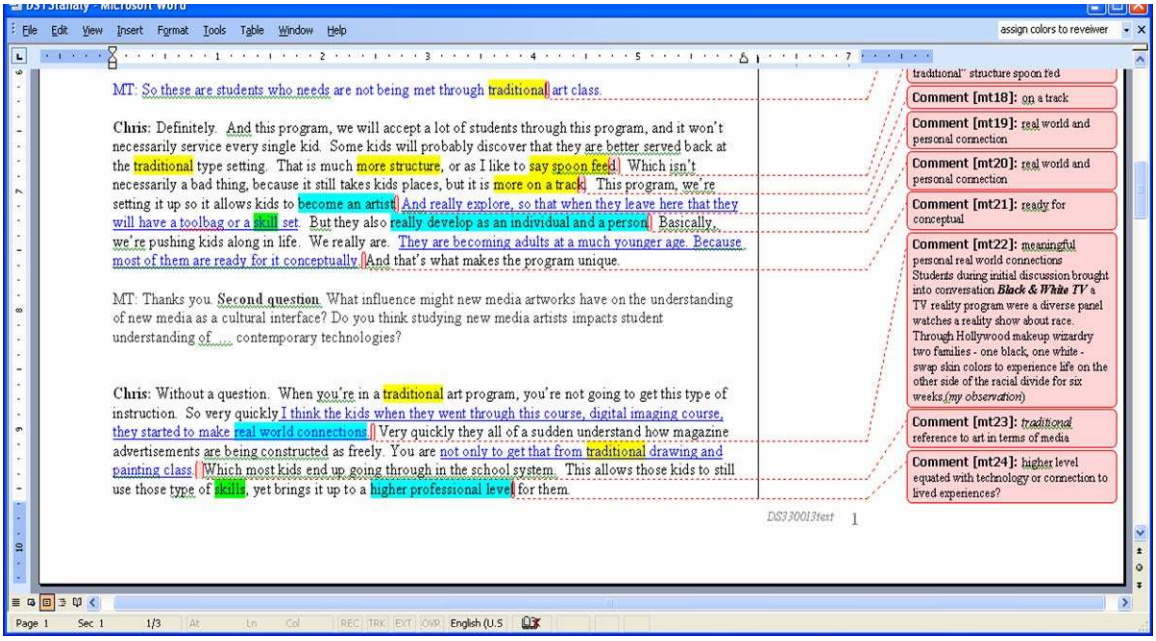

Figure 1. Sample of data analysis coding.

The associated comments indicated a thought, question, or context and how the text related to the research interview questions, and then to the main research question. These steps were repeated several times over the course of the data collection process until ideas or categories were saturated. Saturation was achieved when additional categories could no longer be extracted. For example, *becoming an artist*, *developing as an individual and person*, *adults at a much younger age*, *magazine advertisements constructed freely, real world connections, professional level,* and *becoming adults* reference connections outside of school. (See Figure 1.)

For example, I used the color turquoise for the category of "real world connections and personal context." (See Figure 2 for a sample of how I coded computer

memos.) This process reduced the data down to specific passages that would be analyzed for conditions, consequences, strategies, and interactions concerning the research questions. As themes emerged from the documents, separate memos were written both on and off the computer that reflected the emerging themes related to the research design.

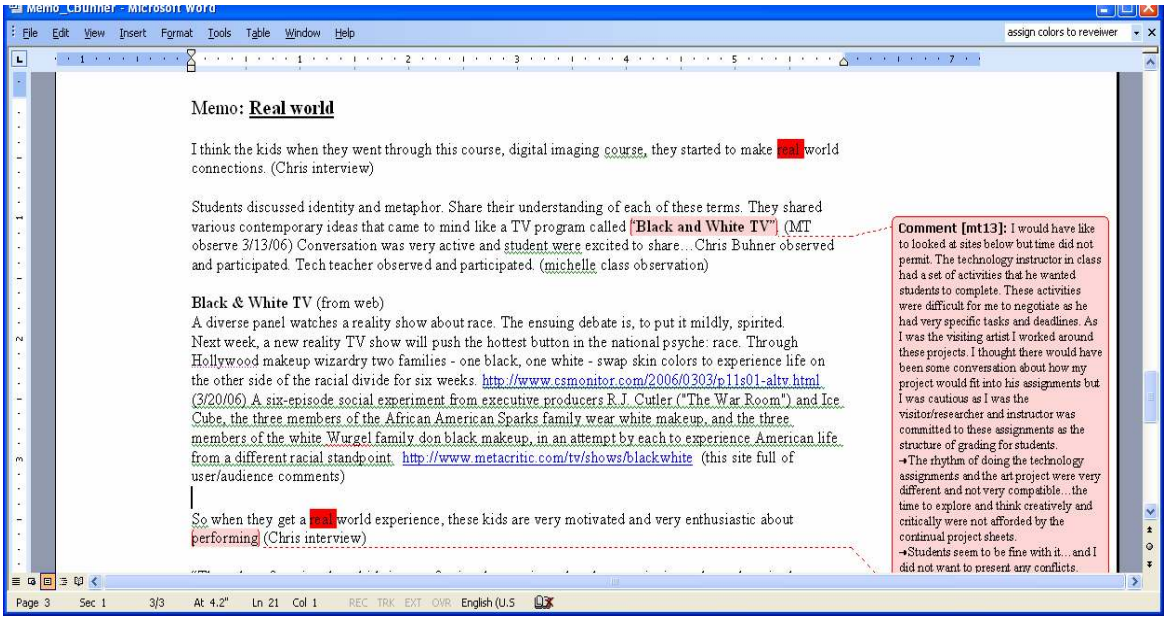

Figure 2. Sample of computer memo from coding.

Ethical Considerations

Research conducted with human participants must conform to the ethical and procedural requirements as established not only by the Social Science Institutional Review Board at The Pennsylvania State University, but additionally by each of the school systems. The research (#22023) was reviewed and approved by the Social Science Institutional Review Board at The Pennsylvania State University on January 18, 2006; approval expired on December 19, 2006. The sample forms are located in Appendix A.

The first step of the research was to contact prospective teachers, school administrators, and school systems with an invitation to participate. This step located art

educators who might desire to expand their current curriculum and educational pedagogy with digital new media, as well as participate in the research process. Permission letters were then obtained to conduct the research at each site. Any students who met the inclusion criteria (members of the participating art educators' classes), regardless of gender, race or ethnicity, were invited to participate and given the respective informed consent or assent forms. Altogether a total of 50 students and four educators were part of the research. Although the data reflects all participants' involvement through observations, only three art educators and six students agreed to interviews. At least one student was interviewed at each site.

Both participating art educators and students had the choice of whether or not to be included in the recorded and archived data of projects. Due to the requirements of confidentiality and working across different schools and school systems, participants did not have knowledge of the other research sites. Risks to participants were minimal, as I was not asking the art educators or students to venture beyond the scope of their regular art class. Although each art educator collaboratively developed the lessons and activities with me, there was no guarantee of the project outcome. The result, regardless of outcome, is reflected in this research.

The participating art educators voiced their opinions about whether they felt the project was a success or failure. If a failure had occurred that negatively reflected on the art educators, I would have insisted they remove their names and retract their consent permission forms as a protective measure. Regardless of the outcome, the results would still be included in the findings and analysis. The process of teaching is dynamic—a dynamic between varying degrees of success and failure, all relative to participants.

Similarly, concerning student participants, I, as an outside interviewer, understand that art is personal in nature and can be a sensitive area. The classroom instructors' knowledge of each student and my twenty years of teaching art and working with young students in public education serve as a measure to assure instruction and content reflective of the local, state, and national requirements. At the same time, it is normal for students to experience successes *and* failures through the learning processes in art. Class grades were dependent on class activities, not on research participation. Additionally, participants could terminate interviews upon their request to do so at any time.

As principal investigator, I kept the informed consent/assent forms in a locked cabinet. Once I received these forms, a number/letter combination was used to key code the participants and the data of this research. These key codes and names were kept in a locked cabinet separate from the actual research data. The key codes were destroyed on January 1, 2007. All data is stored on a password-protected computer, and paperwork is kept in a locked cabinet. The data for which I was not granted permission to archive will be destroyed in 2010.

Limitations and Challenges

The use of qualitative methodology is still considered "soft" research, as it is responsive and reflective and ignores some of the requirements of conventional quantitative research. Qualitative data is difficult to report precisely and requires thick descriptive methods, triangulation of data for analysis, and interpretations based on coding, as well as justification for why these processes are appropriate. PAR and action research are often criticized for being value-laden modes of inquiry: derivative, political, impure, situated in praxis, and absent of theory (Kemmis & McTaggart, 2005).

Qualitative analysis is theory generative and does not always reveal where data may lead. Educational systems do not always offer spaces in which educators and students can legitimately act upon their environments in ways that are directly relevant to their lives. This context challenges some of the principles of PAR.

The small sample size of three participating art educators and six students somewhat limits the scope of the research. Educators participated voluntarily, so there is a possible predisposition toward new approaches to technology in art education. This predisposition and other factors present challenges for this research. Some examples of these factors include the political nature of art, technology, and culture, and the voice of all actors as part of the politics of sites, sights, and insights.

The research design is conducive to the complexities of classroom practice within research settings. In a "convergence and coalescence of theoretical and practical traditions" (McTaggart, 1997, p. 26), it is important for educators to conduct substantive research themselves on the practices that affect their lives. However, this task is challenging, as public educational environments are responsible for students' education. I believe that collaborative experiences bring understanding of how people define their situations—by connecting intellectual knowledge and everyday personal and social actions, and by contributing to personal and community understanding of situated ecologies.

Background Assumptions

The study considers the limitations and possibilities of using digital new media art within high school art programs. The study aims to inspire creative options in both participants and researcher with regard to new visual technologies. One goal of this study

is to gain a critical awareness of the relationship of public school art educators with art and new media technologies. Two additional goals are to mobilize art educators and encourage change concerning approaches to integrating digital and Internet technologies in art education.

The principles of PAR encourage the researcher to serve as a catalyst for change, and encourage all participants (as social actors) to reflect on, and participate in, the questions being considered. Additionally, the principles encourage participation in the research process and joint ownership of the research products. The principles strive to encourage transformation in the social reality of all participants in order to empower them to make changes in their respective communities. The process engages a cyclical activity where theory informs practice, and practice informs theory.

Adhering to the principles of PAR is especially difficult in formal public school settings. This is due to current public school academic accountability policies, which create tensions for the research process. For example, public education is partial toward research processes that use numeric and statistical data analysis for accountability. Similarly, tight schedules are often not conducive for collaboration. These difficulties do not imply that PAR is exploitive, distorted, or not valuable due to not adhering ideally to its principles. Rather, PAR is especially valuable because it offers hybrid forms of research and collaborative options. But to have validity, the relationship of these collaborative options and roles must be honest and open. All participants must clearly define what they hope to gain because of participation, what they are able to offer, and how they see themselves in the process. This is a critical negotiation as participants have multiple [in]sights on the lived teaching and learning experiences, thus offering art

education exposure to daily practices. At this juncture, the role of the researcher is to act as a "translator" to facilitate educational practice without being a representative.

As part of the translation process of PAR, several assumptions relating to technology in art education and the PAR process were made throughout this research. One assumption is that art educators are concerned with technology being a part of an art educational experience, which also presumes that technology has a place in art education. Considering today's educational climate, two additional assumptions are that students will want to be critical of technology, and have an interest in technology as part of an art educational experience. A final assumption is that public education in general has an interest in technological discourse and that art education is a viable place for this discourse.

Additionally, I had several assumptions about the PAR methodology relating to this research. First, I assumed that my presence in the research site was as a resource to be capitalized upon. I also assumed that qualitative research is an interactive process in which I participate and make reflexive sense of my presence and role in the research. I assumed that this reflexive process is entangled with the social world as well as the research study. I acknowledged that my interactions within the site could possibly influence the cultures of the sites I was investigating. With respect to this possibility, the challenge was to act as a catalyst and reveal all patterns of perceptions and articulations. Finally, I assumed that the writing itself was part of the process of qualitative investigation: a process of inquiry, not just a process of telling. Additionally, I acknowledged that social truths are constructed differently within different discourse communities, such as k-12 and higher education.

Validity

A feature of qualitative inquiry and ANT is their dislike of large scale, obvious tautological answers to problems. The qualitative PAR and ANT analysis frameworks include issues of reciprocity in a heterogeneous network of aligned interests. Action research is grounded in the phenomenology of everyday experiences. This research draws on the reflections and negotiations of strategies from the participants in each of the research sites, and is concerned with how sense is made of experiences and accounts. Therefore, this research consists of a variety of data such as observations, reflections, artifacts, and interviews for thick descriptions to provide a point of entry into the quality and validity of this research. Validity of the research findings are achieved through connections to art educational scholarship/literature, by the exploration of the congruencies of theory and practice, and by the analyses of claims to knowledge derived from practice.

Guba and Lincoln (1989) refine a constructivist inquiry paradigm for action-oriented evaluation practices. What evolved from this process is what has come to be called “authenticity criteria” (Lincoln, 1995, p. 286) or “trustworthy criteria” (Lather, 2001, p. 245). These criteria are refined into subsets that are not just parallel to criteria embedded in assumptions of positivism, but also blur the lines between ethics and validity. These new criteria include fairness and ontological, educative, catalytic, and tactical authenticity (Guba & Lincoln, 1989). This dissertation considers these criteria as part of the process of validity and authenticity.

Several factors open a space for validity to transgress from a “set of epistemic concepts to a space of relational practices in a situated context of inquiry” (Lather, 2001,

p. 245). In this study these factors include acknowledging multiple viewpoints, encouraging both researchers' and participants' learning, sharing knowledge democratically, and fostering social action. These factors further enable "criteria to grow indigenously as a natural consequence of the inquiry effort" (Lincoln, 1995, p. 286). These practices of validity interrogate inquiry as a cultural practice and open research spaces situated between traditional validity and deviations of validity that challenge the practices of educational inquiry (Lather, 2001).

Data collected in this research for coding and verifying emerging patterns include observations, participants' review (member checks), and methodological triangulation between observations, interviews, reflections, correspondence, artifacts, and reflective journaling. As part of the research process, I used participants' review with respect to each of their sites, in which I recycled interviews and email correspondence back through respondents. Additionally, I offered the participants the opportunity to check categories, emerging analysis, and conclusions. Participants also had the opportunity to review and make changes to the final case study reports requested by the administration of each site. Triangulation of multiple research techniques such as interviewing and observation provided a series of checks on the findings. Through reflexive inquiry processes, I re-examined my assumptions based on my collected data.

Plan for the Data Analysis Narrative

In Chapter 4, the emerging patterns from the data analysis and the multiple voices of participants begin to reposition students and art educators toward insights on digital technological presence in art education. The *how* of integrating technology into the

teaching process by art educators and students offers [in]sights for creatively engaging meaningful art education when using a cultural interface approach with digital media.

In Chapter 4, I describe settings, characters and unfolding plots, and analyze the data into emerging themes. I create a multilayer metastory combining the primary experiences of what happened with embedded evaluations through a combined ANT and art education perspective. The narratives consist of orientations, complicating actions, evaluations, resolutions, and coda. The narratives are a mixture of passages from the interviews, and highlight key themes that cut across the three research sites. "How we arrange and rearrange the [inter-views] text in light of our discoveries is a process of testing, clarifying and deepening our understanding of what is happening in the discourse" (Mishler, 1991, p. 277).

More specifically, Chapter 4 contains data from the three situated studies. Each research site involves participants' articulations and reflections on *ontology* (the way we see ourselves, a theory of being), *epistemology* (how we understand knowledge, including how knowledge is acquired), and *methodology* (how we do things). Within Chapters 4 and 5, this dissertation presents the three situated studies through a polyvocal text. Meaning is negotiated between social context and interaction of researcher, art educator, student, and digital technology. The narrative is an expression of classroom practice and identity. A particular event or set of events from each site create stories. And these stories create the narrative for this research. Negotiating a new approach, a cultural interface, is a responsive, iterative pedagogy. The iterative pedagogy is a critical part of this process as it elaborates the discourses of practice, the roles and relationships of actors (research participants), actants (technology), and art education. The co-evolutionary nature of PAR,

ANT, and digital media art as a cultural interface reframes questions and answers—leading to actions, which reveal limitations and possibilities of technology discourse in art education. Through robust accounts, the narrative offers an opportunity to focus on the alternative natures of technology, people, and relationships—ultimately the limitations and possibilities in art education.

Chapter 4 aspires to reflect heterogeneity through narratives and participants' interview transcripts, documented artifacts, and theoretical explications. This task presents a symmetrical study of technology in art education that emphasizes sociocultural contexts. In the narrative process, actors and processes of ordering reveal patterns and categories. Empirically derived patterns and categories intersect and interact with each other, and are contingent rather than fixed, universal, and generalizable. As Latour (1996a) stated, "Technology projects are deployed in a variable-ontology world; that's the result of the interdefinitions of the actors" (p. 173). These interdefinitions are complex and promise no consistency. Instead, actors are composed of conflicts, tensions and knowledge claims. Therefore, self-perception plays a critical role in one's interpretation of meaning. In revealing a variety of perspectives, the narrative attempts to reveal multifaceted interpretations, illuminating multiple sources of meaning through the identities of all the research participants. Finally, Chapter 5 summarizes the findings, and analyzes the claims to knowledge derived from practice to understand potentials and obstacles to a cultural interface approach to digital media in art education.

CHAPTER 4

DATA ANALYSIS

This chapter, organized into three sections, one for each site, presents how three high school art educators and their students explored technology and contemporary digital media discourses within their educational settings. In a narrative fashion, I describe the settings, characters, and unfolding plots in order to create a multilayered metastory evaluated from an ANT perspective. The narratives consist of orientations, complicating actions, evaluations, resolutions, and coda. The narrative style is based on two of my favorite authors and works, Catherine Riessman's (1993) *Narrative Analysis* and John McPhee's (1972) essay entitled *The Search for Marvin Gardens*. The format of the following narrative is an intertwining of two lines of thought: the analysis with an ANT and educational perspective; the second, the thick description of experience. In many cases, the blends of the two components overlap and often become indistinguishable.

The research sites were chosen based on several educators' interest in exploring digital new media within art education. One art educator expressed an interest in participating after seeing a presentation I made at the National Art Education annual conference (2003). The chair of my dissertation committee recommended another art educator to me. Wanting to widen the sample, I contacted two art coordinators from two different school systems and one technology administrator from within one of the school systems. After several months of no response from teachers within the two schools systems, I directly contacted several art educators from within these districts. Two of these educators had previously expressed an interest in participating in the project.

The final number of sites for this research was narrowed down to three, as one site elected to withdraw. Once the permission process was started and the project descriptions were sent to the school administrations, one of the school systems turned down my request to conduct research. The specific reasons sent by the deputy superintendent for not supporting my research were that I could not guarantee complete confidentially, that they reserved the right to select the teachers to participate in the research, and that my collaborating with the instructor could potentially have a negative impact on students.

As an outsider, I needed to gain the trust of the school systems, especially in consideration of the pressures of accountability and testing. Prior to one of the research site's approval, an educator from within one of the final research sites stated that the "school system did not like students being used as lab rats." This was contrary to my view, as I see research as a dynamic, engaging process that provides reciprocity for all parties involved. This was also a perplexing remark as this school system has an office dedicated to research requests. This office was very helpful in offering support for resolving any issues that arose in preventing the research project request from being implemented.

Site 1. A Mid-Atlantic Arts Academy

Interfacing Expressions, Experiences, and Inscriptions of Technology.

Empowering Translations: Two Entities Coexisting

Site 1 is unique in this study because the site is forming a new program/curriculum. Thus, the two entities, (i.e., the site and research goals) coexisted in the act of action research, both in philosophy and in process. Site 1 is a new mid-Atlantic Arts Academy, which began in 2004. In its second year, the program had a freshman and sophomore class. It is situated in an older high school. The Arts Academy in this urban school setting has visual arts, theater, music, and dance as its core components. Through the curriculum, students take classes across all the art components with a concentration in a discipline. Additionally, students are integrated into the traditional high school curriculum for the academic subjects needed to meet graduation requirements.

As a new program in transition, the discussion amongst faculty and administrators concerning the direction, content, and role of the digital media components affords a dynamic and reciprocal relationship for all participants. However, I became acutely aware that this site was transitional in multiple ways; it was not only transitional as a result of the evolving program, but for my newly defined identity as a researcher, as well. In this transitional identity space of researcher and teacher, I struggle with the tensions of methods, inquiry, and theory. The unstable identities and the cycle of this research reveal that "behind the actors, others appear; behind one set of intentions there are others; between the goals and the desires, intermediate goals and implications proliferate, and they all demand to be taken into account" (Latour, 1996a, p. 100). My contributions as a resource on new media, and the participants' responses within this research framework

became an interpersonal network of collaborative inquiry, specifically, in how the position and context of new media art relates to the visual art program. These issues involved the identity of the Arts Academy as a school within a school, and new faculty relationships to the school culture, faculty with longevity at the school, and facility (technology spaces) negotiations. The narrative that follows is an analysis of how Site 1 negotiated multiple cultures, identities, and beliefs.

Differences in Artistic, Technological, and Cultural Dimensions in a Translation of Accounts

The interplay of art education and contemporary technology often depends on educators' beliefs, attitudes, and interests, and the culture of working environments. This interplay creates both limitations and possibilities and a need for a continual critical understanding. Additionally, the use of technologies within art education and within traditional fine arts contexts is not independent of our beliefs and the ways new digital media influence our personal and collective identities. These synergistic results influence the exploration of creative problems, issues, and actions within cultural contexts of digital media.

I had forgotten the culture of high school students, specifically the behaviors and the rituals in a large urban high school. As I walked down the halls to meet with the academy art coordinator and high school technology teacher with whom I would collaborate, the familiar sights, smells, and sounds of high school returned to me. A bell rang, signaling a change of classes. I reached the central concourse of the building, which was like a giant stage where many students where assembling as part of the ritual performance of going to their next class. Focusing across the concourse, I saw the sign

for the technology wing become sporadically visible in between the moving student bodies.

At first it seemed like mayhem, but as I entered the crowd, I saw two waves of [co-existing] bodies moving in concentric rings, flowing in opposite directions. Throngs of student bodies, brightly colored shirts with numbers and logos of the school name and mascot pressed against me and swept me into the surge of the outer circle. Students had hands in their low-slung pants pockets or perched on the contours of their hips. Their heads tipped downward, with eyes looking up as they walked past me.

Barely noticed, I struggled through the outer circle of students to get to the inner circle, one moving toward the technology wing, and one moving in the opposite direction. As the crowd got larger the smells of gym lockers, cologne, and excessive perfume assaulted me. The multiple smells followed the clustered student bodies. Hundreds of conversations were distorted. They vacillated from sheer noise to fragments of declarations. Periodically, a few of these declarations emerged through the dissonance.

"Hey girl, I didn't see ya this morning."

"Yo man, later."

"Are ya going to Erin's?"

"Tanya, catch me a ride later."

I was obviously oblivious to these students, perhaps because of my being an outsider, my small size, my age, and their strong cultural presence. This weighed heavy on my sense of self, my identity, and my new role here as a researcher. As my senses took in the environment, I reminded myself that the concern of the "everyday world and the world of the professional fine arts community are often isolated from each other"

(Efland, 2002, p. 76). One of my goals with the cultural interface approach is to instill that the "understanding of a work of art requires it to be grasped in relation to the social and cultural realms where it took form" (Efland, p. 166).

Finally reaching the technology sign, a security checkpoint, I was asked to show my visitor ID. I was given passage into the technology corridor. Crowds thinned, smell evaporated, and sounds diminished, until only the silence of the space was noticeable. I was thinking as a participant/researcher, how unique and privileged a position I have, one whose angle of view has seen transitions and changes from within k-12 practice. Moving down the corridor, where years of industrial technology classes had been held, a place where old met new, a transition, was visually reflected in the displays. Several academy arts bulletin boards were packed with a collage of documents evidencing community partnership events, master class schedules, mission and philosophy statements (see Appendix B), and awards received by arts academy students.

I reached my destination, about three quarters of the way down the hall on the left, across from the regular arts academy studio class. The door had a small black sign mounted with white embossed text reading, *302 Communications*. Below the sign were a red stenciled image of a 35 mm camera, a role of film, and a classic press camera—a visual contrast to the colorful eclectic energy of the montage display boards I had just passed. Before entering the *302 Communications* classroom, I peered into the very narrow glass window slit on the wooden door. Observing the familiar collection of technology equipment, I realized I had arrived. I stopped to observe the adjacent display case. One-third of the case area was organized with several rows of film-based cameras set against black paper. The cameras represented a variety of models from the last 30

years of still photography. It was like a visual time line narrating the transition of wet lab photography to digital process. In the remaining two-thirds there was one awkwardly placed small information sign. This impact was noticeably quieter and more solemn and somber than the displays I had just seen.

Opening the door, I entered to be greeted by Chris and Mr. H.

"Hey," I stated exuberantly, and then quipped. "Wow, I forgot what it was like during bell changes, give me a moment to see if I have ALL my parts."

Chris and Mr. H both stood grinning and chuckling, each empathizing with my hallway experience during the bell change. Mr. H, standing just slightly taller than me and displaying years of experience weathered onto his playful but resolute expression, stood in contrast to Chris, standing over six-feet tall and displaying the physical attributes of a state wrestling champion from college.

Chris is a visual arts instructor and Arts Coordinator for the Academy Program. He has a Bachelor of Fine Arts and a Masters of Science in Teaching and 14 years of teaching experience in public education. His role as a participant in this research was as both teacher and administrator. This offered a different view outside the classroom dynamic and strategies of this research and, in turn, provided the research with articulations and insights from another vantage point. His teaching and artwork explores more peripheral media forms such as ceramics, metalsmithing, cartooning, and animation. Both Chris and his students articulated their views about skills and knowledge, and what warrants complex thinking—that is, beyond technical ability. The students' views were voiced in the students' reflective questionnaire (see Appendix C), while Chris presented his views in a subsequent interview with me. Chris, articulating one of the Academy Art

program goals states, “Because of the nature of this program, this program being a visual Arts Academy, our task within the public school system is to pull a select group of students that need more than a basic skill set” (Chris, personal communication, June 22, 2006). This was reflected in the mission and philosophy poster (see Appendix B) on one of the hall displays I had just passed. Chris recognized the unique nature of the program as a network of artistic, technological, and cultural expectations.

Artifacts in schools, such as mission statements, curriculum materials, student handouts, and evaluation tools have scripts. These scripts, as actors, have agency that frame and inscribe ideologies. The scripts (objects) are a result of a process of negotiation between historical associations, current policy and standards, and the people interacting with them. In this site, we see the concept of *skill* migrate through the network from artifacts to the student reflection. Although the art educational system within the Arts Academy framed the idea of art *skills* as technical ability, I observed through interviews with students at this site that they often translated the notion of art skills as *talent*. For example, one student stated, “Learning digital imaging skills helps individuals have the talent [innate ability] to use new knowledge in a different art medium” (Student #7, response in final assessment, May 15, 2006). In this response, which was to the question, “Why does this information matter to me,” the student refers to *skill* as a practiced ability to achieve *talent*. Here the perception is that *skill* (skill-base approach) is sufficient for achievement. Negotiation is needed to recognize that skill is one component. In an art class, there is a need to equally foster creativity and forms of expression that bridge culture, society, and personal experiences.

As I approached Chris and Mr. H, Chris said, “Let’s talk about your visit with students” (Chris, personal communication, March 6, 2006). Pulling a green file folder from my bag to reach the handout I had prepared for our meeting, I set three copies on the table, paused for a moment, and looked around the room to see where the digital projector and screen were located. I reflected on the research participants’ interests and desires. For example, I reflected on my desire to explore the possibilities and limitations in approaching new media through a cultural conversation—especially in a k-12 public school environment. I reflected on the Arts Academy’s interest in examining teaching and learning practices involving art through and about digital technology. I considered the students’ desire to explore a *new* medium and create artworks for their portfolios. Ultimately, I reflected on the fact that each of our desires was different.

These interests and desires varied among the participants at the Arts Academy. For example, students’ interests were to create in the digital environment and express ideas in a different art medium. Mr. H’s desires were to be helpful to the academy students and program, and maintain a good working relationship with Chris. My desire, as part of my dissertation research, was to conduct a collaborative study in k-12 practice. And Chris’s interest was in providing a digital media workshop for his art students, one that balances real world experiences, substantive assignments, relevant application of technical knowledge and skills. In my interview with Chris, he emphasized that, “They [students] need deep conceptual assignments that bring the depth and complexity … Because that’s what motivates these kids. So when they get a real world experience, these kids are very motivated and very enthusiastic about performing” (Chris, personal interview, June 22, 2006). This conceptual approach with depth and complexity, in turn,

raised educational expectations beyond those of a traditional school environment and became a motivating force.

What motivates one student is evident in her response to a questionnaire I provided to the class. She wrote: "When I am intrigued about information, I try to apply it in any form I am capable of" (Student #7, response in final assessment, May 15, 2006). The reasons for student motivation in engaging with technology are complex, and involve many interacting internal and external interests. Some factors that influence students' performance and motivation include: delivery programs, a sense of ownership, and teaching strategies (Atkinson, 1999, 2000). Motivation can be evoked with teaching strategies that encourage curiosity about technology and new media art when students feel ownership of how they apply knowledge.

In *302 Communications,* the large equipment, appearing like human-made monoliths, caught my attention. It triggered a memory of working with Mr. H for three days last year on a technology curriculum development committee for the Arts Academy program— then beginning its second year. His vivacious and strong personality, knowledge and experience with technology, and years in the school system infused those meetings.

My reminiscing was interrupted when the technology coordinator entered the classroom to ask Mr. H about the computers that would be used for testing. I had also worked with the technology coordinator in the process of curriculum development in regard to the software and hardware recommendation. He smiled when he saw me.

When Mr. H and the technology coordinator finished discussing the accommodation needs on the computers for the following month's testing schedule, I

took the opportunity to ask about getting an account on the system while I would be working with students. It became clear that getting an account was not possible because I did not have an employee number, and the process to unblock sites was too complex for the short amount of time that I would be working with students. For the benefit of all involved, I decided that I could resolve these issues myself with less disruption to all—including the network.

Once the technology coordinator left, I asked if I could connect my laptop to the projection system in the room. Not receiving a response after a second request, as Mr. H was still resolving the testing issues, I opened my laptop and proceeded to turn it on, as this meeting time was framed by school class schedules, and I knew I needed to get started. Chris and Mr. H both sat down. I began with a summary of my research, and showed the research permission forms (see Appendix A) approved by the school system, which would need to be signed by all voluntary participants.

"What are the students currently working on?" I asked. "They are finishing up and matting the six lighting schemes portraits. They used the digital cameras and lighting equipment you saw them working with last week," Mr. H answered. "This is the extent of their experience. Only one has worked with the Photoshop® program." This caught me by surprise, so I asked him to explain. He described, "They take the six head shots and bring them into MSWord, arrange the head shots three over three on a 8 ½ by 11 inch horizontal, with labels below each image defining each lighting scheme. They place a title across the top in a font of their choice, print, and then matt." The ideology underlying Mr. H's phrase "this is the extent of their experience" closely reflects his

teaching methodologies and objectives. The evaluation of the students' technical ability is in terms of skills, regardless of the students' relationship with technology.

In an attempt to bridge the dichotomy between what I thought would be of value for the Arts Academy students and what they had been doing, I shared my thoughts on how *we* might approach the next lesson with students. I offered, "Since you are working with digital cameras and portrait lighting, I think a portrait lesson exploring identity, metaphor, advertising, and digital media would offer a good connection and transition from the current class assignment."

I suggested looking at two digital artists, Nancy Burson and Mariko Mori for their use of digital media in considering personal identity within digital environment. Pulling up examples and explaining their artwork with the slides on my laptop, I explained that we could also use advertisements to illustrate approaches and various uses of metaphors and how they are used to communicate and persuade. I felt the room get quiet, followed by a longer than normal moment of silence.

Chris broke the silence, "Mr. H what do you think?" He replied, "You're the artists, whatever you want, let me know what you will need." There was another moment of silence. With this statement, I sensed that Mr. H was defining his role as technology support along with his feelings about artistic process and content.

This began defining the boundaries of our roles. Specifically, his role within the collaborative process as technology support and mine as facilitator to explore the content and process with students with regard to a cultural interface approach to digital new media. I understood his abilities with the technology devices and systems in the classroom would be invaluable; however, I had hoped for him to claim a role beyond just

technology support for the project. I had hoped for a collaboration between technology instructor and myself in developing the teaching strategies as well as working with the technology. I realized that I may have been asking too much considering that his time was limited as he was giving up his planning period to work with the academy students. He would be most directly involved with the daily classroom experience for this research, but in the end did not wish to be interviewed.

"Michelle, when do you want to begin working with the Arts Academy students?" Chris asked, refocusing the discussion. I considered where academy students are with the current project. "What day would be best for me to introduce the lesson and begin working with the students?" I asked, glancing at Chris, and then directing my attention to Mr. H.

The rhythm of Mr. H's response was disrupted by a flood of sounds emanating from the flow of students entering the classroom doorway, signaling the meeting's end. Additionally, he was immediately surrounded and swept into engaging with students, who although staring with puzzlement at Chris and me, asked questions only he could answer.

Pulling my calendar out of my bag, I asked for a starting date. Mr. H and Chris selected and articulated a starting date for beginning the lesson with academy students. With the date written in my calendar, and recognizing the roles that had been defined, I began transitioning out of the meeting and classroom. I began focusing on my journey into the school's busy circular commons area with the contrasting flows of student traffic.

In summary, this section described various heterogeneous relationships between the network entities (people, definitions of art, mission statements, Web pages, etc.) with

multiple trajectories (interests, interpretations, teaching strategies, etc.). ANT theory recognizes that the stability of the network is established through the relationships in the network, often as the outcome of negotiating the network spaces (i.e., obligatory passage points). One illustration is the importance Chris places on conceptual assignments–thus raising expectations, and ultimately resulting in persistence beyond its initiator (i.e., Chris).

Mutual Co-dependence on Technologies Defies the Possibility of Emphasizing the Autonomy of Technology as a Discrete Entity

The day of the presentation and introduction to the *Identify Metaphor Project*, as I came to call and define it, I timed my arrival during classes so that I could transition through empty hallways to set up the equipment before students arrived to *302 Communications*. The room was empty of students, with Mr. H having his lunch at his desk. This was quite a feat and not an ideal space for lunch, as his desk was covered with papers, software CDs, file folders, student projects, certificate templates, as well as the usual technology equipment of digital cameras, portable hard drives, and staplers.

Continuing into the classroom, a large U. S. flag hanging across the room locked my gaze. The display caught my attention through the contrast of repeated circular shapes emerging below the bottom edge of the flag, like the tensions of boundary edges of non-objective Modernist painting, one in which not only the formal elements of art but also the relationship of those elements create meaning through the tensions between the art elements. It activates the area at the edges of those fixed elements. As I entered the class,

the circles came into clearer focus. There were a hundred or so clip art CDs arranged on a bulletin board.

"Hi, how is your day going?" I asked Mr. H.

"Things could better," Mr. H quipped, peering through his wire-framed glasses.

"How can that be? It seems like a quiet spot."

"Yes, but I have just found out that *they* want to *migrate* all my computers onto the school network."

I implicitly understood that this did not make him happy, as it meant a disruption to teaching and the loss of administrative control of his technology network. *Migrating* his network would be an additional burden with me and the Arts Academy students occupying his planning period.

"What do you need for today's presentation?" he asked, as he finished his lunch. I told him I brought my laptop, portable USB drive, and a CD with my PowerPoint® presentation. Pointing to the computer on the top of his desk, he suggested the USB drive as it was easily accessible from the back. We worked together to set up the presentation.

"What does *migrating* the system mean for your classes?" I asked.

"Well, it means a pain in the … you know what! Basically, they want all computers in this class up on the school network. I do not know what this will do to accessing scanners, printers, and other equipment. We will have to wait and see what happens. It could mean reinstalling all the software. I just do not know what will happen. I think it will be a hassle until it gets worked out. And of course … worked out means by me and my students." Thinking quite selfishly, and in an attempt to cheer up the

atmosphere, I asked, "Do you know when this *borg* take over is planned?" Smiling at my remark, he continued to shift out of lunch and began preparing for students.

Mr. H articulated the complex dynamics and relationship that technology maintains with education by perceiving the changes to the network as a *migration.* For Mr. H, the migration was viewed as a movement, while the school system viewed it as an expansion. Mr. H's view stems from his investment in the local classroom network. The school administrators' view is shaped by their need to think about investments in a school system network. The implications of these differences, often obscured by allusions to progress or advances in technology, are significant. These differences are articulated by Mr. H's foreshadowing of potential issues.

These differences manifest themselves as various resistances of both human and non-human agency. Specifically, the *migration* of the network will test conditions of various actor networks (e.g., material, cultural, and institutional, etc.) under which belief and values operate, for teaching and learning. New skills and knowledges will be developed in response to these altered conditions, explorations, and assessments, and changes to the software and hardware. This migration will require a significant material and cognitive investment by Mr. H and the school system, and each will have an investment in protecting their emerging identities. Therefore, personal and institutionally transmitted beliefs about technology are contingent and continually under transformation, making it difficult to stabilize teaching methods.

As the academy art students began arriving we focused our attention to beginning this project. Mr. H opened the cabinet where student artwork was kept. I pulled a folder out of my bag and gave him a copy from the stack of *Identity Project* handouts (see

Appendix D) I had prepared for the students. He responded, “Great! I can put this in the master class binder and students can put copies in their binders” (Mr. H, personal communication, March 13, 2006). He took the handout and walked to a shelf filled with class binders.

I generated the handout, as it was in keeping with the artifacts and process used in the class by Mr. H. The handout was a device he used to define the assignment and as a record of the objective for the performance assessment. Students put the handout into their binders, and Mr. H recorded the students’ scores for each assignment on the handout. This was an established process, expected by the students as part of the class structure/culture, and part of the network I did not want to disrupt.

The quiet was interrupted as students began entering the class. I continued to set up the presentation and reviewed my notes. Students said hello. Several took seats at the long front tables and took out their lunches. Others slung their large backpacks onto chairs asking to go to the bathroom. The first 15 minutes of class were dedicated for eating lunch only. Students were not permitted to work on the computers at this time. Once all 15 students arrived, Mr. H spoke to the class: “Ms. Tillander will begin with a presentation as soon as the 15 minute required lunch time is over.”

At this time, I told him that I would distribute the research forms at the next class, as it would be too invasive to the class process. I gave him a copy for his records.

Mr. H signaled the end of the 15-minute lunch holding pattern by introducing me and turning on the projector. My presentation began to appear on the screen in the front of the room, as the lamp warmed up. A student offered to turn the lights off. I introduced

myself briefly, with background information and told students that I would be here as part of the computer workshop to work with them over the next few weeks.

I began by conveying my familiarity with their current project and how we would extend the digital conversation to include metaphors, identity, and digital technology. Artworks by Nancy Burson and Mariko Mori, who were selected because they challenge and disrupt the notion of identity and explore the hybrid nature of individual identity using digital technologies, appeared on the screen. I presented work by Nancy Burson. As I showed her images I explained how Burson collaborated with two computer scientists and used computer code to morph the layers of world leaders for the artwork *Warhead* by the percentages of their territories (55% Reagan, 45% Brezhnev, less than 1% for Thatcher and Deny), and an image of *Mankind* (Oriental, Caucasian, and Black) by world population statistics. Although we now consider digital morphing routine, her work was pioneering in the 1980s. While showing images of the *Human Race Machine*, I explained how the use of the digital environment offers the audience an opportunity to 'see' themselves as a different race, and the role that digital imaging might play for considering identity. Students were very focused during the presentation. I think they were so intent because this was art they had not seen before, and it made them begin speculating on their personal connections to issues related to the *Human Race Machine* and Burson's other artwork.

One student commented, "This is like *Black and White,* have you seen the show?" "I know that show," declared another. "Me too. You should hear what some of the viewers say." Facilitating student agency and mobilizing support for this project, I asked "How do you know what viewers say?"

The responses to my question were lively as several students began to explain several Internet chat boards. Similarly, small group conversation began to erupt amongst the students. It was apparent that the majority of these students were familiar with *Black and White,* a new reality TV show where two families, one White and one Black, through makeup magic swap skin colors for six weeks to experience life on the other side of the color divide.

"What is most interesting," one student said, "is comments on the Web site. It really tells you a lot about attitudes."

Students remained very animated through the rest of the presentation. They made connections to manga (cyborg superhero) characters and avatars in gaming environments when I showed Mariko Mori's work were she plays different female roles against the backdrop of Tokyo.

"I know her," stated one student. "I have her manga books."

As part of a teaching strategy, connecting Mori's identity to a manga character and narratives offered me an opportunity to activate student ideas. Harnessing students' connections and engagements with "Black and White," manga, and Web spaces like *MySpace* and *FaceBook*, I reconnected this to the artists, Mori and Burson, and how they create tensions about technology and identity.

Expanding on this idea through practical applications, I showed examples from advertising. I knew Mr. H and the students would see the connections to graphic design and contemporary pop culture. Although advertising uses a persuasive approach to sell a product or service, it allows an exploration of "meaning making" through juxtaposition, fusion, replacement, and connections. These are visual techniques made especially fluid

by digital technology's ability to manipulate imagery through seamless compositing and subtle alteration of images seen as "realistic representations." We collaboratively analyzed several ads and explored how the juxtaposition, fusion, replacement, and connections from the seamless digital construction of these images encouraged meaning-making, thus exposing how images as metaphors can often serve as meaning beyond the literal representation. Students considered and reflected on the ways in which advertising was appealing to their desires, emotions, and visual sensibilities. They shared examples of advertisements they were familiar with, analyzed how multiple codes of meaning were facilitated, and speculated on the digital techniques. On student commented, "you can put anything together."

In my attempt to connect with recent class assignments, I asked how lighting creates mood and tension to appeal to our desires, emotions, and visual sensibilities. "Consider how digital technology impacts how we see and come to know," I said. "Now, I would like each of you to think about how you might use metaphors, and the processes unique to digital media to create a self-portrait, one in which the viewer is stimulated to make meaning, and discover your identity."

This began the conversation about technology, one that might contradict their understanding. I knew this was a different approach to the way they had been working with the computer. This positioned the students to think critically at several levels—about the unique characteristics of the medium and how it might limit or expand expressive possibilities. I gave each a copy of a handout for their binders that further defined metaphors and identity, and asked for four sketches and written reflection on ideas. I asked them to work on this and generate possible approaches for when I returned to work

with them, in two days. By imagining responses to prompts on the handout like, *I am like ...,* students began to develop ideas and sketches.

"Once you feel you have some ideas and sketches I would be glad to discuss and offer suggestions on what you might additionally consider," I remarked. Within a few minutes, several students wanted to share their preliminary ideas.

One student stated with confidence, "I am familiar with Photoshop®, because I do all the theater department posters, so I will have no trouble with making this." She continued, "I see myself as a book. I want to work with the ideas of a book, and how you turn pages. I want both cartoon drawing and photographs like this." A simple pencil sketch flowed across the double page spread of her sketchbook. Original stylized cartoon drawings of books and faces surrounded scribbles and the word *photo*. A slightly more elaborately drawn profile self-portrait sat flush to the far left side of the page spread. "I want to work with the two styles, not sure how much or where, but like this, like many sides of me," she said, while pointing to her sketchbook drawings.

Several more students defined their artworks to me in the time remaining. Like the book metaphor, this revealed much about how they understood themselves and the digital world around them.

Another student's love and connection to horses provoked her to consider how she might be able to take lots of different patterns from their fur coats as a way to show diversity. "Here are my ideas. They involve horses, and lots of colorful coats, but I am not sure how I will do this," she explained, while standing at the table where I was seated. "I see myself in the horse. I am like them. I have many drawings in my sketchbook. Here are some I want to use." Her sketchbook contained incomplete drawings of horses. The

bodies, heads, and legs—all part of an elaborate process of investigation she had undertaken.

"Do you have any books on horses?" I asked, although I knew her answer.

"Oh yes," she replied. "Yes, I can bring them to class. I have many books and many more drawings." It was clear that she was intensely engaged.

She asked me to look at one of her horse paintings that were on display. We went across the hall for a few minutes to the art studio class. We discussed the composition and talked about how the digital environment, like painting, offers unique ways of seeing and knowing.

Back in the room, several students were at the tables still developing their ideas, and several were in the back of the room finishing the matting of the lighting assignment that they had just completed. "Put your matted portraits in the cabinet for grading, and gather your things because I am not signing late passes," Mr. H said. Within a few moments, the bell rang and students began disappearing as quickly as they had appeared. Grabbing my laptop and bag, I said "bye" to everyone. The students and I exited the classroom, moving counter to the flow of new students entering for the next class. Everyone dispersed and I found myself navigating my way back to the school's main entrance ID station to check out for the day.

In summary, the autonomy of technology as a discrete entity has dissolved the borders of objects, processes, and concepts into networked actors. The co-dependence on technology, as seen in this study, reveals the links between the actors and practices in different ways—resulting in translations between the things that are being linked. In art education practice, these multiple ways of knowing and derivations are problematic when

trying to enact a particular process of keeping technology autonomous (i.e., the just-as-a-tool approach, or the narrow compartmentalization of curriculum of exclusion of new forms of media).

Tensions along the Borders of the Network:

Interactions of Participants, Environments, and Discourses

Over the next few weeks, students continued to develop their ideas. They also began exploring the tools of the software program, Photoshop®. With the one exception, students did not have any working experience with Photoshop®. As a result, Mr. H felt students would be best served by completing several Photoshop® tutorial activities. He brought out the tutorial books (Photoshop® 6.5 version) and explained to students that they needed to complete eight of the 12 tutorial assignments. They could choose which eight he would grade. Mr. H has found that this strategy works well in exposing students for the first time to software like Photoshop®. Students began the tutorials. The overlapping of the two tasks extended over several sessions. Once the tutorial assignments were completed and handed in for a grade, students could begin to work more exclusively on metaphor identity projects.

During this process, I worked one-on-one with students as they researched and developed ideas and sketches for their images. Students showed me a variety of sketches and found images that they wanted to incorporate for this project. Ideas began to gel. For example, I spoke with the student working with the horse imagery about a composition she was considering. We discussed possibilities of scanning many images she had collected, and then I demonstrated how the software would allow her to select and layer

multiple images. She began exploring the possibilities of layers with the software, while I moved to the next student, Lucy.

Lucy, a 9th grader, was so captivated by the possibilities of the digital interface that she immediately established her idea concerning abortion, and invested much time in exploring many options of the digital image environment, while staying focused on her intention and purpose for her imagery. Simultaneously, she diligently worked on completing the eight tutorial activities requested by Mr. H. In my interview, she revealed her relationship to art and technology and the contrast of having a technology teacher and artist working together.

> I enjoyed having another teacher in there, especially a technology teacher. Because I am an artist, I have never explored the technology part of art. Just having someone with a view of technology working with someone who is an artist–creates a lot more options. Because you can do a whole lot more with that. (Lucy, personal communication, May 31, 2006)

Lucy sees the dynamics and differences of Mr. H's and my teaching strategies in regard to art and technology by considering the technology part of art. Chris mentioned that students had talked to him on several occasions about the differences in teaching approaches, and that the students saw the benefits of both approaches.

Through this understanding of the differences in approaches to art and technology, Lucy adapted as a learner. She selectively employed Mr. H's and my approaches to art and technology, and developed her attitudes toward art and digital technology, and her personal ideas for the project. She came to realize that making art is a negotiation between design, technical skills, and interpretation of her social and cultural

context. Through research on abortion texts and images for her artwork (see Appendix D), she explored personal ideas. Abortion as a social political issue weighed heavily on her religious convictions. She wanted to actively confront the personal tensions of such a complex decision for young women. Inspired by both fetal images and women's autobiographical narratives, she chose to position her identity and become an active participant within the conversation. In dealing with fetal and body imagery as both consumer and producer, Lucy exposed the cultural and political impact of the mediated environments through both her research and her artistic meaning-making practices.

Lucy was able to develop her technical skills while simultaneously exploring ideas of personal interest. By reflecting on an actor-network approach, I consider agency outside the normal human centric parameters. Every aspect of Lucy's network, such as computer software, text and images from the Internet, personal beliefs, and teaching approaches, are entities that can be said to have an agency. This agency exists in that the entity's presence, for Lucy, is now part of the networks that motivates her desires and defines her realities. Knowledge is dependent on networks of understanding, thus agents cannot be separated from their networks. Although for Lucy there are different levels of power forces in the interessement process, it is interfacing with the network as a whole, which mobilizes her desires and defines her reality.

The student at the table next to Lucy had a horizontal composition in his sketchbook detailing an iceberg tip floating in a loosely sketched seascape. "I want to work with the idea of an iceberg because there is so much you do not see below the surface," he states. Additionally, he had several words like *not visible, emotion, likes, dislikes, dreams, fears,* and *hope* that he wanted to move across the water surface. We

spent time exploring how text can be altered and skewed in the digital environment. In response to the reflective questionnaire, this student expressed his ideas about technology and art while acknowledging different views. These ideas acknowledge that art is art as a result of its materials, a stable definition of art based on its materials.

Human and social elements of the imagination cannot be divorced from the forms and materials in which they are disseminated. This point, from an ANT perspective, is evidenced in several students' responses to the questionnaire. First, many position digital media in relation to art defined through materials such as pencil, paint, and clay. The student with the iceberg imagery responded to one of the questions by writing, "Over time, I will probably be more accepting of this kind of art which involves no lead pencil, acrylic, white clay, or sketch pad." And to another, "I believe people have different views on this type of art [digital] because it involves aspects different from older art. It requires different mechanics to shoot a photo and modify it, than drawing what you see in your mind's eye" (Student #8, response in final assessment, May 15, 2006). Secondly, art is defined through an understanding of peoples' different views articulating that this type of art (digital) is different from older art media (i.e., painting, drawing, clay). Other student responses reflected similar beliefs and values about originality and computer-generated art. Specifically, for this student, the software programs automatically create tension for not being authentic. "I do not consider digital art made through pre-constructed programs as authentic or valued as a hand-crafted, completely original piece" (Student #10, response in final assessment, May 15, 2006).

This response asserts that digital media are processes whose forms articulate discourse expressed by traditional media. Although this is a convenient and possible

approach to using digital media in art classes, it is limited in its consideration of the differences and cultural codes of digitally mediated communication. Like this student defining digital art in relation to his existing definition of art, teachers who use technology in instruction often have a tendency to use it to reinforce existing teaching practices (Cuban, Kirkpatrick, & Peck, 2001). A position that only reinforces existing teaching practices does not acknowledge that tools have unique codes that influence our participation in our world. New media, like traditional tools such as paintbrushes, enable us to communicate in different ways—tools create structure inherent in the articulation process.

Although similar to past arguments about whether photography is art, and more generally about the definition of art and the valuing of handmade art, the context today offers some new insights as technology expands as a ubiquitous communicative medium. ANT is concerned with how tools and methods are adopted and how these decisions are made about what is known. The cultural interface approach encourages students to be active agents in their own conceptual change. This is evidenced in several scenarios in this study; the following is one example. In considering the differences between new media and traditional painting, Lucy began to examine the physical and conceptual differences between the two media. Lucy's remarks below, from my interview with her, exemplifies issues of relating art to digital media as she tried to resolve the tensions between painting with acrylic paints versus with Photoshop® colors and virtual brushes:

> Painting and digital images are very different. The painting is a big process with layers and layers of things. Not that there are not layers in digital imaging, because there were in mine. I just had to build it up—the colors and different

techniques with texture and all. Texture is very important in digital imaging and in painting. (Lucy, personal communication, May 31, 2006)

Lucy's response attempts to reconcile the virtual layers with the actual painting layers. The texture of painting is an actual physical process, which becomes an illusion in the virtual environment. The illusion of texture becomes a representation—rather than an actual surface experience. For Lucy, the material layers of painting processes become the way to comprehend the ephemeral layers of digital code. Lucy enters into technology processes for art making, by first seeing it in terms of materiality. Then she adopts understood ideas such as paint layers to reconcile the digital interface. The conflict between digital media and traditional materials resurfaces throughout student reflections, and offers insights on student knowledge building as part of the stages of digital integration.

It is not a rejection of technology, but the inability to move past technology entry and adoptions stages that are often cited as obstacles to technology adaptation, appropriation, and invention. Additionally, students become more assertive learners when teaching moves into the third stage, adaptation (Sandholtz & Reilly, 2004). When considering learning as "changing participation in the culturally designed settings of everyday life" (Lave, 1993, p. 6), one can reason that the learner may not be merely an autonomous human agent. The learners are responding to the heterogeneity of a situated activity, the social processes enacted in everyday settings, and their open-ended character as knowledge builders. This is a process that changes understanding in practice, that is, as learning. Humans are often dependent on the artifacts that embody knowledge. Therefore, we cannot consider a knowledge-skilled person outside the relationships with his or her

tools and materials. Additionally, these tools and materials embody knowledge. This is evidenced in my journal entry that follows.

> I noticed today that there were horizontal mirrors on all three walls around the computers. The mirrors were placed so that from the front of the room you could observe all the students at their respective computer stations. One mirror, ironically, had a cross-eyed blue feather cartoon bird looking at you, while it held the edges of the mirror. I had not noticed the mirrors before and now felt a bit like being under a microscope; it was obvious that you could monitor detailed activity in the computer area from a distance, like from the instructor's desk as well as other strategic positions across the room. (M. Tillander, personal journal entry, March 20, 2006)

The artifact of the mirror embodies meaning as evidenced in both the instructor's use and my understanding. The relationships of humans to tools and materials become networks composed of both human and non-human entities and cultural knowledge and meaning. These hybrid relationships require us to reflect on the learner as what Haraway (1991) calls the *cyborg*: a hybrid of material and knowledge, such as the change from science to techno-science (Haraway, 1997). Similarly, the technology project for this research site was a function of hybrid relationships between the complex network of artists, educators, technology users, art students, consumers, and several interrelated factors including the classroom and equipment, technology accesses, teaching philosophy, content knowledge, and technical ability. In considering ANT, these factors include multiple hybrid networks, cultural beliefs and values, as well as interests embodied in multiple networks, and "obligatory passage point[s]" (Callon, 1986b, pp. 24-

28). An example would be the academy mission statement (see Appendix B) of Site 1 hanging on the wall in the hallway. The negotiations of technology projects involve multiple networks and hybrid interests, and thus through knowledges and materials, define, regulate, and shape what goes on in the learning environment.

Moving around the room, I sensed a level of frustration from the students working at the computers. I realized there were continual calls for assistance for Mr. H, as I saw him go from his desk at the front of the room to the area where the computers were located. As I began working with the next student, he asked for help with one of the tutorials. Taking hold of the Photoshop® 6.5 instruction manual, I asked the student to show me how far he had gotten. Suddenly, I realized the obstacle. The Photoshop® software version on the computers was 7.0 whose interface design was much different from version 6.5. Thinking that the technology instructor had accidentally grabbed the 6.5 tutorials by mistake, I mentioned it to him. "Yes, I know that there are differences and I should download the 7.0 tutorials, but I did not have the time," he said.

I decided to redefine my role and told Mr. H that I was very good at working with students to get past obstacles and suggested he let me work with students if they got stuck on the tutorials. He in turn could work with the two students who were ready to scan, showing them how to use the scanner. He agreed, and thought that was a good idea. This was a political move for me as I enjoy direct involvement with students and do not like the role of *sage on the stage*.

The Photoshop® 6.5 tutorial manual's step-by-step instructions temporarily destabilized the network and precipitated a change in action and knowledge. The network process of several entities (scanners, sketchbooks, student artists, 6.5 manuals, 7.0

software, constructivists, and technical demonstrators) are all determining and transforming each other as symmetrical agents (i.e., equivalent agents) involved in the network. Similarly, many of the textbooks (Grabe & Grabe, 2001; Sharp, 2002) and professional development activities (National Center for Educational Statistics, 2000) for teachers learning to use technology in the classroom emphasize knowing about the computer operation and software application. These are often prerequisite topics to thinking about technology supporting teaching and learning. I wrestle with socially located, non–innocent political performances that make a difference in considering how textbook, manuals, and professional development goals impact the teaching and learning environment. Actions of non-human actants like computers, manuals, and professional development goals play a role in the network.

Realizing that I might be very busy for the rest of the afternoon, I began scooting around the computer area on a chair I found that had wheels, a bit like flying in for a visit. Since I prefer the strategy of being at eye level to collaborate with students to overcome their obstacles, this made the whole process a bit less frustrating and somewhat comical. Several of the tutorial activities were difficult because of the changes to the software interface; some procedures were no longer possible to follow, as they did not match the new software interface. In these cases, I suggested that students approach by *reflecting* on what was to be accomplished from the activity and *actively* use what they knew to *explore* alternative ways to achieve. Students had been informally exploring the Photoshop® interface already as a result of my explanation on accessing the software and the layers feature. They had become very fluent and knew their way around the layers of process windows. Students learned quickly which of the tutorials were problems and

chose either to avoid them or to *collaborate* with students who had been able to move past the differences within the interface. This is an approach that includes *reflection*, *exploration*, *collaboration*, and hands-on *active* learning as integral to the learning process. These strategies shift the focus away from step-by-step process associated with tutorial where learning is focused on the tool. A recent study found that reducing the technical expectations for teachers can enhance their instructional use of technology (Sandholtz & Reilly, 2004).

"What a smooth day and how busy everyone was," Mr. H commented.

"Yes, students are great at exploring, reflecting, and collaborating with each other to resolve any technical obstacles," I said, and took Mr. H's comment as a compliment.

I saw several students grin, which for me acknowledged their resolution to deal with the tutorial obstacles. As students collected their things to leave, I double-checked to make sure they had not left anything at their computers and that they had logged off the system. I gathered my things. I followed the straight line of students out of the classroom, moving counter to the visual flurry of students entering for their next class. I thought for a moment of the blurred boundaries of my role in this study as researcher, visiting artist, and participant. As I moved down the hall to leave the building, I found myself energized about the day. I was glad to transition from step-by-step tutorials to hands-on active learning, especially to negotiate a change in the interface. I was excited about the explorative, reflective, and collaborative strategies I was able to suggest to students as they began to work in the digital environments, thus enabling students to take control of the digital interface, and negotiate for their needs, as well as understand the embedded

assumption and codes that the software embodies. This was a territory were my identity as an educator was familiar and stable.

An appreciation of the transparent benefits of using technology while struggling through the boundaries of the mechanics is more palatable when it occurs in the context of making art itself and not skill drills. For example, one student writes, "When I am intrigued about information, I try to apply it in any form I am capable of" (Student #7, response in final assessment, May 15, 2006). All media have mechanical demands, so keeping the end in view can be difficult when all you can see is step procedures. By shifting media boundaries and bringing a negotiation of the parameters of artistic processes to the foreground, we keep meaning-making in clear sight. For example, as a reflective response to *What are the theories that govern the knowledge of the subject,* one of the students wrote, "... that one's identity can be represented in many ways. That is what drives the mechanics of this project" (Student #8, response in final assessment, May 15, 2006). Through their own art pieces, students became engaged in the difficult processes to create with purpose, investment, and direction. The process of meaning-making itself becomes visible, tangible layers through many mechanical options.

The students at this site were exposed to Mr. H's approach to teaching technology as well as the newly introduced cultural interface approach. By contrasting these two teaching strategies, students questioned the relationship of skill to ideas. "Entities—human, technical and textual, are compound realities, the product of a process of composition" (Callon & Law, 1997, p. 170). ANT suggests that it is not any innate properties that are important, but rather network associations—a result of considering the process of redefinitions. Students became interested as part of the third phase of

translation known as *enrollment* as processes defined by various actors. Through enrollment, new curricular methods such as a cultural interface approach can occur concurrently with the development of new social and organizational relationships.

I returned for a total of eight sessions to work with these students. I left before the images were fully complete and printed, but returned several weeks later to see the students and their completed and matted images. A new school gallery space had just been completed to display academy art students' artwork in the central concourse, a balance to the many academic and sport trophies in the large central glass display case. I walked into the circular concourse, which was empty of students. The new gallery was enclosed on three sides by glass. There were several movable walls displaying 16" x 20" matted digital prints from the workshop. A poster and sign mounted on the glass window described the workshop.

Completed images reiterate the rich conversation I had had with students during the new media workshop and research that explored a cultural interface approach to digital media. Two students chose to investigate their identities from inner and outer expressions of identity. One of the students in the class was interested in exploring the world of hip-hop culture, and how it defines youth and youth culture. After researching visual codes of hip-hop culture, she digitally layered a brick wall with graffiti style text, and a selectively posterized three-quarter self-portrait body pose. These are all part of the visual conversation that signal codes that inscribe their meaning on her identity. Her attention to the body pose, facial expression, and finger gestures all signal the details of the codes that hip-hop culture uses to convey messages, make meaning, and frame identity. Similarly, another student's image articulates his dual roles as artist and baseball

star. A pitching pose of himself is repeated three times in slightly off center positions in the composition. A translucent layer of two bats intersecting his pose like an X conveys his tentativeness of his dual roles as artist and pitcher. Intrigued by the idea of having two faces and playing on the painted face he wears for games (anti reflective make-up), he uses the digital environment to combine sports logos, team pictures, and text about the process of winning and the abilities he has been given and opportunities he has had as both artist and athlete.

As I moved to another angle to see the artwork, I saw the completed image by the student who chose to work with the book metaphor. As she was one of the only students to have experience with Photoshop®, I had shown her a new media art work of Margot Lovejoy (2003, 2004) as a possible way to extend both her technical and conceptual abilities. Although she did not have time to work with animating the image, her final solution blurred the boundaries of her working relationship to art and technology. In the image a central axis in the upper right hand corner acts as both a binder and window into a cartoon-like imaginary space. From the axis, a cross section of the binding radiates slices of pages that emerge and appear to be turning right. Here we see the artist's playfulness with identity as she uses many self-portraits sporting different glasses, hairstyles, and expressions that reveal the complex and multiple facets of her identity. In the upper left side, a larger blue profile self-portrait looking left beyond the image frame signals an imaginary dream reality. This provides a tension as it fluctuates between photo and drawing. Through a juxtaposition of cartoon style drawings and playful construction using the photographic medium, the digital environment provided for this student a

critical inquiry space to explore the possibilities and limitations of new media technology.

In her final image, Lucy chose to represent the fetal image, a woman's body and text through a limited color palette of Caucasian flesh tone, red, black and white. A sharp diagonal bisects the composition provide contrasting fields of red and black. Narrative text textures the entire surface shifting to red on the black background and white on the red background. In the lower right hand area, a simple cutout silhouette of a fetus sucking its thumb is inlayed with a very soft photograph of a nude seated woman clutching her body. Random scribble lines across the image add emotional chaos to the simple graphic representations. A drawn contemplative sitting self-portrait is located in the upper right area, back against the wall and edge of the image. It is as if Lucy has been engulfed in a graphic novel thought bubble. The simple yet complex dynamic of this image echoes the layers of Lucy's personal belief on abortion, complex ideas of mediated environments, and her artistic meaning-making practices. These investigations through a cultural interface approach facilitate students focusing on the ways meaning is produced in mediated environments, and develops their abilities to engage the dialectic process of new media.

I continued across the concourse, down the technology wing to the art studio.

"Hello," I said as I entered the classroom.

"Did you see the show?" several students asked.

The academy and school was such a pleasant environment to be in as a first time researcher. Additionally, I felt that the collaboration had reciprocal benefits. Students had a successful experience with digital media. Mr. H had an opportunity to assist the

academy students with their art, and use his expertise in negotiating the computer migration process, all part of his growing relationship with Chris. For me, I was able to work within the unique environment of an art academy in transition. And, as a result of the students' artwork and my visit, Chris was able to secure funding for a digital lab dedicated to the academy art students. Additionally, he realized the need for his program to have someone who could bridge the art and technical conversation, a position that was secured and filled the following year.

"Yes, I saw the show, and you should all feel really good about the artwork. Everyone's ideas are really wonderful and insightful," I replied. "I just told Mr. H how great the images looked and how exciting it was to see the final artworks all matted. You should be excited about the digital artworks on display, and proud of your first time experience with digital imaging." Students' busy class schedules, as well as my schedule, did not allow time to have a detailed conversation with them about the exhibition and the digital workshop. I shared my observations, very briefly. I did not want to interrupt further. It was very close to the end of the year and students were engrossed in completing their current artworks. "Good-by everyone, have a great end of semester. I will not see you again till next fall," I said. I left the class, walked down the hall and across the concourse, turned in my ID at the office, and exited the building.

This section in summary described several examples of interaction and negotiation of entities in the network. The tensions and exchanges of ideas are seen in the teaching strategies of Mr. H and myself (e.g., tool-based versus cultural interface). Another set of tensions are seen with the students shifting their perspective of engaging with (technology) interfaces (e.g., redefinition of art based on its material and medium).

These encounters foster the capability to construct interpretations—to establish a relationship between the point and purpose of instruction.

Site 1. Summary

In summary, the narrative of this experience and data from Site 1 exposes several patterns concerning the possibilities and limitations of exploring a cultural interface approach to digital new media. Upon entering this site, I noticed that the class assignment was a technical exercise in lighting portraiture. I introduced the *Identity Metaphor* lesson as well as new media artworks to provide an experience outside the box of technology as a tool. Specifically, using a cultural interface approach at this site engaged contemporary new media art (Burson and Mori), technology as a culture entity (role in meaning-making in advertising and media), and student lived experiences. It also used a constructivist approach in acknowledging sociocultural context as part of learning. This was evidenced by students' engagement in their sharing of different impressions, contexts, and meaning-making processes in the class discussions and through the variety of issues explored in their artwork.

In this research, there were several actors. One group of actors, as participants [students, teachers, administrators, and researcher] engaged with a second group of actors, new media art [systems and discourse] and digital technology [systems and discourse]. And performing in the network with these two groups of actors was a third set of educational systems (e.g., curriculum, school, teaching strategies, and artifacts).

Through these actors and a cultural interface approach, several themes surfaced in this research. These include beliefs, values, and assumptions about art and technology, connections to real world experiences, the power of ideas to motivate and sustain

learning, and relationships of learning skill to knowledge constructions. One of the first issues involves the dynamic nature of technology and how art and technology definitions are reflected in beliefs. This exposes definitions of art (handmade with materials like pencil, paint, and clay) and technology (i.e., tool or medium) according to how they are perceived and also separated—art from technology. The use of only technical exercises creates an artificial separation of nature (technology) and society.

Technological reality is not a separate analytical domain but "simultaneously real, like nature, like discourse, and collective, like society" (Latour, 1993b, p. 6). That is, the role of art and technology, their dynamic inseparable nature, and the view of technology as a medium, rather than a separate tool, is an active network process. As part of the contemporary consciousness of young people, and their role in interactive cultural consumption and production, this active network process facilitates choices in experiencing and participating. Participants valued the ability to apply their knowledge about technology inside the classroom, as well as to connect to everyday digital experiences and engagement. "These ideas make sense because they influence me in my everyday life. Artists organize their knowledge and skills by using them in their everyday life …" (Student #12, response in final assessment, May 15, 2006). Through a network process, participants explored cultural codes of art and technology, and codes of engagement and experiences such as those through forms, feelings, ideas, and beliefs.

Participants viewed the ability to translate skills and knowledge into relevant action as a substantive educational experience. For example, one student remarked, "I may try to use what I learned with other media. I will learn to explore more and think beyond the usual" (Student #1, response in final assessment, May 15, 2006).

Site 2. Small New England High School

Research Site 2 is a high school situated in a small town outside a very large New England metropolitan area. The school serves about 700 students, and its mission statement is to educate all students in a challenging, safe, disciplined, creative, and nurturing environment. The school's goal is to foster lifelong learners whose achievements are a credit to them and to society. Their mission statement is very comprehensive in scope, and makes a commitment to society and humanity, literacy and language, logic and reason, science and the natural world, career education, wellness, learning, respect and tolerance, and culture and the arts. The specific objectives related to culture and the arts are stated in the school's mission statement as a commitment to "develop and enhance creativity and an appreciation for the arts."

The community's commitment and long-standing relationship with the arts is evident. For example, the local newspaper featured a several page spread on the annual school art show during one of my visits, highlighting student artwork and the school art program. The short feature article was dominated by images of artworks, students with their artworks, and the community engaging with the exhibition. These images were surrounded by local business announcements congratulating the "performers," "artists," "talented students," and "Fine Arts Program" for its successful "Evening of the Arts" (local paper, June 1, 2006).

The town is located adjacent to a 7000-acre Native American Indian reservation. The area is rich in archeological and historical resources from prehistoric sites, old homestead sites, and the legacy of the granite industry. The impact of this Native

American culture on the school is seen in Michelle's, the participating art instructor's, use of the term *pow-wow*[2] as a forum for group thinking.

Approaching the school, I could see the building's renovation and expansion, as the variations of colors of the old and new building sections were subtly different. The grounds and new plantings further revealed the areas of renovation, which began in 2003, and were just recently completed. As I entered the high school, I was awe struck by the sweeping width of the new contemporary atrium space and how the older building sections had been joined and integrated. Sunlight bounced around the interior and off the faculty and students entering the building. I glanced at the display cases located along both sides of the atrium space that highlighted student projects and educational cultural exchanges. Students' and teachers' interest in both local and global cultures is seen through the display of artifacts in these showcases. Specifically interesting was a display with cultural artifacts and information about China. I came to know later that this was part of an ongoing cultural and faculty exchange program. I signed into the office—an all glass-fronted space with a door located to the left side of the atrium—about twenty minutes before the start of the school day. Once I was signed in and had my visitor badge in hand, the office staff called Michelle via the intercom to meet me in the hall.

Tracing Actors and Actants that Create Representations

According to Dr. Martin, "the secret to his [Latour's] method is to follow how artifacts are used to create representations of the world in order to understand those

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[2] It derives from the Narragansett Sovereign Nation word *powwaw*. They were a Native American tribe who inhabited the area of Rhode Island and eastern Massachusetts. The term has since come to be improperly used to describe any gathering of Native Americans of any tribe.

representations" (Martin, 2005, p. 283). As we will see, inscriptions—such as those featuring the instructor's philosophy, titles of resource books, course description titles, and room names—represent the entities that comprise the network.

Within a few moments, Michelle appeared at the end of the hall. As she walked toward me, I remembered our first meeting at NAEA, and the many emails we had exchanged in preparation for this project. I met Michelle, an art and technology instructor, because of a presentation I made at the 2005 National Art Education Association (NAEA) conference. Michelle was interested in expanding her knowledge and abilities with teaching digital art. She expressed an interest in being part of my research process, even though it would take place a year and a half later. Her philosophy of education is best expressed by a Mahatma Gandhi's quote, which Michelle has on her Web site: "Real education consists in drawing the best out of yourself. What better book can there be than the book of humanity." Michelle has a traditional art background in painting and printmaking, graphic design experience, and a strong working knowledge of digital technologies. After the NAEA conference, we began conversations through email. "I feel like a starving computer art teacher who finally had something she could dig her teeth into and enjoy the connections" (Michelle, personal communication, May 7, 2005). I was intrigued by her comment and began to consider how art educators who have a passion to learn but are limited by resources might explore digital artists in order to encourage cultural conversation within the skill-driven domain of digital technology.

The books on Michelle's desk reflect her commitment to making technology integration into the art program a meaningful experience for students. The book titles *New Technologies in the Artroom*, *Digital Art*, and *Web Design for Teens* reflect

Michelle's interest in staying current with digital technology as it pertains to art and to her students as teenagers. (See Appendix E.) Her selection of books focus on connecting technology with traditional art media, as well as focusing on the types of approaches to use with students. For her, these texts frame an accepted approach and offer successful possibilities. She is knowledgeable and fluent in many software packages, such as imaging and illustration packages, Web design, 3D rendering software, and animation software. Michelle integrates themes and ideas from her more traditional art classes, such as painting and drawing, into the computer art class to bring the art conversations into the technology environment. This is her solution to adaptation and integration as she pioneers in the computer environment. She acquired many of her abilities from her previous graphic design work experiences. These experiences are articulated through the title of the course *Computer Art and Design,* and the curriculum, which has a fine art strand and a graphic design strand. Michelle's supervisor is committed in expanding the art program by creating the computer art classes and by providing a new fully equipped computer lab dedicated to art. Taken together, the mapping of both Michelle's experiences and her surrounding environment is my tracing of an actor's representation of herself in the network.

Reordering through Material and Social Phenomena

We begin to reorder the associations within technology and art educational practices by stepping in and out of the practices in teaching, that is specifically in order to frame (i.e., identify and develop) new practices (cultural interface approach) in art and technology. By considering ANT's key ideas of translation, inscription, and networking processes through social and material phenomena, we are offered an analytical approach

to communication and technologies with an understanding of the locations that technology occupies within art education.

As we came upon the art rooms, located at the end of the large atrium, which was also the entrance to the rest of the classrooms, I commented on the display cases: "Your display cases are beautiful. It is refreshing to see the student and faculty projects at the entrance to the school. I will take some time to look closer sometime today." Michelle replied, "Yes, you should take some time to look at them all. I see so many people stop and look, all types of people. I tell the students that I have even seen the construction workers looking and discussing the artworks" (Michelle, personal communication, April 10, 2006).

Michelle and I reached the door labeled *Computer Art.* The small blue with white lettered sign was mounted at eye level to the right of the door. As we began to enter the *Computer Art* room, the art department supervisor approached us. Michelle shared with her my observations of the display cases. She smiled and said,

> Thank you. Originally the art classes were in the back of the school. Because of the renovations, and requirement goals of the entire school district to display more student work, I argued to move the art department to the front. Listen, I am busy with the upcoming annual art show, but wanted to stop and say hello. I am excited to have you here, as we love Michelle and the work she is doing with the students and computers. It is a busy week as we are preparing for the student art exhibition. Have Michelle take you around to visit and see the new space before you leave. I am very interested in keeping the technology as part of the art

> department, ensuring the artistic part is kept. (Michelle, personal communication, April 10, 2006)

With this, she turned and went down the hall, quickly disappearing into one of the rooms.

Michelle and I walked into the room labeled *Computer Art*. It was a large classroom with computers down the side and back walls. The back of the room also had scanners and a color laser printer. The center of the room had several long worktables and chairs around them. Pointing to a large cabinet, Michelle said, "You can put your coat and bag in there; it will be safe."

Once I had stored my things, I continued to scan the rooms. There were historic gargoyle images and original student artworks from the previous project on medieval gargoyles tacked up around the classroom. Michelle's desk sat in the center front of the room. It was covered with her computer, lesson plans, student projects, and books that she used for teaching and professional development. In front of her desk sat a small table with several bins for student projects, some for incoming work, and some for work to be returned**.** Each bin was labeled with the respective class title.

At this point, I began to consider how to bridge my previous conversations with Michelle with the infusion of a cultural interface approach at this site. Cultural content can be contentious and is often excluded for various reasons in art education (Stuhr, 2003). Michelle saw the need to understand her students' connection to the world of technology and to consider their cultural perspectives. As a result, we can begin to consider through translations—involving people, artifacts, and their specific performances—multiple ways of breaking down barriers of traditional approaches when analyzing the production of knowledge. The analysis of complex networks offers a way

to consider how hybrid materials and social performances explain change and stability. One of my many dialogues with Michelle led to her translation of culture.

> Culture seems to be a loaded term in classrooms today, and many students use their *culture* as a way of using profanity or being rude or abusive to adults—they say it is their *culture* that allows them to cuss or be disrespectful or loud. (Michelle, personal communication, February 23, 2006)

Acknowledging that *culture* was seen as a loaded term provided articulations that were directly connected to the questions of this research.

Michelle had previously explored digital gaming as part of the technology class (and social phenomena) the year before, and reflected on how she would now engage gaming within her class the next time. She stated, "It would have been better if students were required to analyze the style of the graphics, backgrounds, and characters' personas, costumes, movements, etc." versus exploring the games they liked and disliked (Michelle, personal communication, February 22, 2006). Michelle's consideration of exploring the topic of gaming also highlights several questions about engaging students in conversations about violence.

> Should we integrate violence and desensitization of it in this discussion? The gargoyles were violent creatures in our subconscious mind—the threat of hell or a horrible end. Much of today's games are violent. I think the difference may be the fact that medieval minds were receptive and aware of violence and were afraid of its reality, as they knew death, real illness, and oppression. I think we can contrast that with the fictitious TV and gaming violence, which desensitizes people, and in turn enables them to believe it is normal or natural behavior. Is this too much for

> an art teacher to take on, or should we regard this as a responsibility? (Michelle, personal communication, February 23, 2006)

She also stated that the students this year were not as involved with digital gaming as the students from last year, and wondered if it would still be as valuable to consider.

Another aspect of integrating technology into art education is to trace the perceptions of technology as it progresses in both the social and technical process realms. In an email, Michelle stated that students often equated technology with speed and efficiency, not with the nature of the creative process or the desire to explore ideas that do not operate with the same speed and efficiency. She felt that this attitude contributed to student frustration. Students had a limited understanding of how their beliefs, values, and assumptions were being informed by this illusion of efficiency:

> The nature of imaging is not fast—sometimes the animation seems fast. The animations are not fast. Sometimes it is about the things the teachers were talking about in the lunchroom, the whole idea of gratification—instant gratification. You got to have it, and you got to have it now. And that they [students] expect the computer can do that for them; they need to put the work in, they need to struggle through the same issues that you juggle through when using a paintbrush. (Michelle, personal communication, June 8, 2006)

Michelle was very interested in questioning and considering what students' cultural connections were to these issues. Early discussions of the *Information Age*, the master metaphor for society, often highlights individual technologies. However, as these technologies become more embedded in society, these discussions have moved toward the social and technical process (Castells, 1996). The ubiquity of new media and its social

perceptions such as speed and efficiency offer places of contention and resistance as networks try to gain stability. Additionally,

> … what has made new media 'new'—the ongoing process of technological and cultural adaptation, reinventions, and recombination—is still strong, but users' expectations of stability and reliability are likely to lead in the short term to more regulation, standardization, institutionalization, and centralization of control. (Lievrouw, 2004, p. 14)

This creates a growing tension between a traditional view of the media environment (new media and information technologies) as sites for production, consumption, and distribution and an alternative view of a venue for participation, speech, interaction, and creativity (Lievrouw, 2006). New media and information technologies often resist fixation and stabilization, and the ongoing process of innovation, adaptation, and reinvention separates new media from older technology systems. Artists working with digital media often make this process of remediation a main feature of contemporary creative work and media culture (Bolter & Grusin, 1999).

Michelle was also intrigued by how our interactions with technologies are reordering the material and the social. Specifically devices are now considered "cool," like cell phones and text messaging, because when she was young, walkie-talkies were associated with "geeks" (Michelle, personal communication, June 8, 2006). Michelle and I explored our surprise and puzzlement over the different perceptions of devices like walkie-talkies and cell phones by reflecting on the phenomenon before us. This process is reflective of a culture interface approach, and illustrates an ability to reorder and move

away from the social and material dichotomy existing with the human and machine interface.

Translations: Interpretations, Equivalents, and Messages

As part of the process of translation, Michelle and I investigated the issues we were going to explore in her art curricula plans. This process is known as *problematization.* Through the next step*, interessement,* we negotiated the terms of our involvement. Once we had decided on involvement, we then defined each of our roles. These were often in flux during the process of the action research, where the boundaries of the teacher and researcher roles became more blurred. Once this process was established, we began to imagine the possibilities and then eventually *mobilized* them into action as the final step in the process of translation. As an example, in a closed network, teachers enroll students, who are translated as specific types of "learners." In this case the teachers become what Callon (1986b) describes as the "obligatory points of passage" (pp. 24-28). In a more open network, such as the approach used in this research, Michelle, her students, and I negotiated these boundaries of teaching, learning, and research.

At this research site, students and teachers were able to engage in and encourage co-participative, dialogic, and co-constructive activities to consider new media in art education—through the building, sharing, and evaluating of differences. Both Michelle and I were informed by our views that learning is situated and socially constructed. We both believe that learners' capabilities are seen as personal and social meaning-making, and that pedagogy involves strategies to negotiate differences, such as how a cultural interface approach is engaged at this site in relation to new media and art.

Changing Culture Contexts—Sorting Strategies and Engaging the Lesson

The research participants and technology are both symmetrically studied as "actant[s]," which is anything that acts or is the source of actions within the actor network analysis (Akrich & Latour, 1992, p. 259). They embody a relation of institutional structures and social authority. An embodiment is a "co-constituted embodied participation" in collective acting (Verran, 1999, p. 149). This embodiment is a process of accounting for, rather than explaining an argument for relativism over realism. This exposes participants' different ways of understanding technology in art as a way of mirroring each other's beliefs in physical and social reality. Haraway (1991) similarly challenges us to acknowledge the body's active position as an agent *without* implying its immediate, predetermined presence. Thus, I considered the participants as material-semiotic generative nodes, which are fundamentally both material and discursive, and both historical and real (Haraway, 1991). When considering this approach in teaching, education becomes an exchange between multiple ways of knowing, meanings, reasons, and judgments, and is no longer about learning the concepts. These are struggles where technological and social systems construct actants' positions—a location where subjectivities are both defined and rejected.

Michelle and I met after school to prepare the lesson she requested that I do with her students. Additionally, I knew that the perceptions of the *research* part of this project had heightened her sensitivity to students' daily actions. Specifically, she voiced her concern that her students had "behaved silly" the previous day, during the powwow and group webbing activity. The term *research*, like *culture* and *powwow*, are floating and sliding signifiers, which are mobilized by different groups with different agendas. The

agendas of research as part of accountability are laden with historical meanings and feelings.

During two dialogues and subsequent reflections, Michelle asked several questions that assisted me with guiding the direction for the research activities. These questions were related to the interests of her students as well as this dissertation's research explorations of a cultural interface to new media in art curricula. For example, one question focused on how to involve students in exploring their interests (e.g., something such as her students from last year's love of gaming). Michelle stated that students from last year enjoyed games and were excited to show Michelle what they knew. They would often invite her to game with them. "We are doing this game after school; you should come over and play with us" (Michelle, personal communication, June 8, 2006). Although Michelle indicated in one of our discussions that it was against school policy to have games in school, she expressed an interest in broadening her understanding to know more than just what games students liked and disliked. This exemplifies how Michelle reflected and wrestled with the socially located process of gaming manifested in the hybrid social and material worlds of her students.

Michelle and I negotiated the planned activities and sorted through a selection of artists that reflected the context and process of the current class activities, namely the *Earth Animation* project. Once immersed in Michelle's school and its culture, I was better able to tailor the lesson to participants' intentions and interpretive strategies. Michelle and I felt that the students' own perspectives toward the medium, improvisations, and their practices would provide some valuable insights. As a result, my original lesson plan, one to synthesize artists' ideas and critically analyze contemporary

digital new media artwork, would have been too out of context for how students had been exploring technology within this class. I felt that using Michelle's planned goals and my strategies (as she had asked me to teach her students) would contrast the differences and offer a pivoting point from which to start the negotiation process. So I asked, "Michelle, will you take notes and make observations while I teach the class tomorrow?"

"Yes, I can do that," she replied.

"What are your goals for tomorrow's lesson?" I asked.

Michelle responded, "I would like the students to understand *protagonist* and *antagonist* as important for their animation storyboards. In addition, I want you to show them some of the things that are going on with animation on the Web." She added, "They can see how people are using this, and connect it to their lived experiences beyond the classroom." (Michelle, personal communication, April 11, 2006)

> Yes, this would be great; connecting to their lives would be very engaging. This will also give us an understanding of their involvement with media content and process outside the classroom. Also today many of your students told me why they took computer art. They said that they could not draw or did not like drawing, but liked art. From talking and watching them in class today, I think they like art because it engages their imaginations; it is improvisational, creative, and expressive. (M. Tillander, personal communication, April 11, 2006)

"I like the animation *Anna* (2004) that you showed me, the one that was created through manipulated gaming software," Michelle stated. I replied, **"**Yes *Anna* also has very unusual antagonist and protagonist [elements], and some very interesting angles of

view that evoke emotional content. This will be a good example to start with, and then ask the students for examples that they enjoy."

The exchange is an example of using actors and actants as interacting co-agents for probing the ways in which social ordering and disordering operate. This epistemological analysis is reflexive and acknowledges its own contingency. It represents the balance of human and non-human, and the analysis of mediated forms that create general truths out of individual experiences. This analysis (exchange) helps both to create a space for network change, and to create change as an object to be distributed and consumed by organizational members.

Michelle tried to enroll the students to value their own world experiences, but this task proved very difficult. She concluded that students do not value their own individual experiences. She tried without much success to get students who were technology wizards to assist other students:

> I would like to get students up doing more teaching too or showing. My last major class last year did ... But if they are a rich source, I don't think they realized it. I don't think they value their experience or understand their experience as valuable. (Michelle, personal communication, June 8, 2006)

She found this perplexing, and attributed it to their maturity level as well as to students continually looking outside themselves and becoming so externalized. Additionally, during my interview with Michelle, she posed several questions about how technology was adapted by her students. This reflects again, her valuing of students' approaches to teaching as being valuable to her teaching practice. She responded,

> There is not a lot of innovation or creativity going on out there [i.e., the general public in a consumption mode]. But it's the teenagers ripping stuff off … doing the stuff they're not supposed to do [i.e., remixing, appropriating, reverse engineering, etc.]. But, creativity and innovation does come out. What is this and what can we do with this? But, they don't even realize that, and that is what I think was my point before. That the whole idea is that they don't respect–they don't understand that what they are doing has a value, they don't realize. They do make Web pages, and they do have digital cameras. What do they use it for? Do they email their friends? And now will they go in and adjust the pictures? And what will they do with the technology that they wouldn't have been able to do before? And stuff like that. Try to get them to think about it. (Michelle, personal communication, June 8, 2006)

This self-reflection allows for a re-examination of one's teaching strategy, and shows a willingness to integrate multiple ways of knowing into the educational process.

Balancing the Material within the Social without Privileging Either

By introducing the concepts of *cyborg* and *hybrid*, Haraway (1991) and Latour (1993a, 1993b) consider the balance of human and non-human, material and semiotic, and the real and constructed. These concepts highlight the balance and rediscovery of the different role of the material [digital new media], and how the unnoticed artifacts shape our everyday lives. Their concepts help trace the way the material comes to be translated, and provides a way to narrate the heterogeneity inherent in social processes and practices.

In this research, this balancing emerges from bonding art and technology, shown above as both accomplice and as antagonist. As illustrated in Michelle's observation above, the balancing reveals a paradox, as the concepts of hybrid and cyborg are cultural and analytic fabrications. However, by reordering and illuminating these hidden semiotic processes, we are able to examine the relations, connections, and interactions that enact and disrupt everyday routines of the art educational network.

For example, the differences between technology and art were perceived and responded to differently by the instructor and two students. In her interview, Michelle stated that the National Art Education Association (NAEA) recommended exploring technology in art as "just another tool" (Michelle, personal communication, June 8, 2006). With this in mind, she explored art themes with students in relation to the digital projects and often found it difficult to make connections. Because Michelle is very knowledgeable and fluent with many digital technology software packages, she looked for meaningful connections. It is interesting to note that many students were taking the computer art class because they wanted to express themselves. The students noted that they either did not like drawing or had no skills, and felt this class (computer art) would still offer an opportunity for expression: "I love to draw. I just do not have the drawing skills. I wish I did, but I don't" (Elyse, personal communication, June 8, 2006). In addition, one student stated, "Like I don't draw all that well, it [computer art] gives you an opportunity to express yourself through art, but you don't have to have drawing talent" (Allie, personal communication, June 6, 2006).

These students saw the creative potential as great, but acknowledged the complexity of the programs as frustrating. The participants in this negotiation offer

multiple voices, and they re-order and approach the project with different abilities. For example, students expressed connections to the real world with digital technology: "Well, I see more things on TV now, sometimes I think. 'Oh I learned how to do that.' It gets pulled out of connection with it. I think it is nice to understand it" (Allie, personal communication, June 8, 2006). Nevertheless, the same students acknowledged that with traditional art, "there is just that human feel to it" (Allie, personal communication, June 8, 2006) that is missing from digital art. This becomes a deliberate re-ordering of things human and non-human, a re-ordering that brings art into technology and technology into art. This reorders relationships at a moment of individualization (personal systems of representation) and a moment of institutionalization (definitions of art and technology). The politics of this negotiation are part of "the entire set of tasks that allows the progressive composition of a common world" (Latour, 1993a, p. 53). This is a negotiation at a boundary zone where participants are integrated into a process that follows art, human, and technical propositions through stability and instability.

That evening I developed a presentation and *Digital Video Project* handout (see Appendix F) based on what Michelle wanted covered within the 40-minute lesson. We agreed to have students explore digital animations, *Machinima*, *GoogleEarth*® and *YouTube: Broadcast Yourself*® as cultural phenomena. This assignment explored popular culture linked with contemporary technology that we thought would be engaging for students.

Michelle's class objective was to have students develop storyboards and understand protagonist and antagonist as a foundational process of the *Earth Animation* lesson project. Students had recently obtained access to *GoogleEarth*® via the Internet in

the computer class. This provided a timely connection to current interfaces used in everyday life. It enabled student conversations about different types of interfaces and their impact on contemporary culture. With this in mind, I suggested the following approach to Michelle. She agreed, and at her request, I created a lesson the following day that explored the following:

- the differences and similarities of engagement and consumption of digital streaming film such a www.youtube.com, machinima [*machine cinema* or *machine animation*], and large production digital films;
- a "critical looking" activity with regard to angle of view, control of content, and emotion in a short digital machinima animation entitled *Anna* http://www.fountainheadent.com/n.x/fe/Home/Productions/Animation; and
- a conversation connected to students through pop culture for a lesson involving protagonists and antagonists in students' favorite or last seen digital animation or film.

The next morning I went to get copies made at the local copy store. I entered the school, checked into the office, picked up a visitor pass, and proceeded to the *Computer Art* room. Michelle greeted me, "Hello, I thought you might be early." "Yes, I needed to get copies of the handout I sent you last night made for the class," I remarked. "Oh, I was planning to do that this morning," she replied. "Well, I was not sure how busy you would be and it is part of the research protocols, so you and your school should incur no expenses," I remarked. "No big deal, it is something we are using for my class," she said amusingly. "Is there anything else you need?" "Yes, can we load the animation links into

the Web browser so that we can transition smoothly to each of them?" I asked. "Yes, that is what I do and it's real easy. Give me your drive I will set that up."

Students began to arrive as we prepared for the lesson. Once Michelle got the links loaded into the browser, she began moving around the room and gently engaging with students at the computers. She also began setting out on the center tables, several boxes of animation clay, modeling tools, paper, and scissors for construction. Once everyone arrived, she introduced me and I briefly explained that we would be developing characters and storyboards for the earth animation. She then sat down with the students.

I began the planned activity. I reiterated the ideas that Michelle had shared, about the webbing activity that was now hanging on the board. I talked about divergent and convergent thinking, pointed to examples on the webbing poster, and discussed examples of each. I then told students we would go around the room and have everyone share their favorite animations or movies, and describe the antagonist and protagonist. I briefly and simply defined antagonist and protagonist, and began on the left side of the room. Students were quick to share and listen to each other's responses. Several students were not sure of the antagonist and protagonist for their movie. I asked for student help, as I was not familiar with the film. Several students eagerly entered into the conversation and helped.

I distributed the handout, and then told them we would look at several digital animations. I took them to the Web sites, where we viewed the animations and then analyzed each. "Who are the antagonists in this animation?" I asked.

Students were very responsive in speculating on the protagonist and antagonist for each of the animations. Using the quick time slide bar, I moved the animation sequence

to one with unusual camera angles and asked, "What meanings might we consider with this change of camera angle?" During a long silence, I could see students thinking. I knew that a longer wait time was going to be needed.

"They would feel distant from the planet," responded one student. "And how would you feel," I asked. "I would feel less connected or concerned," a student replied. "Does this relate to us as we zoom around the planet with the *GoogleEarth*® program that you were all looking at earlier," I asked. I did not want an answer to this question, but wanted to make a connection. I knew that each student would have an opportunity to consider this further with the reflective handout Michelle had developed.

"What do you call the transition process in digital technology," I asked? "Tweening opacity," exclaimed one student. I answered, "Yes, exactly. You have been exploring transition as a digital process in ImageReady® software, as when you blacken the screen. Now we will build on this and consider transitions as part of the story telling process."

Michelle noticed that students made "aw" and "cooing" sounds as I showed a clip from the *Ice Age: The Melt Down* (Forte, 2006). Their familiarity with the film provided a familiar space to understand animation. I then moved to several examples of how people are created in digital spaces. Specifically, I showed the motion-capture movement processes (Dils, 2002) used by the artwork *Pedestrian* (Eshkar & Kaiser, 2002). *Pedestrian* is a twelve-minute video loop that projects a bird's eye view of moving pedestrians onto the ground, where digital avatars (cross-section of urban archetypes) move across the space as a series of broken narratives with no beginnings or endings.

This was an accessible artwork in terms of process and content. The artists' Web site offered images that clearly illustrate the motion capture process.

Michelle observed that I had "hooked them in by engaging them about their favorite movies … 90-95% of students were engaged and stayed engaged for most of the lesson" (Michelle H., observation notes, April 11, 2006, ¶ 15). She acknowledged their understanding from the exposure she had given them with Bryce 4® and their research on the Internet (¶ 14). Previously, Michelle revealed "I'm not accustomed to having students synthesize information to bring it to a more ingrained and personal level" (Michelle, personal communication, February 23, 2006). When she observed how all students were "hooked," she decided to use several current articles, such as the streaming video of *GoogleEarth*®, and another on the dazzling features of Internet map sites that she thought would be valuable for students to read (Vascellaro, 2006a, 2006b).

As a result, she developed a new student reflection (see Appendix G) connected to these articles. She asked students to consider their opinions about "streaming videos of landmarks" and "the ability to navigate streets in a virtual car," "closing the gap between the real world and the computer," and "privacy rights and laws" within the article. The collaborative process, as well as the research issues, created a subtle change in the types of reflective assessment questions Michelle gave her students. Prior to this project, Michelle's reflective assessments (see Appendix H) involved asking students to reflect on how they approached the use of technology, what meaning their work expressed, and how they described the central focus of their artwork. This reflective assessment was effective for measuring students' exploration of the digital technology process within the computer art class.

Because of our collaborative research, Michelle developed two additional reflective questionnaires. The first is a homework reading reflection (see Appendix I) entitled *Project Earth: ImageReady Animation Homework;* and the second is a new student reflection (see Appendix G) entitled *Computer Art and Design Reflective Dialogue: How does Technology Inform and Misinform Us*? These questionnaires support the questions of my research and, additionally, expand the context of students' technology experiences outside the classroom. Several questions were in response to the students' current fascination with *GoogleEarth*®, particularly issues involving virtual navigation and privacy. Michelle was intrigued with the idea of how technology informs and misinforms us. Both of these reflective assessments asked students to share examples of personal experiences with digital technologies, express opinions about the pros and cons of digital technology, critically consider digital visual technology's impact on their lives, and critically consider how digital visual technologies engage in communication processes by informing and misinforming us. These illustrate a new approach of engaging students to consider technology beyond "just a tool" for personal expression and beyond the walls of the classroom.

Site 3. A Mid-Atlantic Urban High School

I walked across the large parking lot that serves more than 2,200 students in a community with 68,000 students, to enter the main high school entrance. This school is the oldest secondary school in the community, celebrating its 52nd year in 2006. The school is more like a large high school complex with several special wings; one wing serves secondary level severely handicapped and special education students, another serves pregnant girls, and one serves an International Baccalaureate Magnet Center for the entire city. The new town center under development near the school is transforming the school culture. The school is no longer considered a "country school," but more of a "downtown" school.

Importance of Artifacts Having Agency

I entered the building and signed in at the security station. I continued down the hall and turned right to enter the area labeled *Art Wing*. I opened the double doors and entered a central space lined with tables and bulletin boards. The art classrooms and faculty offices all extended like spokes of a hub from this space. This school and its four art educators have a long tradition in Discipline Based Art Education (DBAE)–an artifact that formulates the curriculum. The school's art program is structured around art foundations, drawing, painting, printmaking, 3D sculpture, Advanced Placement (AP) studio, and AP Art History.

> One might say that while a *site* [italics added] represents the constituent physical properties of place, its mass, space, light, duration, location, and material processes, a *place* [italics added] represents the practical, social, cultural,

> ceremonial, ethnic, economic, political and historical dimensions of a site. Places are what fill them out and make them work. (Kelly, 1995, p. 142)

A site represents the physical properties of space and location; it also represents the practical, social, cultural, political, and historical network of articulations.

The bell had rung a few moments earlier, so the art educators were moving from classes to offices, as they prepared for their next class. I entered Betsy's office to the left, where she sat in front of a bulky computer screen. The room was lined with art storage spaces, student artworks, and portfolio racks.

In thinking about how to introduce the cultural interface approach uniquely to this site, I was reminded that it was not enough to study the existing relationships [between the objects in the network]. "Once art departs from traditional models and begins to merge into everyday manifestations of society itself, artists not only cannot assume the authority of their 'talent,' they cannot claim that what takes place is valuable just because it is art" (Kaprow, 1995, p. 158). We must also consider the receptiveness of change, both at the individual and administration levels, in conjunction with the trajectories and ideas of students and educators.

Betsy had been the education director at the city contemporary art center for eight years before taking a position to teach in this public high school three years ago. Here she teaches 2-D media, as well as the AP portfolio courses. Betsy regularly contributes art reviews to the art and cultural sections of the local paper and arts magazine. Her artwork specializes in 2-D media, specifically oil pastels. Her themes explore material objects as symbolic forms of representation, and her pastel artwork includes realist representation to abstraction. Betsy and I collaborated on many projects while she was education director

at the contemporary art center. These projects ranged from basic workshops for local art educators, to complex community-engaged projects involving multiple high schools. As a result, we have a history of collaborative efforts that facilitated the process of this project.

During my initial visit to this site two weeks earlier, I assisted students with the final phase of their AP portfolio process, which enabled me to see their artwork, discuss themes and issues that were relevant to them, and offer an external and alternate perspective. It was a very comfortable environment, knowing that I provided valuable feedback for students as they considered writing their art statements and arranging their required slide sheets. The AP class was a studio environment where students were very self–directed, creating and critiquing at a high level of synthesis. I met several times with students before beginning the research project to promote a smooth transition for being in the classroom. Based on these prior discussions, today's focus was on introducing the cultural interface approach, and enrolling the students and instructor into the new paradigm.

I entered the art class the day of the presentation early so I would have time to set up before students arrived. Betsy said, "Hello. Let me finish this note to the administration and we will go and get the digital projector for today's presentation." I replied, "Yes, take your time as I came early so that we could talk, as well as set up before students arrived." Betsy replied, "We will have to go to the media lab, which is upstairs and on the other side of the building to get the projector that I have reserved."

Although school systems say they provide technology, the actual logistics of how resources are managed and distributed impact pedagogical practices. Since the media center was at the other end of the building and on the second floor, it required time as

well as some logistical negotiations to access the elevators in relation to the art wing and media center.

As this was a long walk, I began to share with Betsy some of the artists that I had chosen to show the students today. Since she was not familiar with new media artists, she asked me to present the artwork to students. In understanding that objects have agency I agreed, realizing that the dynamic nature of new media art might seem intimidating at first. Betsy understands contemporary art and the youth culture, thus providing a foundation for her to make connections throughout our conversations.

I stated, "I have selected several new media artists as a way to explore the issues of the medium, and to connect to students' artworks based on their AP portfolios." Betsy said, "This is new to me, so I am going to be just like the students learning." I also selected several examples of rethinking visual representation that are integrated into everyday lives, such as *START MOBILE* and *The Visual Thesaurus.* The first is the world's first retail art gallery to sell new art for cell phones. My strategy was to bridge students' lived experiences and relationships to new media technologies that focus on some of the issues artists are exploring. I hoped that this would provoke critical cultural inquiry and discussions for exploring issues students might wish to explore.

Upon returning from picking up the digital projector, I began to set up for the presentation. Students began to arrive. I had brought my laptop, which provides flexibility as to where to set up the digital projector. This would not have been as easy with the technology equipment in the room, because the large desktop computer and monitor were set up under the ceiling-mounted projection screen.

The art room is a typical art space overcrowded with easels, two computers and printers, supply carts, canvas racks, student artwork, large worktables, a paper-cutting station, and a light table. The computer sitting on the side counter struck me both visually and metaphorically, as it was covered with large canvases and a stack of loose art drawings. The keyboard and monitor were covered in splats of paint and charcoal smudges, which blended into the environment like an impressionist painting. I spotted the projection screen, which was suspended above the only other computer in the room. This computer was set up *as if* to be a teacher's work area as it was sitting on a traditional teacher desk. Introductions began informally as I set up the projector, and students helped by pulling down the screen and turning off the lights.

I used the digital projector with my laptop in a 40-minute presentation, entitled *New Media Artists Presentation,* to explore the work of several new media artists. As a strategy to bridge the unique forms and processes of digital new media art, I made connections between artwork that students had used for their AP portfolios and to the presented digital new media artwork. The presentation included artworks such as *Pedestrian* (2002) by Shelley Eshkar and Paul Kaiser, *Thrift Store Tape #3* (2001) by Brent Watanabe, *System Azure* (2003) by Jill Magid, *Errata Erratum* (2002) by Paul D. Miller aka DJ Spooky, and *Verbarium* (1999) by Christa Sommerer and Laurent Mignonneau. In addition, I showed two Web sites, *The Visual Thesaurus* (www.visualthesaurus.com) and *START MOBILE* (www.startmobile.net) to demonstrate examples of application of art networks beyond the gallery, and the use of visual systems in the learning process.

Students were quiet during the presentation, but I knew that they were engaged with thinking deeply. This came from the relationship I had built in assisting them with the final critiques of their AP portfolios. Additionally, this was revealed when several students asked if I was familiar with *deviantart.com*, www.deviantart.com/, and *Interactive Refrigerator Magnets*: http://web.okaygo.co.uk/apps/letters/flashcom/.

These pop-culture digital interfaces are artifacts that assisted in the enrollment of this site into the cultural interface approach. As a result, I took time to look at these sites and have students explain their relationships. This was eye-opening for Betsy and me because we did not know how students might be engaging with digital media outside the school context.

I supplemented the presentation with a handout of images, artist names, Web links, and new media themes, and provided a copy of the presentation for the teacher and students for future reference (see Appendix J). This strategy compensated for the limited time and access to technology in the classroom. The class then followed up the next day with a webbing strategy in which students responded and brainstormed, "How does technology impact my life?"

The students' initial responses to my presentation on new media digital artists were problematic, as the students were not accustomed to looking at and discussing artwork. The presentation was supplemented with a brainstorming session collaboratively developed with Betsy, to explore students' knowledge of the role of technology within their lives and society. The fusion of unfamiliar new media art and students' lived experiences catalyzed the development of topics of personal interest for their visual

investigations. This catalyst was seen during the next class session involving my follow-up meeting and discussion with students about their final artwork.

During our follow-up conversation, each student described the concepts to be used in developing the artwork for this project. As an example, a student said he wanted to explore "old technologies as a precursor to new." His final project was a large mixed media artwork which started with layers of painted TVs and radios (i.e., old and new technologies). He then covered this surface with a black stenciled icon of a generic image of a TV. From the center of the artwork, several sets of eyes connected to partial portraits peer out at you from under the layers of technology. This student was trying to convey an archeological exploration of how new media is not really new, but reinventions of themselves.

As a second example, another student said she wanted to explore "issues of public and private spaces in regard to surveillance technology." Her artwork was a whimsical painting of an old-fashioned yellow and red bathtub with a green interior, half-filled with jostling water. The tub was under surveillance by three black-and-white contour line drawn animated camera lenses protruding down from above. Lying on the brown and blue striped bathroom mat was a drain stopper, also drawn in contour black line, slightly tipped on its edge with a long connecting chain running off the right edge of the canvas. In her exploration of public and private spaces under surveillance, she used a sense of irony to evoke serious consideration of the pervasive surveillance phenomenon in contemporary society.

The concepts of the remaining students included: *text messaging and cultural hybrids of communicating (like 'chirping'*[3]), *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 concepts reflected the rich cultural conversations embedded in their everyday lived experience*s*. The students' approach to technology was no longer focusing on tools that extend painting, drawing, and photography. Rather, the student artworks (see Appendix K), and generated topics for their artwork, illustrated their ability to synthesize digital new media within a cultural context and expose contemporary ideas that offer unique insight into new communication discourses.

By acknowledging that artifacts have agency we can explore through inscription how artifacts and places embody patterns of use. In Site 3, this is illustrated by DBAE's impact on the curriculum, and by the placement of technology (a media center) in relation to a building's site. Although "objects are really the end result of a long process of negotiation between the material world, historical associations and people—who give things names and relationships" (Martin, 2005, p. 284), it is the awareness of their continual impact that offers insights into introducing change.

Cultural Interface Dynamics—Definitions and Access Networks

The relationship between human and non-human entities within education offers an opportunity to examine the processes and strategies in a network. If we characterize

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[3] *Chirping* refers to using cell phone as a walkie-talkie … chirping walkie-talkie phones hear BOTH sides of the conversation. It is a trademarked term in mobile communications used by Nextel™ and Boost Mobile™ for sending voice messages to a private number in *push-to-talk* or *walkie-talkie* mode. A chirp is a signal in which the frequency increases (up-chirp) or decreases (down-chirp) with time. It is commonly used in sonar and radar (Urban Dictionary, 1999). Retrieved May 10, 2005, from http://www.urbandictionary.com/define.php?term=chirp).

what is on the *inside* and *outside* of a network by their associations, as opposed to a classification system, we become more sensitive to paradigm shifts and incremental changes. Values, assumptions, and beliefs of the entities in a network are then revealed through considering the position of technology through various manifestations of understanding. As an example, this site's values and assumptions concerning the institution's positioning of technology in art education is reflected in an art room where a dusty computer sits under a pile of artwork. This reflects the positioning of technology from the instructor's perspective of technology in relationship to the site's traditional medium-based curriculum. Technology's regard is also seen in the cumbersome method by which the school's media center requires ordering and then lugging of technology from one end of the building to another, then back again. In these cases, the institution's values and assumptions of digital technology are reflected, and consequently technology is positioned as neither easily accessible, nor used with any frequency in this location.

By recognizing a larger set of dynamics involving the actors (e.g., students, educators, administration, etc.) and actants (e.g., institutional procedures, implicit and explicit values and assumptions, etc.), the educational focus broadens from an actor-centric model to a network-centric model involving institution, society, technology, and art. This perspective challenges traditional divisions between art, technology, culture, and society. This site is an example of existing complex educational structures (e.g., the DBAE model, curricular frameworks as defining art, room layout, etc.) often prescribing and constraining new media technologies in art education.

A second way to step inside and outside an existing structure to consider how education comes to explore new practices in learning environments, is by tracing

innovation as agency that acts on an established structure. Betsy questions, "Where can I go to find the clearest definition of New Media? For starters, what makes it new? I was with you for all, but reverse engineering. I really don't understand that concept" (Betsy, personal communication, November 14, 2005). By tracing the articulations of participants and technology, as opposed to cause and effect, we gain valuable insights.

> If no one is interested in digital new media art (as a form like painting, printmaking, etc.) and does not think it is valuable to have as part of art education conversation, this is also a valuable finding. This is not a problem, but a finding. Technology entered education with many promises and assumptions ... some of the assumptions are not even possible to overcome and will continue to be problematic ... this is my experience from some informal research with Pennsylvania art educators. (M. Tillander, personal communication, May 15, 2006)

By looking at how the composition of technical objects constrains the participants' relationships to the objects and one another, we can see the negotiations of such interactions rather than something that determines them. This approach is an exploration of disagreements, negotiations, and the potential for interruptions–like static that disrupts a communication signal. The stages of technology infusion (e.g., adoption, adaptation, integration, and innovation) are so subtle that they may go unrecognized until they are conceptualized as part of the entire dynamic. It becomes crucial to understand and analyze the production of knowledge by supporting innovative practices combined with participants' perspectives on change. The analysis in a situated activity such as this

site integrates multiple perspectives (e.g., social interaction, meaning-making, strategies, and participants' beliefs, values, and assumptions) as nodes within the network. Cuban (1986) argued for what he calls "situationally constrained choice," which integrates the school and classroom structures, and the culture of teaching, including the beliefs of teachers. He views these as working together to restrict and enable what teachers can do in adopting different innovations.

Artists, through their artwork, often explore the boundaries that define technology. Their work offers an exploration of people's relationship to technology by considering possibilities at the periphery of a network (e.g., art and education). For example, the activist group Institute for Applied Autonomy focuses on dissemination of knowledge, agency, and public critique through artistic expression. They are an anonymous group of artists that employ technology in protest. They created *iSee,* a web-based application, that charts the locations of surveillance cameras in urban environments. With *iSee*, users can find routes to avoid surveillance cameras (Schienke & Institute for Applied Autonomy, 2002). Similarly, Natalie Jeremijenco and the Bureau of Inverse Investigations create art projects such as *Sniffer* (2002) which re-engineer technology as a form of artistic practice. They take robotic dogs available on the toy market, specifically the Sony AIBO (1999-2006), and rewire them to *sniff out* radioactive sources. These art works and projects like *Evidence Locker (2004)*, *They Rule* (2001), and *The File Room* (1994) redefine technology to turn technology back on itself. These artworks enable us to look out from the periphery as a critical investigation in reconfiguring a culture of surveillance, tangible media, data access, and censorship.

I believe that it is critical that art educators look to art and artists for their interpretations of contemporary culture and technology, and how they use art to identify important social and cultural phenomena. Although these interruptions can perturb a network and often affect associated entities, many factors can return the network to its original form. The following narrative—developed from what I discovered at site three—shows how disrupting one's unique identity within a subculture can change the dynamic within the network.

Jon had been creating cell phone art prior to my arrival at this school. Betsy was excited about the idea of this project, as it would offer Jon an opportunity to develop his cell phone artwork within the new media conversation. Jon showed me his cell phone artworks on one of my early visits and showed me some of the work he liked on deviantart.com. After seeing several of his cell phone artworks, I encouraged him to explore his ideas as part of the new media project. He shrugged his shoulder with indifference and his enthusiasm waned. Once I began working with the students at this site, I made several more attempts to encourage Jon to continue the cell phone artwork to no avail. His final piece for the project was a skillfully executed and conceptually playful black and white ink drawing. I sensed that the boundaries of youth culture had been breached, and that to engage an inside activity as part of education on the outside was just not *cool* from his perspective. I was sorry to not continue the cell phone art conversation, but found his engagement and final artwork just as illuminating.

This section, expanding on the last section's discussion of the impact of objects having agency, further illustrates the redefinition of the entities and the boundaries negotiated within the network. In summary, the exploration of the boundaries that define

technology in art, culture, and society offer insight into the complex educational networks. These networks often prescribe and constrain new media technologies in art education.

Having the cultural interface approach accepted at Site 3 calls for strategies aimed at enrollment. It is a negotiation with others for an agreement on an approach. In Site 3, the use of technology as part of the cultural interface approach encountered many resistances, and was ultimately transcribed into a form different from that at the other two sites of the study. An actor-network is configured by the enrollment of both actors and actants through a series of negotiations in a process of redefinition.

Although Betsy and I considered using the school's new online course management system, several factors precluded its use: the short timeframe of this project, the inexperience of the students with the system, and the newness of the technology infrastructure. As a result, conversations about how to consider technology without direct access were an integral part of the collaboration conversations. Although students were familiar with digital technologies and had the option to use them for this project, the minimal access to technology within the classroom was a deciding factor against its direct use in the project. Instead, we decided to approach the theme of technology through art materials and processes that students were both familiar with, and had access to in the art room. These included tempera paints, acrylic paints, oil and chalk pastels, and color pencils. Students had the choice to use digital media beyond the class at their option. Several students considered this approach, but access and time were problematic. Betsy additionally felt that the approach through materials, such as paint and color pencils, might offer a richer context of ideas.

> Related to your research, since these students are specifically NOT using technology as a tool (except Lauren's interest in video [recording of her piece made by someone else]), I think you will certainly be able to show that the conversations can be rich and dense. Sharing this with them [students] again will reassure them. (Betsy, personal communication, May 15, 2006)

Betsy provoked students by engaging them to consider the impact of technology on their lives. This strategy served as both an activity and medium to engage discussions as students considered their approaches to technology in art.

> In class today, I'm afraid their reaction was "confused" rather than "juiced." They were very confused about what New Media is (just like their teacher was initially); confused about what your research involves and how they fit; and confused about their assignment. I bumbled through as best I could. I would suggest that on Tuesday, we address those things right off the bat. This is an interesting group, less interested in what other artists are doing than you might hope. And VERY concrete and linear, as I had told you … However, by noon, they all had ideas. Not bad for being dazed and confused initially. Hopefully, you can help them run with these ideas. I hope you're not disappointed with the directions they've started off in. But, like you said, there's no right or wrong way. They just crave some more explanation and reassurance. (Betsy, personal communication, May 12, 2006)

In the next narrative description, Betsy negotiates with a student, Lauren, who was conflicted by wanting to focus only on personal issues of a recently failed relationship rather than participate in considering the possible connections to technology

and relationships. By acknowledging the use of video as one way to make her project "appropriate," and then through her understanding of youth culture, Betsy tried to engage Lauren in considering the social spaces of technology in young people's lives. Betsy also connected this to art by suggesting approaches such as documentary or performance as well as hybrid activities.

> Well, evidently, Lauren had her heart "blown up" by someone and really wants/needs to deal with this. I started to say, "You can and should still do the piece; just do it on your own time." But, instead, we agreed that the very fact that she wants to use video makes her concept appropriate. And, if you can help her somehow infuse this idea that technology—text messaging, *MySpace*, etc.—complicates romantic relationships in the 21st century into her performance piece, that would be great. But I don't know if that can happen. Whatever she does, I think she needs to be clear about whether it's a documentary or a performance [art] piece or a hybrid, along with how and why. (Betsy, personal communication, May 16, 2006)

In knowing Lauren's theme, I decided to show *The Dumpster* (2005), an interactive artwork by Golan Levin, Kamal Nigam, and Jonathan Feinberg, that presents a visualization of teens' romantic breakups, extracted from online databases as a way to incorporate humor as well as multiple voices in expression. This reflects the ability to infuse new media into the understanding of students' live experiences.

More generally, the actions and events of a network are shaped by the material and social organization of art education practices, the organization of the discipline, and the process of communication. This was seen at this site, by the access and use of

technology by the art teacher, the physical spaces of the classrooms and the furniture for designated uses (e.g., painting, drawing spaces), and the curriculum framed around media (e.g., foundation, drawing, painting, AP art history and AP studio classes). All of these actions and events impact how technology is considered within the art program. Additionally, how the art classes are organized—through material experience or communication of ideas, and the artworks selected—also frames the possibilities and limitations of how technology is considered within the program.

One student's artwork explored our relationship to technology through the phrase "like a fish out of water." This example highlights our dependency and interdependency on technology interfaces and the impact on our personal experiences: the practical (material), emotional, and intellectual. His artwork is a highly technical pen and ink drawing of a half-organic fish and half-cyborg fish. The stark, staring expression on the eye of this fish, rendered like a target, and the electrical spaghetti-like wires coming from the mouth, along with exposed internal organs, acknowledges that the creature's electrical plug has become disconnected from the energy source.

As a second example of our interdependencies on technology, Lauren, a senior who expressed having no ability with new media technologies, showed an interest in exploring video through collaboration. She expressed her frustration with the limited exposure the school provided, and perceived this as having a potentially negative impact for future careers in the arts.

> Because I know a lot of jobs that are art-related now, are with all the computer things and stuff like that. And there is so much you have to learn and remember with it, that it almost angers me because I don't know it [using technology and

> computer software such as Photoshop®]—I have not picked it up already. Whereas when you are doing this [painting] kind of art, you already knew it. When you were little, you already were taught with crayons. But if you are little and you go onto a computer program and you can't do anything with it, you have to be taught it. You can't as much learn it on your own. (Lauren, personal communication, June 2, 2006)

Lauren valued her intuitive, creative side, and art that is both discovered and created from a "blank canvas"—as opposed to art through a machine interface (i.e., the camera or computer). She sees learning with the computer at a young age, as less natural than learning with material like paint. Her perceptions of technology's role in the job market, as well as her own lack of technical skill and experience, are a source of frustration. As I observed from the class' portfolios and heard from their conversations, the other research participants all seemed to be very fluent with technology and satisfied with not having access to technology in the art class. One student, for example, considered digital new media art "a craze" (Rene, personal communication, May 31, 2006).

Students' perceptions of technology varied across the class and offered an interesting insight into what role education was playing in these perceptions. For example, one student, Sally, did not value what she perceives as technology's speed and efficiency:

> And I think to a certain extent, you really have to delve deeply into new media to get to the subtleties that make it individual. Otherwise, it is like I just want to make a pretty picture, so they can blow it up and put it on my wall for my

> grandmother or something like that. I do not think that you can really make "art" in such a short period of time. (Sally, personal communication, May 31, 2006)

Additionally Sally stated that you "have to delve deeply into new media to get the subtleties and make it individual," a perspective similar to one of Lu's (2005) findings in her study of eight preservice art educators and their attitudes toward computer-based art. Lu found that using a comparison activity between computer and traditional art emphasizing the computer's power to mimic traditional techniques and tools was detrimental to art teacher preparation. This is similar to what Sally stated in that she believed going further than just mimicking traditional techniques and tools.

Ideas of originality were another issue of concern to the Site 3 students and art instructor.

> One of the issues that is "hot" right now in our class—based on a critique yesterday—within the context of Student Gallery, is the issue of visual "sampling," "appropriation," and use of other people's "visual resources" as inspiration for one's own work, etc., including in digital collage. I've done a little research about the ethics of it, never mind the legality, and it's clear as mud. I would think this would be a strand running through New Media in a BIG way. (Betsy, personal communication, April 27, 2006)

One main concern in this area is to clarify for students some acceptable ways to use sampling, appropriation, and accessible visual resources without plagiarizing. Specifically, students often associate new media with processes such as collage, appropriation, and ease of image access. New media art also greatly challenges the definition of art, by contrasting its ephemeral quality with the materialness of art. The

ephemeral nature of new media art often requires redefining the language and models of criticism. For example, in some new media artworks, you could consider the process of interacting with the digital interface as a formal element or conceptual element.

An early stage of the enrollment process considers all aspects of the environment. This was shown in Site 3 by the access to technology and ideologies of the space. The use of existing issues of interest (e.g., digital new media and issues of plagiarism) helped align the actors/actants to include new domains.

Technology Translations: A Polyvalent Reordering

Tracing the discussions with students about their projects revealed the recurring issue that technology alters our senses and the way we communicate. This was a dominant, overarching issue for all three student participants in Site 3.

> With the artwork I created, I wanted to explore the relation between the images we see, the way we reflect on the world around us, and how we can demonstrate that through new media, or even how media can influence how we see the world. It's kind of a play on it ... That's how I see art. It's a reflection on the world; not always necessarily our feelings. It is a reflection on how we see things. (Rene, personal communication, May 31, 2006)

The following example shows how a subtle shift in one student, Rene, changed the way she had been working all semester. Rene took a risk (traditional to conceptual) creating *Art Makes What Was Old, New* as the artwork for this project. Her love for classical art and her dislike of contemporary art, until this project, had directed the content of her AP portfolio concentration. In her new work, however, Rene used a conceptual, contemporary approach with materials and ideas. Her artwork is a color mixed media

drawing of a robotic arm and a computer screen on a table. The robotic arm, sitting outside the screen space is adding a planet into the existing computer screen image. Her artwork conceptually speaks to blurred boundaries of the computer screen and our physical spaces. Additionally she had computer printouts collaged on the surface of the artwork and a string of binary code in the middle of the image. The binary code is the title, *Art Makes What Was Old, New* (see Appendix K), which serves as a hidden additional meaning embedded into the work. Her artwork reflects a conceptual and a visually playful approach to how our vision is altered with technology.

In the interview, she remarked that visualizations of scientific information were pervasive in many of her classes, and that seeing them often provides a visual way to conceptualize ideas. Additionally, she stated that she wanted her artwork to "explore the relation between the images that we see, the way we reflect on the world around us, and how we can demonstrate that through new media, or even how media can influence what we see in the world" (Rene, personal communication, May 31, 2006). Although she still favors classical and functional art forms, her final artwork and my observations of her commitment to this project revealed her interest in exploring new media issues in relation to her learning experiences. The exploration challenged her to express her ideas about new media as well as about a process of knowledge building.

With similar overlapping issues, in her interview Sally described the ideas of her artwork:

> The final one I actually finished is about the different identities people create for themselves, like through technology. You can customize all your ring-tones for your phone, so yours is not like everyone else's technically. But I am sure ten

> other people have that same ring-tone. And on the Internet people have five different screen names. They have a different identify for a different time of day; or for different people they are talking to. (Sally, personal communication, May 31, 2006)

Sally recognizes that identity and originality is impacted by the medium of technology. Similarly, other students saw both the advantages and disadvantages of technology. They understood our dependence on technology and the ways in which it changes the way we see the past and how we negotiate the present.

Several subtle shifts occurred in thinking about technology within Site 3. Betsy expressed an interest in exploring the theme of technology in future lessons through her traditional classes of printmaking, drawing, and painting. She also recognized technology on multiple levels, and demonstrated a willingness to adopt and adapt technology through traditional media.

> … on having done that project [cultural interface] with the AP students makes me realize that I could and should do it [consider technology conversations] with the intermediate level students in my drawing, painting, and printmaking class. All the things that are listed in our curriculum ... that technology and the impact of technology on student lives should definitely be another theme that is explored through traditional media .... You know, whatever the capabilities of the class and school are. So I think definitely next year one of my units for my intermediate students is going to be technology and new media, and how it impacts their lives .... (Betsy, personal communication, June 23, 2006)

ANT assisted with overriding fixed sites of learning to understanding new media and the consequences of including new media in the curricula across complex networks (e.g., curriculum and definitions of art, technology of culture). By studying art classrooms in action, the transformations, and the ways through which inscriptions are assembled, we can better understand the processes of adoption, adaptation, integration, and innovation concerning new media in art education.

Betsy's seniors were very self-directed, and as a result the class environment was like an atelier. It was easy to move around the studio and engage fluidly with students during the several visits I made to the class.

On my fourth visit, I entered the class and decided to sit at J's table for the day. He said hello as I saw him in the hall a few moments earlier. J came into the classroom right behind me and we both approached the large right table at the same time. He put his overstuffed backpack down and began to unpack his things. This included a set of drawing tools and a bag of seven cell phones.

"Are those all yours," I asked? "Yeh," he replied with a gleam in his eye. "How do you have so many, do they all work?" I asked. He laughed at my question and responded, "No these are all my old phones." "Wow, I am older than you and you have more cell phones than I have owned," I remarked. ANT offers insight to this interaction by encouraging an understanding of the real, social, and discursive. Specifically ANT suggests that the stability and form of artifacts can be seen through the interaction across entities such as cell phone ownership, age, laughter, and a gleam in an eye. This passage further illustrates the redefinition of the actors, actants, and entities and the boundaries they negotiate within the network.

J's artwork response for this project *how does technology impact your life* was an exploration of the idea of *text messaging and cultural hybrids of communicating, like "chirping."* Specifically the work was about communication with text messaging (icons), as a cultural activity, and of perceptions of meaning with text messaging. His large color pencil drawing was a composition with a large cell phone with patterns all over the surface, a large envelop icon signaling a new message, and a ribbon of "chirping" text. The cell phone was morphing into a giant mouth with a full set of teeth with dominant, pointed incisors. A red tongue and color drawing of a mouth roof covered the inside surfaces of the dial pad and screen. Four blue graph bars rose from the lower right-hand corner, a reference to the Alltel™ "raising the bar" wireless phone company logo. An oversized yellow message envelop with blue edging was located behind the cell phone. Pixilated letters ran around the page like a ribbon exposing the front and the reverse view of the words "*u should call m… atal* [lata] *fi* [if] *u nac* [can] *but i w*ould chirp u."

"J, Who do you talk to with all these cell phones?" "My friends," he replied. "For example, can you explain?" I asked. "We can not play in my neighborhood so we get together at the city basketball courts. I chirp with my friends to find out where they are, and let them know we are meeting at the courts."

Although peer-group activity is not new, as exemplified by J and his friends, the continuous mediations through shared access to mobile and open communication devices are relatively new. Individuals and groups are ever co-present even across space. For J, these social spaces are a way to override passages between fixed sites of media access. As a result " … when lickety-split bits on the infoban supplements or replaces movement of bodies along circulation paths and when telepresence substitutes for face-to-face

contact among participants in activities, spatial linkages that we have come to expect are loosened" (Mitchell, 1996, p. 104). The communication network is becoming a complex interface—as these networks utilize multiple spaces (e.g., social, news, and advertising).

The introduction of the cultural interface approach, and inherently the formation of a network, is as much about the way agreements are reached and the breadth of translations that can happen, as it is about the agreements themselves. In Site 3, we see several shifts in students' and instructor's perceptions. Examples include the exploration of their relationship to technology through the use of metaphors, the consideration of ideas of originality and ease of image access, and the association of new media with processes such as collage and appropriation. The perceptions of technology varied across the class, fostering reflective activities resulting in multiple interpretations. This makes the impact of technology on student lives that emerged through a cultural interface approach an important theme for consideration in the curriculum.

Border Transgressions: Translating and Negotiating Boundary Objects

Analyzing the mediating artifacts used as part of the process of translation, in their role as boundary objects, enables an understanding of how actors view knowledge-transfer problems at the boundary between network groups. Actor-Network Theory considers the relationship between human and non-human entities in the construction of socio-technical reality. Boundary objects are artifacts that expose a relationship between network entities.

> Boundary objects are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become

> strongly structured in individual-site use. They may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them a recognizable means of translation. The creation and management of boundary objects is key in developing and maintaining coherence across intersecting social worlds. (Star & Griesemer, 1989, p. 393)

Educators inscribe their interests in technical artifacts (i.e., lesson plans, curriculum, writing on blackboards, presentations, handouts) as a process that defines the use of these artifacts. Facts and knowledge are manifested in the final products of multiple processes of translation (i.e., students' relationship to technology spaces). Non-human inscriptions (e.g., slide presentations, color transparencies, handouts, software interfaces, and art reproductions) mediate these that stabilize the meaning of artifacts and processes. By viewing a mediating artifact as an inscription of human interests, we can begin to understand how influences are transferred or translated in a network comprised of both human and non-human entities. Procedural manuals, forms, presentations, and critiques all serve as boundary-objects in a knowledge network that mediates collaboration.

ANT narrative according to Latour (1991) should account for the "progressive passage from the microscopic to the macroscopic;" that is, it should account for the social structures that influence the course of the local history. An ANT narrative tells a story of how a cultural interface approach evolved in the context of this particular network, and provides an understanding of knowledge transfer between networks.

The *art wing,* which was closed off from the main hall, had a unique central entrance foyer. From this foyer, all the classrooms and art teachers' offices could be

accessed. As a result, I often saw many of the other art educators from this school. These teachers knew my interests in technology, as well as my history of teaching in the surrounding school systems. On one occasion, the art teacher responsible for teaching the AP Art History course was returning to her office at the same time I was waiting for the bell to ring. She asked me if I had seen the recent discussions on the art history listserve about using digital images rather than slides for AP studio portfolios. I had not and inquired further. She said there was much discussion about the ability to manipulate digital images, and how this influences the validity of the adjudication process. She said there was some concern over this. I asked her if she had seen the latest issue of *Studies in Art Education*, specifically the article on projection technologies. She had not, so I gave her a copy I had with me, and told her that the first article in the journal had an interesting argument on projection technologies. She took the copy and the bell rang. We each moved to our respected spaces.

The article I gave her focuses on a historical analysis of visual projection technology (Eisenhauer, 2006), and frames the slide projector as part of a larger discourse of projection technologies. Eisenhauer's larger question is, "How do technologies acquire meaning?" within the framework of "magic vision," "scientific vision," and "corporate vision" (p. 199). By inquiring into the role of visual technologies in our lives as part of our visual culture, like in a cultural interface approach, we move away from the tool-based discourses to shift the emphasis from, "What can technology do?" to, "What does technology mean?*"* (Eisenhauer, p. 112).

When I returned the next week, the AP art history teacher came rushing out to talk with me before I went to work with the students. In a very animated voice she said the

article really made her rethink her use of the slide projector with her students. I knew the article's cultural discourse on technology would give her a similar but slightly different view of technology and culture, one related to her recent discussions about the use of digital media for portfolios. Just as projection technologies extend the boundaries of the visual within the classroom, so too the cultural interfaces of technology bring a reflexive context to disciplinary practices.

Research as a Boundary Object

Actor and network constantly redefine each other. The boundary objects in the network shape the process of translation, by which one actor transfers his/her will upon the other. Betsy stated that the "school system does not like students being used as lab rats." This was contrary to my view of the term *research*, as I see research as a dynamic, engaging process that provides reciprocity for all parties involved. I had not considered the multiple view of research, especially in a time of accountability and testing driven by *No Child Left Behind* (NCLB). She again articulated this in an early email as we began negotiating the project. "Perhaps we should get together and talk. Incidentally, I know the school system is VERY particular about having students participate in anything as 'research subjects,' so we'd have to get that cleared, as well" (Betsy, personal correspondence, November 14, 2005). I attempted to negotiate any concerns about my role as researcher and the process of research in a follow up email.

> I too do not like the idea of "research subjects." I am not collecting statistical data but rather personal insights …. I am trying to not work with students as "research subjects," but as voices in a conversation, as much as I can do this within the

> political framework of research ... (M. Tillander, personal correspondence, November 14, 2005)

This is an interesting remark, because it conflicts with the school system's organization that has an office dedicated to research requests. This office was very helpful in offering support for resolving any issues that prevented the research project from being implemented. This example demonstrates the assumption that meanings are not understood the same way across organizational networks (i.e., boundary objects). Here the boundary object is research as a final product, i.e. as a repository of knowledge such as research reports, dissertation documents, or journal articles.

The Site 3 project did not engage surveys, but rather sought to follow actors and actants in their every day environments. This approach initially created confusion about "what they [the students] were supposed to do." Thus, I was reflectively more conscious of the research process and the blurring of boundaries as both researcher and collaborator. I was aware of the need for shared methods, which support accommodating views of knowledge across a boundary. I wrote the following as a follow up in an e-mail to Betsy:

> I will talk again about my research ... This is an interesting dilemma ... Inevitably, they [students] will think about it. There is no right or wrong in their responses/art. Their responses will become part of patterns that emerge. For example, if I took all the AP portfolios they just completed and put the artwork into patterns and themes of topics/media/process and asked, "What emerged from their portfolios?" I would be exploring from the student point of view how they approached AP portfolio. This would then present some context to my

> assumptions, expectations, or biases about what students do for AP portfolio. The analysis might present information for other students to consider in their approaches to AP portfolio. (M. Tillander, personal communication, May 13, 2006)

Carlile (2004) frames four characteristics of a process at a pragmatic boundary of knowledge evolution where innovation is desired. These characteristics include the use of a common lexicon, the ability to identify and learn about differences and dependencies when novelty is present; the transformation of actors' domain specific knowledge to work effectively together through shared understandings; and the need for multiple iterations for sharing and assessing knowledge. This research considers boundary objects of research and teaching and the political nature that they embody within a k-12 environment. Discourse about boundary-crossing and border-crossing (Tuomi-Grohn & Engestrom, 2003) is a subtle move away from cognitive concepts of transfer. This assists in exposing the interface and making explicit the social practices and objects through which learning is mediated, but also identifying that objects may be part of many contexts. The ideas of mediation, mobilization, and transition can also be seen as more than a one-way transfer; rather they can emphasize the relational and flow processes. The research as boundary object becomes a translation of specific interests that are mediated by human and non-human inscriptions, assumptions, and understandings. This translation provides an understanding of the evolution of knowledge transfer and influences that encourage situated educational processes in complex socio-technical networks.

CHAPTER 5

REFLECTIONS AND IMPLICATIONS

In Chapter 5, I reflect on the themes that emerged from the data analysis narrated in Chapter 4, and synthesize the information from all the chapters in relation to the two research questions. This chapter begins with a section entitled, "Boundaries of the Classroom," which synthesizes and reaffirms the intent of the research. Next, I will reflect on each of the two guiding research questions from my field experiences. Finally, this chapter concludes with a summary of implications and future directions.

This study offers several significant insights for art education. First, it reveals the possibilities and limitations of using a cultural interface approach as a means of exploring technology in art education. Specifically, the study shows that by combining new media artworks, students' lived experiences, and cultural context into the classroom, educators can provide meaningful explorations of digital and Internet technologies as actors and actants in k-12 networks as part of larger social networks. Second, this study explores the use of Actor-Network Theory (ANT) within educational practice. Specifically, this study traces the network actants and how the translations within the network (e.g., changing of definitions, and shifting of roles) are reflected in the three study sites. These translations are important because they make visible the natural, social, and discursive orchestrations of art and technology in art education.

Boundaries of the Classroom

As the digital-visual interface moves beyond the screen-based framework, digital technology is engaging in new technological and cultural dynamics, and is being dispersed through transparent cultural and aesthetic forms and processes. These dynamics

and subsumed transparency are blurring the boundaries of our communities. Both the formal and aesthetic perspectives of an *interface culture* (Johnson, 1997) and what Manovich (2001a) calls the *cultural interface* provides a foundation for considering the cultural implications of these new dynamics.

Through this research, I consider the impact of the ever-expanding and transitional nature of digital and Internet technologies in k-12 art education. It builds on Johnson's and Manovich's concepts, and emphasizes an evaluation of the integral infusion of digital technologies in our daily lives through art making and discursive experiences. This research examined new media art in the classroom and reflected on the role of technologies in one's life. This perspective, a *cultural interface*, includes technologies' codes, scripts, inscriptions, and informational and dynamic qualities. As digital technologies engage our senses and co-modify our experiences, inscription becomes more transparent as forms of (or aids to) imagination, representation, and cultural memory. This research engages new media art with participants' personal experiences through natural, social, and discursive spaces of art educational practice.

Participants in this research confront and examine the cultural interface of new media through the works of new media artists. The artists presented at the sites in this research make visible and challenge the boundaries between machine mediation, artistic image, and organic reality. For example, the artist Jill Magid investigates how tools and processes (e.g., surveillance) are ubiquitously integrated into contemporary everyday life based on a notion of digital and human agents. The collaborative art team of Christa Sommerer and Laurent Mignonneau explores digital remixing and convergence of digital forms. They address issues of interpretation, transformation, and meaning changes

through system and network translations in Net artworks such as *Verbarium* (1999). Specifically, a user participates through a digital interface connected to the Internet, and transparently instructs a remote genetic algorithm to encode (remix) text characters into design forms, then translates the forms into networked art. Nancy Burson explores identity and representation through digitally mediated translations in works such as *Warhead* (1982) and *First and Second Beauty Composites* (1982). Shelley Eshkar and Paul Kaiser, as an art collaborative, render digital time, space, and human forms in a unique, mediated way in their works, which include *Pedestrian* (2002). By tracing technology, culture, and the self, these artists show us how we can explore issues from within and move outside ourselves to challenge the culturally constructed boundaries of technology and art education.

This dissertation not only calls for the integration of skills and lived experiences, but also for a critical examination of strategies in order to move beyond the boundaries of traditional linear pedagogy that merges technology *skills* into art education classes. Additionally, it calls for the examination of what it is to be human in a technological age. Everyday aesthetic experiences, like digital media, are created through a layer of technical equipment leaving traces of digital residue on culture. For example, the artworks *System Azure* and *Evidence Locker* by new media artist Jill Magid, offers unique and alternative perspectives about surveillances and the digital interface. Similarly, Elkovich's (2006) theory calls for removing the "Van Gogh button" and allowing students greater complexity, creativity, and critical inquiry, as well as a balance of structure and experimentation for alternative perspectives. This research study exemplifies Elkovich's approach of keeping tool-based demonstrations at the

introductory level in order to shift the focus to the development of content, design, and contextual relationships. Additionally, this research study encourages students to analyze critically their needs for selective and supplementary skills in order to complete their artwork, and develop the particular skills motivated by the goals of the artwork.

The investigation of the two research questions of this study led to the reconstructing and negotiating of the imposed boundaries within the methods and concepts in art, the classroom, and personal beliefs. Actor-Network Theory (ANT) provided a useful means to consider the natural, social, and discursive infrastructure that establishes boundaries. "The reason why we went to study the laboratories, active controversies, skills, instrument making, and emerging entities was to encounter unstable states of nature/society and to document what happens in those extreme and novel situations" (Latour, 1992, p. 287). Similarly, in art education these networks of interactions often transgress the boundaries of the infrastructure, allowing agency to engage in the process of learning. Advances in technology will bring different forms of communication, but where is the human in today's technologically driven society? In what subject do we question the new symbols, sounds, and imaginations emerging, and ask, "What is human?" How does *knowing*, *perception*, *communication*, *inscription, coding*, and *translation* operate in the digital cultural interface? As a theory of analysis, ANT makes it possible to understand the simultaneous construction of digital new media, culture, and art education.

In the narrative analysis of Chapter 4, this study examines the field experiences from an Actor-Network Theory perspective with a focus on the teaching and learning environments, and the negotiations on practices as a result of introducing the cultural

interface approach. ANT is used here to emphasize that change in the learning process can occur anywhere in the network, and can occur at many places simultaneously. ANT emphasizes that actors and actants "at some point in the network can transform the network, extend its nodes, multiply relationships between the nodes, cut out nodes, and sever the connections betweens nodes" (Fox, 2005, p. 85). Each site illustrates how everyday art educational practices are connected or disconnected with the various pathways intersected by digital technologies, beliefs about art, and institutional conditions. A cultural interface is of interest because it contributes by shaping practices and the processes of perception and experience. The narrative provides a tracing of the paths that create practice—a place where digital technology and art collide and/or co-exist. Each of the sites' stories is unique, with its own actors, contexts, and locations.

By interacting with the participants and examining the *inscriptions* (such as journal articles, conference papers, artworks, and handouts), I observed that, "the stability and form of artifacts should be seen as a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network" (Law, 1990, p. 113). How does the transparency of the code influence contemporary art, culture, and society? How are the invisible digital structures (quasi-objects) expressed, sensed, and acknowledged? This research offers an opportunity to consider multiple perspectives of art, digital media, self, culture, and society, then to reflect on the contours of these networks. In an insightful statement, one student in this study communicated that technology has almost formed our culture, and is defining where contemporary art fits in our world. In revealing this idea through a cultural analysis of technology and art, we move beyond the boundary debates toward a more integrated understanding that echoes the characteristics of

contemporary society. Her response moves beyond the classroom borders and considers the activities of sociocultural networks. This student's response, like many of the responses from the participants, offers insights to begin substantive technology and art conversations.

Recent research suggests that teachers, students, and standards all embody beliefs, values, and assumptions that influence approaches to teaching and learning (Orr, 2003; Hemmerla, 2000). This dissertation also supports these findings with evidence from the field experiences using a cultural interface approach and digital new media. These findings are also supported by theoretical pedagogical strategies that consider communication technology in art education. Specifically, this scholarship explores terms and issues of posthuman, virtual spaces, and representations of knowledge, which are also areas of recent art education literature (Keifer-Boyd, 2005a, 2007b; Taylor, 2007). Art and cultural discourse are characterized by exploring the value of art through the physical and social space, consumption and production, actions, institution, and concepts–a space where the natural, social, and discursive collide.

In considering technology, art, and culture, I observed and participated in patterns of social orchestration and resistances, which revealed participants' perceptions, interactions, and definitions of digital technologies in art education. Examples of these orchestrations and resistances are illustrated throughout the narratives in Chapter 4, and discussed more fully later in this chapter. Similar to previous studies, in this study I found that teachers' beliefs and values influence their use of technology (Orr, 2003; Obiokor, 2002). And as illustrated in the narrative, these beliefs and values are not always readily accepting of technology's integration into the classroom.

This research uses ANT and reflects on the narrative, exploring issues of representation, reception, and material form—all unavoidable issues of digital media when approached as a cultural interface. Encounters with visual digital interfaces, like encounters with new media art, are coded, scripted, informational, and dynamic. The cultural interface thereby challenges the boundaries and basic assumptions about the nature of images, and offers artistic insights and personal experiences to question the nature of the visual images in a digital society.

The boundaries created by digital interfaces offer both challenges and opportunities in the exploration of knowledge and perception, mediation and representation of art and culture, and the expressive possibilities and limitations of new digital visual forms and processes. This research contributes to a new understanding of digital media in art education. By creating possibilities and exploring interpretive frameworks, participants investigate the positive and negative issues associated with the contemporary nature of art, how art is produced and received, and how artistic and aesthetic expressions can contribute to an understanding of digital cultural worlds.

Reflections on Research Question 1

The first research question, restated below, traces students' and teachers' dialogues (discourses), activities (lessons and artwork), and reflective discussions (inquiry processes) through a qualitative, naturalistic approach. I examine the effects of the cultural interface approach through the participants' perspectives on art, pedagogy, and new media.

In what ways have the discourses, activities, and inquiry processes of a cultural interface approach altered participants' perceptions, interactions, and interpretations of art, art education, and new media technology?

The use of ANT as a lens frames the interactions and influences (i.e. linkages) of the network entities (i.e., cultural interfaces, technology infrastructure, educational definitions of technology, and educational interpretation of technology integration). ANT assists in illustrating that "trials trace the limitations of a paradigm … what holds tightly and what gives easily, what is negotiated and what is not" (Latour, 1987, p. 201). For example, the students in Site 3 expose the blurred boundaries between art and technology. Specifically, J's use of a cell phone's *chirping* to locate his friends is an example of an artifact's becoming. In his artwork, J illustrates *chirping* as a hybrid form of communication by representing the cell phone through a giant morphing mouth with dominant, pointed incisors.

The network relationships and interactions (i.e., linkages) as described above are revealed in this study through a cultural interface approach, and include the natural, social and discursive aspects of art education and new media. Properties of technological artifacts are continually redrawn in the processes of network construction. These linkages become what Latour (1993b) articulates as quasi-objects. Quasi-objects are simultaneously real, social, and discursive, and are the products of practices of creating and maintaining a network. These quasi-objects offer a space for agency, because we can continually negotiate the space that intercedes between entities.

A few examples of quasi-objects in this study include collaboration and definitions that circulated through the educational network. Collaboration (e.g., the

hybrid of researcher to art educator) was a partnership between myself and the participating art educators. Collaboration as a quasi-object constructs participants' identities and includes relationships of authority, ethics, and knowledge. Definitions as quasi-objects such as culture, art, and new media circulate throughout the network. For example, in this study Michelle's definition of visual culture was investigated through a lesson in a student reflection (see Appendix G). In this context, Michelle served as an agent of change by exploring her desire to understand culture beyond the negative connotation "of a loaded term" as she perceives it in education today (Michelle, personal communication, February 23, 2006). Similarly, quasi-objects become a space of agency for the students. For example, Lucy (Site 1) entered into understanding technology processes for art making, by first seeing digital media in terms of materiality and adopting ideas of physical painted layers. She used the residual quality of layers as a metaphor to reconcile virtual processes.

The process of becoming is central to qualitative analysis and to ANT as used in this dissertation. ANT recognizes that "the only way to identify logic and signification is through studying the process of an object's becoming … " (Martin, 2005, p. 285). This research shows that educational practices involving technology are in a continual process of becoming, and that the faster dynamics of technology change often conflicts with the slower evolving educational artifacts. These dynamics are seen in this study as shifts in the instructor's role from deliverer to facilitator, and in the student's role from a passive learner to active participant. As teachers and students make these changes, educational institutions need to develop and integrate approaches that rebalance and renegotiate in response to the changes being experienced in the classroom. As an example in this study,

Site 1 is evolving its curriculum by combining a skill-based approach with content-based practices that involve new media.

With few exceptions in this study, a cultural interface approach extended the foundational understanding (e.g., rule-based approach, skill training) with a more complex inquiry involving lived experiences. This finding supports Sefton-Green's (1999) considerations of the social and cultural context of student engagement within formal and informal learning environments as an integrated approach. For example, one student reflected on the question, "How do artists organize their knowledge and skills in the field?" The student later responded, "Artists gain their knowledge and ideas through life itself … and mainly school teaches you how to use technology. But the inspiration [for artists] comes from life" (Student #3, response in final assessment, May 15, 2006). The cultural interface approach applied to the three sites of this study brought students' lived experiences in relation to technology into the class dynamic.

Throughout the field experiences, the promotion of critical inquiry was evidenced. Several students were observed critically wrestling with their attitudes and beliefs about technology and "technology and art." These discussions showed that as the use of new media technologies becomes even more a part of everyday experiences, technology requires a critical dialogue that is often contentious, and one that "creates a dynamic space for experimentation and the blurring of boundaries" (Rosas, 2006). In several field observations, students critically explored the ways technology altered our senses and ways of communication. One student used a playful approach in her artwork to challenge the relationship between the images we see and the way we reflect on the world around

us (see Appendix K). Her approach reflected her own critical inquiry, as depicted in her artwork, and provided viewers with a space to consider their own critical awareness.

Data collected from the observations and interviews revealed that a cultural interface approach to technology in art induced a cognitive conflict to the rule-based paradigm of skill and training. This study showed that all levels of participants (student, educator, and administrator) had to extend their abstract thinking processes beyond a rule-based paradigm to form a more comprehensive understanding of technology within their lived experiences. In Site 2, one of the art educators involved in this study stated that she was not accustomed to having students express their personal beliefs in her class (namely, extending the discussion beyond the tool processes). As another example, Betsy revealed in one of her assumptions about art and technology that she considers technology as a separate discourse from art. These discussions reveal how educators come to know, thus affecting the possibilities for teaching and learning. In another interview, a student noted that her peers do not critically consider technologies as they are all around them, and they were not familiar with computer art. Another student recognized that artists' knowledge, ideas, and inspirations come from life experiences—and schools often only teach a person the "how of technology."

This study additionally revealed that the integration of inquiry processes beyond the rule-based approach requires a re-examination of curriculum content. What was not realized going into this research was that the cultural context of technology (as reflected by new media) needs to be questioned and examined in regards to curriculum. This field study showed that teaching new media requires a curriculum that includes a goal of

considering the unique characteristics of new media—namely that content and interface are interrelated.

> If the aim of education is to fully activate the cognitive potential of the learner, ways have to be found to integrate knowledge from many subjects to achieve a fuller understanding than would be provided by content treated in isolation. (Efland, 2002, p. 103)

The definition of technology treated in isolation and the narrow compartmentalization of curriculum (i.e., painting, drawing, and sculpture) inhibited the inclusion of "new media" or technology. According to Gude (2007), "Art teachers are now faced with the dilemma of designing 'hands-on' projects that authentically introduce students to methods used by contemporary artists in conceiving and constructing artworks, rather than continuing to teach outmoded paradigms" (p. 12). However, this dilemma is not easily or comfortably tackled.

Specifically, as Site 1 was developing curriculum, the participants were able to consider the role of technology within the curriculum prior to establishing specific course structures. This research and subsequent reflections helped formulate how technology might be framed within the new art curriculum. The participants of Site 1 recognized the need for an integrated approach to include skills and a cultural context. Additionally the participants recognized that the combined approach must fully consider both its content and teaching strategies. Because this was the first technology experience in art for the majority of the students in Site 1, the data revealed how participants negotiated the role of technology in art. Specifically, the study revealed the struggle between the two disciplines of art and technology (Student #8, response in final assessment, May 15,

2006), and the relationship between skills and concepts (Student #3, response in final assessment, May 15, 2006).

The field experiences from all three sites revealed that the introduction of the cultural interface approach (and digital new media) dynamically repositioned the relationships between disciplines (art and technology), skills and concepts in the context of an evolving culture where technology is pervasive. "Although new tools make it increasingly easy to produce, students lack essential skills in composition, storytelling, and design" (The Horizon Report, 2007, p. 5). Involving participants in constructing interpretations (meanings), engaging critical inquiry, and applying all of these to their lived experiences (i.e., sociocultural and sociotechnical contexts) engages them in considering these dynamic relationships. "In addition, faculty need curricula that adapt to the pace of change and that teach the skills that will be needed–even though it is not clear what all those skills may be" (p. 5). This statement reinforces the previous observation that all actors need to reflect on the impact of change from their perspectives. This need can be a resistance for adapting a cultural interface approach, as resources (e.g., time, administrative support, and infrastructure) in educational environments are often scarce or inflexible.

The interviews and discussions revealed that even though students are immersed in new media, they often do not critically explore their positions in regard to new media—specifically, how it impacts their lives. This posits a need to go beyond the reductive operation of cognitive process to consider both sociocultural and individual experience. Betsy found this bridge by engaging students and asking them how technology affects their lives—from a context of examining new media. This reveals that

personal experiences, relationships, and how we think with new media should be considered within a framework of new media in art educational curriculum. This consideration extends not just to the context of new media skill level, but also in regards to students' and teachers' everyday uses and interpretations of art and technology as consumers and producers. Curriculum is thus no longer framed around media-types, but around themes and cultural issues.

The interface (the tools, the systems, and the cultural manifestations) creates the spaces where digital new media opens possibilities to extend technology beyond the teachers' and students' initial perceptions. The trope of the term "interface" separates humans from materiality like the classical separation of mind and matter, and it also alludes to connected interaction. The complex duality of this trope is something we confront across our lived experiences. For example, a student from Site 3 stated, "Photography would be art that was already there. Whereas the art we are doing in here [painting], we are making it instead of discovering it." She saw and valued the process of adding (making) to a blank canvas, as different from framing (discovery) to express content. Thus materiality of an object, like photography, is unavailable for use in explaining the construction of human relations and identities. By examining photography and painting as a discourse, or a quasi-object with residual qualities, the boundaries that place animate objects in one category and inanimate in another are removed. The remixing of the natural, social, and discursive through negotiations that occurred between humans and material entities enables an understanding of human relations and identities.

Reflections on Research Question 2

The second research question analyzes the changes to the network when a cultural interface approach is introduced as an educational alternative. The analysis focuses on the interfaces between digital new media and art education, and on the interfaces between technology and society.

> *What processes of patterning, social orchestration, ordering, and resistance are involved in shifting new media art education to emphasizing cultural content—such as the cultural interface of new digital media, digital signification systems, and digital communication?*

One of my underlying research strategies for this dissertation has been to understand the existing teaching strategies of an instructor, and then collaborate and negotiate change. This entails understanding the unique identity of each research site in terms of curriculum and student and school culture, and operating through these embodiments to integrate change. I agree with Rose (2002) that technology integration in schools needs to recognize the importance of caring ways to engage information, skills, and technology resources. I collaborated with the art educators by discussing and negotiating cultural interface strategies, then tailoring them to their respective teaching sites. I reiterate my statement in Chapter 3, *Role of the Researcher*, that as an art educator I believe in exploring and reflecting on new forms of art, analyzing their discourses, and bringing engaging conversation about these issues into the classroom.

This process was accomplished in all three sites through various forms of inscription, translation, and framing. Although I recognize myself as a change agent, I insist on a polyvocal approach. In this section, I describe several variations and instances

of how social orchestration and ordering was used to overcome resistances, and how I negotiated the change of introducing technology to go beyond a tool-based approach. I facilitated an exploration of new media digital art as an integrated approach of tool and medium.

Law refers to ANT as a "sociology of translation" (1992, p. 1), and calls *translation* the process "to explore and describe local processes of patterning, social orchestration, ordering, and resistance" (p. 5). This approach consists of several elements (participating, negotiating, hesitating, and resisting), and has served as a useful lens for introducing technology into the three sites of this study. Using the ANT lens, I examined the community's identity in terms of cultural assumptions about technology, and attempted to explore new media as an integrated approach of tool and culture. My approach recognizes the transformative processes involved in introducing change into an established system (educational practice). The processes include analyzing "characteristics of the innovation itself, the nature of the communication channels, the passage of time, and the social system" (Tatnall & Gilding, 1999, p. 960).

The reoccurring need for negotiation evidenced in the field experience demonstrates that technology is not a singular concept, and that it is continuously reinterpreted and practiced differently. Initially, the educators from the three sites used a tool-based approach as a teaching methodology that aligned with three constraints: a preconception of technology in relation to art, a prescribed process of teaching and learning (including assessment), and an established curriculum model.

As a result of reframing the teaching strategy through a cultural interface approach, participants engaged in meaning-making processes beyond a limited, tool-

based paradigm and considered the intersection and alternative ways of framing of art and technology in the classroom. Participants resisted change because it would require a re-negotiation with the three constraints. It would require a re-examination of the definition of art and technology. It would also require a re-negotiation of teaching strategies and the inherent impact on institutional assessment. And, it would question the definition of new media art in relation to its placement in the curriculum.

Serving as a catalyst, I examined the constraints of each site and selected lessons that challenged the teacher's working dynamic, and yet remained within reach of the sites' operational and conceptual philosophies and constraints. Specifically, the lessons exposed many of the assumptions unique to each site about art and technology. The observations from all three sites reflects Witwicki's (2003) argument to not only challenge approaches and move beyond how to use technology, but also to reflect and redefine technology in a substantive, pedagogical way. In Site 1, one of the art lessons engaged students to critically examine the shifting forms and meanings in advertisement using digital media. In Site 2, the homework reading reflection, entitled *Project Earth: Image Ready Animation,* focused on Internet mapping services and "closing the gap between the real world and the computer." In Site 3, a lesson focused on new media artists, such as Jill Magid, and the collaborative team of Christa Sommerer and Laurent Mignonneau, and served as a catalyst for students to reflect on their own experiences.

Although the assumptions about technology varied greatly among the three sites in terms of teaching strategies and assessment, each site's teaching strategy centered on knowledge accumulation (learning a new skill) versus knowledge transformation (learning in a new way). One major distinction between the sites' assumptions about

technology is the difference between "technology's use to enhance learning of the curriculum and technology's use for productivity" (Staples, Pugach, & Himes, 2005, p. 305). In Site 1, the instructor was comfortable with technology, but only as a tool, and resisted its use from a cultural perspective. In Site 2, the instructor recognized technology both as a tool and as a cultural influence, but searched for additional ways to incorporate technology; the reason for the resistance was the inability to form a new, stable forum (i.e., a network). In Site 3, the instructor was grounded in traditional art foundations, which did not include technology as either a [art] tool or as a cultural conversation. These field experiences support Gregory's (1996) assertion that technology should be valued as a catalyst, not a vortex, for learning.

The experiences from this study show that both reflection on and flexibility in the exploration of alternate approaches is needed for the effective incorporation of new approaches into practical educational environments. As expected, a cultural interface approach, as used in this research, facilitated the participants' (i.e., researcher, teachers, and students) negotiations of their ideologies in the context of technology and art educational practice. However, the field research experiences showed that this process extended participants' ideas, not just abandonment of old ideas for new.

Flexibility and versatility became important dynamics in considering multiple substantive approaches to practice, ones that are feasible in the participants' current environments. For example, the instructor for Site 3 detoured from the class and reflected upon the students' negotiations with art and new media technology. The shift of her teaching role was seen in an email, anecdotally coined elsewhere as, "A sage on the stage, to a guide on the side." The need for flexibility is seen in the shift of her student's

role from passive participator to active negotiator. After initially empowering the student to create her artwork outside the constraints of the class (i.e., constraints of time and medium), the student and teacher agreed that video was appropriate for the assignment. However, Betsy believed that the artwork needed to be grounded in an educational context—namely, that the student needed to be clear as to whether the artwork was a documentary or a performance [art] piece or a hybrid, along with how and why. Betsy accepted a guiding role by encouraging the students to extend their perceptions of technology and culture by infusing the idea that technology—text messaging, *MySpace*, etc.—complicates relationships in the 21st century. In this instance, the educator extended her pedagogy by including the sociocultural effects of social networking technologies into art.

The study also reveals technology's role as an actant; namely, how students' engagement with social networking interfaces and cell phones is integrated through their lives. Betsy and I observed students bringing their own insights on their uses of new media technology seamlessly into the discussion of art. We also observed how their insights offered a variety of interpretations because of their engagement with their lived experiences. The ability to reflect on technology (digital new media) in the art educational environment is essential for all participants—if all participants are to understand that learning through their actions has an impact on their values, beliefs, and assumptions.

This research does not claim that participants experienced any shifts in their approaches to learning, teaching, or technology. Rather, this study shows that participants acquired insight by thinking about culture, and in some cases, expressed a desire to

expand their teaching practices. In the final interview, Betsy stated that after having done the cultural interface project, she could also adapt this approach within her drawing, printmaking, and painting classes. Additionally, she acknowledged that technology is already part of the curriculum and could be explored through traditional media.

This research showed that the changes involving a cultural interface approach were embodied in an individual process involving different strategies—one that emerged dynamically and uniquely for each teacher and site. Even with my unifying role as collaborator and supporter, each art educator and student responded differently to a similar innovative idea. In my consideration of Salmond's (2006) statement that "the newness of technology is in its discourses about the place of emerging technologies in society," I found that this "newness" provides participants a *space for agency* concerning technological issues and ideas. Students in this study often saw the newness of technology as transgressive and explicitly part of their unique [private] culture outside the institution of school. A student who had been actively creating new media art outside of the school art class revealed this perspective in our conversation about his cell phone art, which he chose not to explore as part of the school project. It was as if infiltrating this teenage cultural place was not welcomed within a school art lesson.

This study reveals that students recognize that ideas discussed in the class are more meaningful when connected to their everyday lives. The ability to convey information between media or across various media forms compels youth to understand all the various manifestations when the issues are relevant to their interests (Buckingham & Sefton-Green, 2004). Although the perceived introduction of technology into the classroom may appear to be infiltrating teen culture, a critical conversation engaging

youth would be insightful. As expressed by several students in this study, technology is not always considered as a point of discussion by their peers because of its ubiquitous nature. The cultural interface approach for one student, Rene (Site 3), informed her of how far we can go with technology in art or in everyday life. She commented that the creation of her artwork made her more aware of the lengths to which we could go as human beings to discover things about the universe or even about ourselves. It is here that students, like new media artists, provide perceptions and expressions examining the contours of new media cultural processes. "The human and social elements of imagination cannot be divorced from the forms and materials in which it is disseminated, from fairy tales of oral tradition to printed media, to Web-portals" (Fox, 2005, p. 102).

Additionally, new media's ability to move across a broad range of different systems of signification and representation requires an ability to create and understand these new forms of synthesis. Each medium has its own affordances, systems of representation, and its own strategies for producing and organizing knowledge. The ability to navigate these often-conflicting modes of representation requires young people to make choices about the most effective ways to express personal ideas in their context. This influences how we teach a design literacy approach, one that considers composition, develops a more complex vocabulary for communicating ideas, and incorporates the ability to read and write through images texts, sounds, and simulations. This becomes a way of thinking across media—namely, an ability to compose, design, and tell stories across various modes of expression.

In Site 1, I introduced technology by extending the object world of technology (tool) into the world of culture, thereby, inherently provoking a contextual understanding

of technology in our everyday lives. The students were introduced to the artworks of Nancy Burson and Mariko Mori. These artists explore identity and digital process within a cultural context. Burson does this through digital data that provides the percentages for morphing a world leader profile, and Mori through digitally placing her cyber character into customary Japanese environments. Additionally, the art lesson encouraged students to analyze real world advertisements, with a focus on advertising's use of technology to composite, morph, and juxtapose imagery to evoke specific social messages through visual metaphors. The pedagogical approach seemed to engage students as evidenced by their interest in morphing and compositing techniques to create and express their own identity metaphors. This approach expanded students' technical skills, incorporated the students' lived experiences, but also examined contemporary visual culture and identity through an investigation of the digital environment as constructing knowledge, values, and beliefs.

A methodological finding of this study is that the ANT translation process is often useful in understanding and managing technological change. As introduced in the literature review and explored in the collaborative research at each site, several key points guided my approach in the translation process.

- Identify and challenge cultural assumptions about technology.
- Recognize students' and educators' beliefs, attitudes, and interests about technology and art, in relationship to the culture of the educators' working environments and students' lives.
- Explore socio-expressive aesthetic discourses of new media art.

- Extend the object world of technology (tool) into the world of culture, inherently provoking a contextual understanding of technology in our everyday lives.

In summary, these key points in the ANT translation process could be adapted by other art educators in their translation from a tool-based approach to a cultural interface approach, i.e., a shift that emphasizes critical inquiry of digital and Internet technologies as art media connected to life in contemporary times.

Limitations and Possibilities

This section describes the additional limitations and possibilities that became evident during the research process, beyond those discussed in Chapter 1. The first limitation is the complex constraints in the public school environments. The present requirement of testing and accountability imposes a heavy toll on teachers, and impacts the parameters of engaging in collaborative projects. It affected this research in terms of the time allotted and complexity of schedules. The collaboration often proved difficult and at times artificial, as the research was not part of the established system. Although these constraints are viewed as resistances in this study, they may not have allowed for a full examination of a cultural interface approach. Second, my approach assumed an art-centric model, one that assumed that art educators and students would be used to talking about artists and artworks. This was not always the case and required additional resources to coordinate. Finally, the engagement with new media artwork often relies on presenting the work in its intended medium. In this study, limited access to technology often required the work to be presented in an alternate way, sometimes distracting from the work's full expression.

The next limitation or potential drawback of using a cultural interface approach in art education, is a need for a philosophical shift towards a constructivist approach; namely, one that supports and allows for the unique ways of acquiring and interpreting knowledge (i.e., conceptually building one's own world). With technology, this means that teachers "need to construct a hypothetical model of the particular conceptual world" (Twomey, 2005, p. 7) that the students are facing. This becomes a daunting task as technology continues to change so rapidly; a task that is compounded by the expanding ways technology can be used and adapted. From within the educational environment, this philosophical shift may translate from *how the world is,* to teaching the students *how to see the world*. This translation requires understanding the learning process of every student before choosing the appropriate teaching method—something that the schedules of most educational institutions do not accommodate.

Two additional limitations concerning why technology has not been integrated more readily into the educational framework are argued by Cuban (1993).

> First, certain cultural beliefs about what teaching is, how learning occurs, what knowledge is proper in schools, and the teacher-student (not student-machine) relationship dominate popular views of proper schooling. Second, the age-graded school, an organizational invention of the late nineteenth century, has profoundly shaped what teachers do and do not do in the classrooms, including persistent adaptation to fit the contours of these age-graded settings. (p. 186)

Some art teachers' cultural beliefs as reflected in this study shape their relationship to technology and introduce barriers. Some teachers do not feel confident with integrating technology in art education due to their lack of technology experience and content

knowledge in digital new media and digital new media art. Attempts at integrating technology in schools create a variety of responses from teachers that range from enthusiasm, skepticism, to fear and uncertainty (Cuban, 1993; Zembylas & Reese, 1999).

The static view of curricula and learning environments, along with teaching knowledge, values, and experience often create an expectation that technology will be adapted to art educators' current methods and environments. However, computers and software require more time and energy to learn than teachers are often able to give. When technology cannot quickly and easily be integrated into the curriculum, there is often a reluctance to use it, as there is not enough time. This was evidenced in the initial consideration that Betsy and I had with using the new online learning environment. Similarly, when educators do not understand all the aspects of the hardware and software they hesitate to give any control to students. Additionally, because art curricula often accommodate a variety of media, approaches, and time for artistic thinking and creating, the introduction of technology requires a reprioritization of topics and resources. In summary, barriers to technology integration often include the lack of teacher release time, support, expertise, and access to technology (National Center for Educational Statistics, 2000; Vrasidas & McIsaac, 2001).

As an extension of the curricular issues, there are struggles with and resistances to adopting visual culture, cultural studies, and visual studies (Elkins, 2003) approaches to art education, and consequently to the use of a cultural interface approach in the classroom. When exploring a culture of the visual (e.g., simulation, screen, and network), art educators are faced with complex ideas such as the hyperreal threatening to overtake the real. The loss of the idea of referential reality is a primary aspect of a postmodern

condition. For example, Baudrillard's (1983) ideas about contemporary images is that "if they fascinate us so much it is not because they are sites of the production of meaning and representation–this would not be new–it is on the contrary because they are sites of disappearance of meaning and representation" (p. 133). The resistance to visual culture then becomes one in which the study of cultural interface might challenge existing frameworks of image production and reception circulating in art education.

As a final limitation, digital technologies are often associated with design work and are frequently compartmentalized and regarded as separate from fine art classes. This curricular and socially constructed division is not easily aligned with the cultural interface approach for the study and creation of new media art. The study of design and fine art are often considered as separate educational directives and movements (Marschalek, 2004). The difference between teaching art and teaching design in art education is that design education is concerned with an end result that is functional. Design is similar to visual culture in that both include the analysis of the material culture, the decoding of the visual representations, and the impact of objects and visual messages as having the power to be manipulative or disenfranchise (Freedman, 2003). Although design requires originality, it often aspires to achieve a recognized look or style. As a result, design courses are often separated into a vocational or applied strand with heavy emphasis on specific skills for specific outcomes. As a result, they do not often include conversations and considerations of the implications of technology as a cultural interface.

In terms of possibilities, this study offers art education several platforms where artistic experimentation with young people can explore digital technologies, virtual spaces, and the social influences of digital learning. First, it offers a means to understand

how young people are using content through technology—creating, producing, consuming, and distributing content. Youth are often divided as to their interests; for some technology is a rich, diverse, engaging and stimulating resource, while for others it is a narrow, unengaging, and sometimes a limited resource of rather less significance (Livingston & Bober, 2005). Understanding youth in relationship to technology will afford pedagogical approaches in classrooms involving digital learning that is meaningful to the students at the moment and in their future. During this study, I saw both types of students described in others' studies, some really engaged in technology, and others disengaged. The approach of this study allowed a means for students to explore their relationship to technology and to understand its limitations and potential.

Further Implications and Directions

Although there is statistical information (Burton, 2001; Roland, 2006) about technology use in art education, there are questions still unanswered. How are young people engaging with technology? What is the role of technology in their lives? With the latest technologies, we will move away from the screen and will be using the ubiquitous nature of technology in the production and consumption of visual data. What will this informal interaction, on many levels of community on and off line, mean for education? How will mixing traditional and new media art impact educational boundaries in art curricula? How will students acquire educational content, obtain analytical skills, and be engaged in learning? These questions should be considered in an innovative approach to planning curriculum that engages technology and cultural conversations.

Reframing new media art in art education as a *cultural interface* considers digital media as a threshold (closed or opened) to cultural data. The computer is no longer only a

window into different worlds but is also a mirror with a reflective surface that shapes and is shaped by our interactions (Bolter & Gromala, 2003). As contemporary culture continues to render the interface more and more invisible, we need to recognize the effects of the mediated [non-neutral] interfaces on our environment. "[L]ike the printed book, film, and television before it, the computer is not a neutral space for conveying information. It shapes the information it conveys, and is shaped in turn by physical and cultural worlds in which it functions" (Bolter & Gromala, 2003, p. 77). The interfacing of humans with digital and Internet technologies shapes what we know, how we come to know, and what we think we need to know. Our experiences are augmented by both the content and form of a particular medium. Thus, the window and mirror view of technology as a cultural interface create experiences that need to be interrogated.

These experiences as seen through digital media artworks and research participants are a bricolage of convergences where digital media conversations confront the transparent and reflective character of technology. Thus, rethinking visual culture to include our interactions with digital art media as cultural interfaces explores issues within the invisible interfaces of ubiquitous digital technologies.

> … skills for the 21st century are skills that enable participation in new communities emerging within a networked society. They enable students to exploit new simulation tools, information appliances, and social networks; they facilitate the exchange of information between diverse communities and the ability to move easily across different media platforms and social networks. (Jenkins, *et. al*., 2006, p. 55)

This research shows that adapting a cultural interface approach is not dependent on prior technical expertise, access, and use. Each site considered new media technology differently and applied a variety of strategies in adapting a cultural interface approach. In Site 1, the classes were originally driven by a structured, skill-based approach, with a focus strictly on skills; as a result, the emphasis was on fostering interpretations or embodied experiences through identity and metaphors. The teacher of Site 2 recognized the importance of technological skills and the ubiquitous nature of technology, but wanted more substantive strategies for connecting technology to the students' lived experiences. As a result, students brought their experiences with new media technologies, such as digital animation and *GoogleEarth*® as ways to consider the unique cultural implications of new media consumption and production. In Site 3, the classes were originally conducted with a classical arts foundation with minimal use of technology in terms of access, so the culture of technology was considered through a variety of art media. A cultural interface approach was uniquely applied at each site to overcome limitations or existing challenges to exploring new media technology.

The cultural interface approach practiced at the three sites influenced students' engagement with problem solving concerning self-directed acquisition, societal issues, embodied knowledges, and their identities. For example, the students in Site 3 explored technologies impact on identity and bridged conceptual issues to their lived experiences through the exploration of technology and culture. They demonstrated the capacity to develop interpretations based in contemporary issues concerning new media technologies and art. As another example, the educator at Site 2 modified her reflective assessment handout for students to bridge contemporary new media issues with their lived

experiences. As a result, her curricula explored the "impact of cybernetic art in rendering human identity in terms of consciousness and communication," "how technologies have become part of ourselves, both in function and identity," and "how technology affects perceived boundaries among disciplines, makers/consumers, artists/viewers, and public/private" (Keifer-Boyd, 2005a, p. 1).

The perceptions of digital technologies as only tools limits knowledge of the technology as a cultural interface because digital media operate in specific cultural and institutional contexts, which influence how and why they are being used (Jenkins, *et. al*., 2006). As a result, an approach that includes both technology/tool and culture expands on the *use* to consider *what* and *how* a culture decides to engage with these tools. Gee (2004) argues that the new participatory cultures represent ideal learning environments, and asks why young people engage more with popular culture than textbooks. What is needed is an approach that focuses on the cultural aspects of interactivity, rather than on interactivity as a property of technologies.

Because young learners view formal education as static, and pop culture as innovative, these learners are more involved in creating content through archiving, annotating, appropriating, and remixing digital content (Lenhardt & Madden, 2005) outside the perceived constraints of formal education. We are moving away from a world in which some produce and many consume media, toward a more active stake in the production of cultural capital. Therefore, we need to consider an approach that incorporates many levels of participation, peer-to-peer teaching, and collaborative agency—where one can feel like an expert, while tapping the expertise of others.

Artists offer insight as they play off of software design, or engage in a creative misuse ... "to peel off that ideological wrapper"—a process that exploits technology's potential, as well as reveals hidden issues (Ippolito, 2002, p. 287). A variety of approaches offer possibilities of how technology may be used in public schools. With the range of attitudes, support structures, and rate of technological change, the approach will be dependent on the art educator and his or her ability to facilitate contemporary cultural conversations. "*Art Makes What was Old, New"* (Rene, 2006) and in many ways so do cultural conversations about technology. Such conversations also critique how the new is situated in the old. Continuity and change are subtle when part of lived experience, and it is the subtleties that a cultural interface approach to new media art uncovers, critiques, and thus promotes creative inspiration.

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Appendix A. Research Forms

Art Educator Recruitment Letter

PSU letterhead

Dear Art Educator,

My name is Michelle Tillander, a PhD student at The Pennsylvania State University, and I am interested in conducting art education research during your art class. I am recruiting art educators to participate voluntarily and would like to offer you, as an art educator, the opportunity to participate. Attached you will find specific information about the research project and required permission forms. The project, entitled **Cultural Interface as an Approach to New Media Art Education,** will look at educator/student reflections and responses to new media art, new media technology, and culture as it relates to art in the K-12 classroom context. Within your school, the research will only be conducted with you and your students in this semester's art class. The participation of art educators will be collaborative and consist of the normal process of developing lessons for your class. Additionally, the opportunity to reflect on the projects will be offered. Your responses and projects from class will be kept confidential unless permission is granted.

As a graduate student in the Art Education Department at Pennsylvania State University, I have obtained approval (IRB # 22023) from The Pennsylvania State University Social Science Institutional Review Board to conduct this research. This is to ensure that research volunteers are not compromised in regards to research with human subjects. If you are interested in participating, I have included information about the rights of the research participants, the research study, and the permission form called **Art Educator Consent Form.**

If you would like to participate please read, sign, and return one copy of the **Art Educator Consent Form** and retain one copy for your records. A postage paid envelope has been provided for your convenience in the return of the permission forms.

Please feel free to ask any questions. I can be contacted by email at mdt167@psu.edu, or by phone at (757)619-4444 (collect).

If you are interested in volunteering, return the forms with required signatures in the envelope provided.

Thank you for your time,

Michelle Tillander, Principal Investigator/Researcher, mdt167@psu.edu
PhD student, Art Education,
The School of Arts and Architecture, The Pennsylvania State University

Attachment: (1) Art Educator Permission Form

Parent Recruitment Letter

PSU letterhead

Dear Parent/Guardian,

My name is Michelle Tillander, a PhD student at The Pennsylvania State University (PSU). I am conducting research on technology and art education. I will be conducting research during your child's art class. The project, entitled **Cultural Interface as an Approach to New Media Art Education,** will look at student's reflections and responses to new media art, new media technology, and culture as it relates to art. As a graduate student in the Art Education Department at PSU, I have obtained approval from The Pennsylvania State University Social Science Institutional Review Board to conduct this research. I would like to inform you of your child's option to participate. There is no additional work required of participants as part of the research. The invitation to participate within your school will be only to students enrolled in his/her art class this semester.

If you would allow your child to participate, you and your son/daughter must read, sign, and return one copy of the **Parental/Guardian Permission Form** and the **Student Permission Form.** Please retain one copy of each document for your records. A postage paid envelope has been provided for your convenience in the return of the permission forms. Your art teacher will not be informed of who in the class has volunteered to participate until the semester is complete and all grades have been submitted. This is to ensure that your child's grade is not influenced by his/her choice to participate or not. Any documentation of reflections and projects from class will be kept confidential.

Please feel free to ask any questions. I can be contacted by email at mdt167@psu.edu, or by phone at (757)619-4444 (collect).

If you are interested in your child volunteering, please discuss this with them and return the forms by (*insert date 7 days from recruiting*) with required signatures in the envelope provided.

Thank you,

Michelle Tillander, Principal Investigator/Researcher, mdt167@psu.edu
PhD student, Art Education,
The School of Arts and Architecture, The Pennsylvania State University

Attachments: (3) Research Study Description, Parental Permission Form, and Student Permission Form

Student Recruitment Script

PSU letterhead

RECRUITMENT SCRIPT (Michelle to students via art educator)
Title of Project: **Cultural Interface as an Approach to New Media Art Education** (IRB #22023)
Principal Investigator: Michelle Tillander, 207 Arts Cottage, University Park, PA 16802 (814)865-6570, mdt167@psu.edu
Advisor: Dr. Karen Keifer-Boyd, 212 Art Cottage, University Park, PA 16802, (814)863-7312, kk-b@psu.edu

Michelle Tillander, a student at The Pennsylvania State University (PSU), is conducting research on technology and art education, and is recruiting volunteers and participants in this research. Michelle will conduct research during your art class. Her project will look at student's reflections and responses to new media art, new media technology, and culture as it relates to art. As a graduate student in the Art Education Department, Michelle obtained approval from The Pennsylvania State University Social Science Instructional Review Board to conduct this research. Michelle has asked me to inform you of the option to participate in her research. There is no additional work required of participants as part of the research.

If you would like to participate, then you and your parents must read, sign, and return the **Parental/Guardian Permission Form** and **Student Permission Form**. A postage paid envelope has been provided for your convenience to return the permission forms. Your art teacher will not be informed of who has volunteered to participate until the semester is complete and all grades have been submitted. This is to ensure that your grade is not influenced by your choice to participate or not. Any documentation of reflections and projects from class will be kept confidential.

Any student in this semester's art class may participate in the project. The research will look at students' responses to new media art, new media technology, and culture. The invitation to participate within your school will be only to students enrolled in this art class this semester.

Please feel free to ask any questions. Michelle can be contacted by email at mdt167@psu.edu, or by phone at (757)619-4444 (collect).

If you are interested in volunteering, please discuss this with your parents and return the forms by (*insert date 7 days from recruiting*) with required signatures in the enclosed envelope.

Thank you,

Michelle Tillander, Principal Investigator/Researcher
PhD student, Art Education,
The School of Arts and Architecture
The Pennsylvania State University

Letters to Administration

PSU ART EDUCATION SVA LETTER HEAD TO BE INSERTED

January 20, 2006

Dear Administrator Insert Name and title/position i.e. principal, supervisor,

I am currently a PhD student in Art Education in the School of Visual Arts and Architecture at The Pennsylvania State University. I am recruiting research participants and would like permission to conduct my research in your school, and to invite your art teacher *insert art educator's name* along with students within her art class to participate in a field study component of my art education research. Prior to working on the PhD, my experiences were as public school art educator for 17 years, and as Visual Arts Chair of The Governor's School for the Arts in Virginia, where I coordinated high school students and art educators for five years.

My research, **Cultural Interface Approach to New Media Art Education**, is about the relationship of art, technology, and culture. My research specifically explores teaching of technology in art education beyond the use of the tool to include a sociocultural conversation. *Art educator's name* has expressed an interest in this project and I have offered her/him the option to collaborate with me in exploring possible options for developing curriculum. We will collaboratively explore and develop curriculum through new media artworks, and artists; implement this curriculum through class activities; and then, critically analyze the potential of a cultural component of technology in art education.

The activities collaboratively planned with *insert instructors name* will be a regular part of the art class. I will be researching the results of several class activities, projects created by students, and their reflections on ideas about art, technology, and contemporary culture. This research will collect data in the form of student reflections on artwork, conduct interviews, and document samples of art projects create within one of *insert instructors name's* classes. Only class participants who have volunteered to participate and have parental permission will be included in data collection. All data remains confidential as part of research protections with no links to participant's names, unless expressed permission has been provided by the research participant.

As principal investigator, I have submitted through The Pennsylvania State University (PSU) Office of Research Protections and The Social Science Institutional Review Board (814) 865-1775 an application for the use of human subjects to assure the protections of the art educators and students (minors) in this study (IRB #22023) **Cultural Interface Approach to New Media Art Education**. I have developed art educator and parent letters, consent and assent forms, for recruiting participants on a volunteer basis. I have included with this letter, a copy of all correspondence that I would be used in recruiting

Letter to Administration (Page 2)

PSU LETTERHEAD

volunteers. The decision to participate in this research will not affect present or future relationship with The Pennsylvania State University.

Although my research is with new media art, which deals with technology, culture, and communication, I am aware of the personal nature of artistic expression. While not being specifically asked, the nature of art as personal expression can often reveal sensitive issues. In the event that participants should disclose sensitive content that is a threat to themselves or others, as principal investigator, I will report the threat to your required school authority, and can not honor confidentiality as specified for minors participating in research. Additionally, if your school has any procedures such as this required, then it is essential for me to have and place these procedures on file with the Office of Research protections before beginning any fieldwork.

I am requesting your permission to conduct this research within your school. If you will grant me permission, a letter from you with your support along with any required procedures would be appreciated as part of the process of proper protocol of a research project situated in a public school.

If you have any questions about the study, please contact me. You can call me collect at (757)619-4444, or by email at mdt167@psu.edu. If you have any questions or concerns about this study, or have questions about the rights of research participants, contact Penn State's Office for Research Protections at (814)865-1775.

Thank you for your time. I look forward to working with *insert art educator's name* and your students as an integral part of research for developing art and new media technology education for students.

Sincerely yours,

Michelle Tillander, Principal Investigator, mdt167@psu.edu
PhD candidate, Art Education, School of Visual Arts and Architecture, The Pennsylvania State University
517 Roland Drive
Norfolk, Virginia 23509-1514

cc: *insert art educator's name*

Art Educator Permission Forms

PSU Art Education letterhead

A Research Study on Technology in Art Education

"Cultural Interface as an Approach to New Media Art Education"

My Study, *Your* Help	I am asking for your help in a study focused on technology in art education. Five art educators and their students will assist in this study to look at approaches to the use of technology in the art classroom.
Why You?	I am interested in art educators' perceptions and perspectives on uses of technology as part of their art classes. Four art educators are being asked to participate.
The Research Study's Value	This research will provide a basis for expanding art curriculum and strategies for technology as a topic in the field of art education.
Confidentiality	Participation is voluntary. You may decline to answer specific questions at any time. You may end your participation at any time. The information collected in the form of reflections, voluntary interviews, or voluntary participation in a password secure online discussion will be used without any connection to your name without your expressed permission. Your confidentiality will be safe to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties. By returning the attached and signed permission form, you agree to voluntarily participate in this study. The Office of Research Protections, the Social Science Institutional Review Board (IRB) and The Office of Human Research Protections in the U.S. Department of Health and Human Services may review records related to this project.
Duration	This research will be conducted over the span of a three week time period. I am not asking you to do anything different than you would do as part of your art class.
Risk	The risks are minimal, as I am not asking you to do anything different than they you do as part of your art class. Although art educators will develop curriculum and activities to meet the needs of their students concerning art and technology, there is always the potential for the project to fail and this failure to be reflected in data collected in this research. If a failure were to occur that would be a negative impact on the participating art instructor's career, I would remove your name and append this permission as a protective measure. The nature of teaching is a dynamic process with varying degrees of success all relative to students and classroom dynamics. You will have the final decision on defining the success of the project.
What Do I Need to Sign?	To participate, please read, answer, and sign the attached *Art Educator Consent* form. Retain one copy of the form along with this letter for your records and return the signed form in the provided postage paid envelope. Your signature indicates your agreement to participate.
Contact information	Michelle Tillander, Principal Investigator School of Visual Arts and Architecture Department of Art Education 207 Arts Cottage The Pennsylvania State University University Park, PA. 16802 (814)865-6570, (757)619-4444 (c) call collect, mdtl167@psu.edu Dr. Karen Keifer-Boyd, Advisor School of Visual Arts and Architecture Department of Art Education 212 Art Cottage The Pennsylvania State University University Park, PA. 16802, (814)863-7312, kk-b@psu.edu If you have any questions about the rights of research participants in this study, you may also contact Penn State's Office for Research Protections at (814)865-1775.

This consent document (IRB#22023 Doc. #1) was reviewed and approved by the Social Science Institutional Review Board on 01/18/06; it will expire on 12/19/06 (JKG).

Page 1 of 2

Art Educator Consent Forms

PSU letterhead

A Research Study on Technology in Art Education

Art Educator Consent Form

I would like to invite you to collaborate and participate in a study of about art and technology. I am asking for permission to include you in this study because I am interested in responses and perspectives from art educators. I expect to collaborate with 5 art educators and their students in the study schools around the USA. Your confidentiality will be safe to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by third parties.

For the purpose of credit and recognition, please indicate your willingness to allow use of your name.

Permission to use my name. ☐ **Yes** ☐ **NO**

If "yes," please list my name as: _____.

Your decision to participate will not affect your present or future relationship with The Pennsylvania State University. If you have any questions about the study, you can call me collect at (757)619-4444 or email at mdt167@psu.edu. If you have any questions or concerns about your rights as a research participant, contact Penn State's Office for Research Protections at (814)865-1775.

Audio taping choice: Please indicate your willingness to be audio recorded during the proposed interview.

Permission to be audio taped. ☐ **Yes** ☐ **NO**

Archiving Data: I wish to archive data for future research and will need your permission to do so. There will be no identifying information associated with the archive data and your confidentiality will be protected. I will keep the data locked in my office and Michelle Tillander, principal researcher, and Advisor Dr. Karen Keifer-Boyd will be the only persons with access to the archived data.

Permission for my recordings to be archived for future research projects. ☐ **Yes** ☐ **NO**
Tapes will be destroyed on 2010.

Permission for my recordings to be archived for educational training purposes. ☐ **Yes** ☐ **NO**
Tapes will be destroyed on 2010.

I have read the description of the study above, and I would like to participate in the study. I know that I can quit the study at any time and I do not have to answer any questions I do not want to. I must be 18 years or older to participate.

_____ _____
Signature of Participant Educator Date

_____ _____
Signature of Michelle Tillander, Principal Investigator Date

Please return one copy of this signed document in the postage-paid envelope provided. ***Please retain a copy of pages 1 and 2 for your records.***

This consent document (IRB#22023 Doc. #1) was reviewed and approved by the Social Science Institutional Review Board on 01/18/06; it will expire on 12/19/06 (JKG).
Page 2 of 2

Parent/Guardian/Student Project Description

PSU Art Education LETTERHEAD

A Research Study on Technology in Art Education

"*Cultural Interface as an Approach to New Media Art Education*" (IRB #22023)

My study, *Your* Help

I am asking for your help in a study focused on technology in art education. I am asking five art educators and their students to *voluntarily participate* in a study to look at approaches in the use of new media technology in the art classroom.

Why Your Child?

I am interested in art students' perceptions and perspectives on uses of technology as part of their art making processes.

The Research Study's Value

This research will provide a basis for expanding art curriculum and strategies for technology as a topic and medium in the field of art education.

Confidentiality

Participation is voluntary. The information collected in the form of student responses, interviews, and documentation of artworks will be used without any connection to names of individuals. By returning the attached and signed permission forms, you agree to allow your son/daughter to participate in this study. The Office of Research Protections, the Social Science Institutional Review Board (IRB) and The Office of Human Research Protections in the U.S. Department of Health and Human Services may review records related to this project.

Duration

This research will be conducted intermittently over a three week time period. Students may be asked to volunteer for an in-person interview that will last between 15-30 minutes.

Risk

The likelihood of risks is minimal. As I am an outside interviewer, art is personal in nature and can be sensitive. Students normally experience success and failures as a result of the learning processes in art. Participation is not connected to a grade in any way. The classroom instructor's knowledge of each student and my 20 years of art teaching experience will be a measure to protect against potential risks.

How to complete

To voluntarily participate, both you and your son/daughter must read, answer, and sign the attached **parental/guardian and student permission forms**. Retain one copy of each permission form along with this letter for your records and **return signed forms** in the provided address postage paid envelope.

What Do I Need to Sign?

Because your son/daughter is a minor, permission to participate must be obtained by both you and your child. Parent/Guardian must be 18 years old to sign for these permissions.

Contact information

Michelle Tillander, Principal Investigator
School of Visual Arts and Architecture
Department of Art Education
207 Arts Cottage
The Pennsylvania State University
University Park, PA. 16802
(814)865-6570, (757)619-4444 (c) call collect, mdt167@psu.edu

Dr. Karen Keifer-Boyd, Advisor
School of Visual Arts and Architecture
Department of Art Education
212 Art Cottage
The Pennsylvania State University
University Park, PA. 16802,
(814)863-7312, kk-b@psu.edu

If you have any questions about the rights of research participants in this study, you may also contact Penn State's Office for Research Protections at (814)865-1775.

This consent document (IRB#22023 Doc. #2) was reviewed and approved by the Social Science Institutional Review Board on 01/18/06; it will expire on 12/19/07 (JKG).

Parent/Guardian Permission Forms

PSU Art Education LETTERHEAD

A Research Study on Technology in Art Education
Entitled "Cultural Interface as an Approach to New Media Art Education" (IRB #22023)

Parental/Guardian/ Permission Form

I am interested in the projects about art and technology that your child creates as part of his/her regular art class. I will document artwork with digital photographs, collect copies of personal reflections and critiques, and sample interview participants about their artwork. Any information that is obtained in connection with this study, and that can be identified with your son/daughter, will remain confidential and will not be linked to names in any written or verbal report of this research project. The school at which you son/daughter attends will also remain confidential. If you give permission allowing your child to participate, then art class activities and reflections from the regular class activities may be used as the data in the research.

Limits of Confidentiality: In the event that your son/daughter should disclose that they are a threat to themselves or others, the principal researcher, Michelle Tillander, is required to report this threat, and cannot allow requests to keep your son/daughter's comments confidential. School procedures will be followed.

Audio taping choice: Please indicate your willingness to allow your son/daughter to be audio recorded during the proposed interview.

Permission to audio taped my son/daughter. ☐ **Yes** ☐ **NO**

Archiving Data: I wish to archive data for future research and will need you permission to do so. There will be no identifying information associated with the archived data and your son/daughters confidentiality will be protected. I will keep data locked in my office and Michelle Tillander, Principal Investigator and Dr. Karen Keifer-Boyd, Advisor will be the only persons with access to the archived data.

Permission for recordings to be archived for future research projects. Tapes will be destroyed on 2010. ☐ **Yes** ☐ **NO**

Permission for recordings to be archived for educational training purposes. Tapes will be destroyed on 2010. ☐ **Yes** ☐ **NO**

Your decision to allow your son/daughter to participate will not affect your and/or his/her present or future relationship with The Pennsylvania State University or your respective high school. Your signature below indicates that you have read the information provided above and have decided to allow him or her to participate in the study. If you later decide that you wish to withdraw your permission for your son/daughter to participate in the study, simply tell me. You may discontinue his or her participation at any time.

_____ _____
Printed Name of (son/daughter) **Age**

_____ _____
Signature of Parent(s) or Legal Guardian **Date**

_____ _____
Signature of Michelle Tillander, Principal Investigator **Date**

This consent document (IRB#22023 Doc. #2) was reviewed and approved by the Social Science Institutional Review Board on 01/18/06; it will expire on 12/19/07 (JKG).
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Student/Minor Permission Forms

PSU Art Education LETTERHEAD

A Research Study on Technology in Art Education,
Entitled "Cultural Interface as an Approach to New Media Art Education" (IRB #22023)

Student Permission Form

I am interested in doing research in your art class in regards to art and technology and am interested in the art projects that you may create as a result of class activities. This does not require anymore work and will be part of your regular art instruction. I will be collaborating with your art instructor in this process, which I have described on the first page of this form. I hope you will consider allowing me to interview and document any work that you may create as a result of class activities. I must have your permission and the permission of your parents to include you in my research study. Your names will remain confidential.

Limits of Confidentiality: In the event that you should disclose that the students are a threat to yourself or others, the principal researcher, Michelle Tillander, is required to report this threat, and cannot keep your comments confidential. School procedures will be followed.

Audio taping choice: Please indicate your willingness to allow your interview to be audio recorded.

Permission to be audio taped. ☐ **Yes** ☐ **NO**

Archiving Data: I wish to archive data for future research and will need your permission to do so. There will be no identifying information associated with the archive data and your confidentiality will be protected. I will keep the data locked in my office, and Michelle Tillander, Principal Investigator and Dr. Karen Keifer-Boyd, Advisor, will be the only persons with access to the archived data.

Permission for my recordings to be archived for future research projects. Tapes will be destroyed on 2010. ☐ **Yes** ☐ **NO**

Permission for my recordings to be archived for educational training purposes. Tapes will be destroyed on 2010. ☐ **Yes** ☐ **NO**

I have read the description of the study above, and I would like to participate in the study by allowing my artwork and reflections to be anonymously included in the study. I have received permission from my parent(s) to participate in the study, and I agree to participate in it. I know that I can quit the study at any time.

_____ _____
Signature of Minor **Date**

_____ _____
Signature of Michelle Tillander, Principal Investigator **Date**

This consent document (IRB#22023 Doc. #2) was reviewed and approved by the Social Science Institutional Review Board on 01/18/06; it will expire on 12/19/07 (JKG).
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Research Questions for Interviews

Student participant interview questions

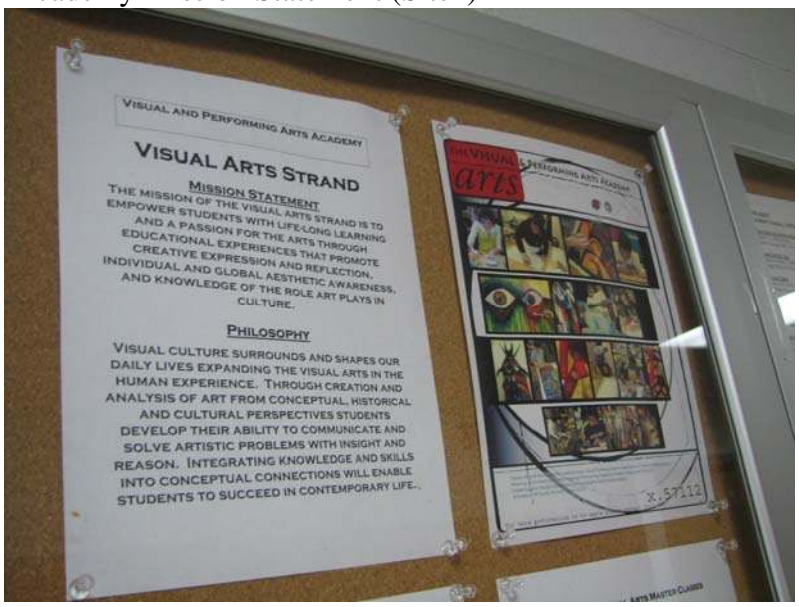
1. Please describe yourself without using your name.
2. Explain the idea and process that you explored for this class project.
3. What issues between new media and art did you discover as a result of the artwork you created?
4. What are some related issues between art and contemporary technology and culture that we could also explored?
5. Did the discussions of digital new media art and the creation of your artwork cause you to think about technology and contemporary culture? If so can you explain?
6. What are the strengths and/or weaknesses of exploring digital media issues in art?
7. Has the exploration of new media art, artists, or issues altered your thinking of art? If so, how?
8. Can you suggest a way to explore art and technology in the art class that would be most valuable to students like yourself?

Art educator interview questions

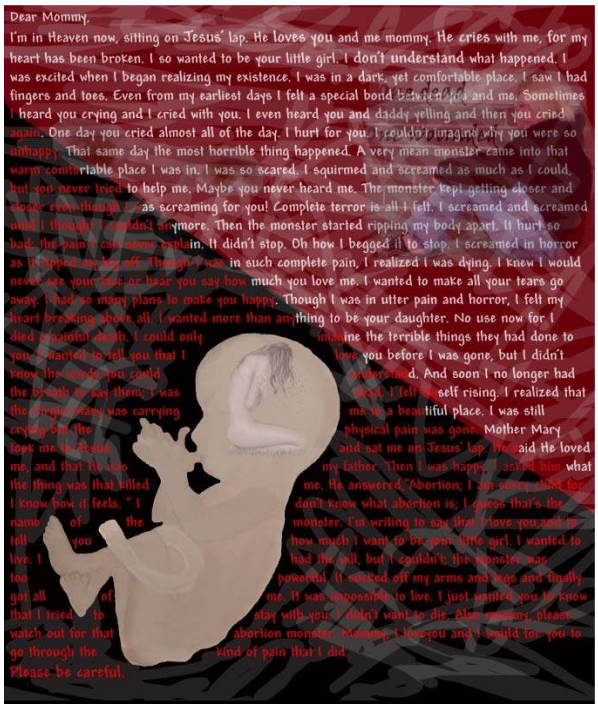
1. What ideas from art and technology did you think about as you developed/selected activities and content for students?
2. What influence might new media artworks have on the understanding of new media?
3. How has the exploration of new media art and artists affected the art and/or technology within your art class?

Appendix B. Mission Statement and Artwork (Site 1)

Academy Mission Statement (Site1)



Lucy (2005), *Untitled,* digital image, 14”x 11” (site 1)



Appendix C. Student Reflection Questionnaire (Site 1)

VISUAL AND PERFORMING ARTS ACADEMY (9-12th grade)
MASTER CLASS REFLECTION SHEET QUESTIONS

DIRECTIONS:

1. Student's full name and arts strand
2. Master class name (include a ticket stub/program if possible)
3. Artist or group name
4. Six chosen questions, minimum of one from each section
5. Number your answers to match the question number
6. Answers directly below each chosen question

QUESTIONS:

Core Questions:

1. Why does this information matter to anyone? Why does this information matter to me?
2. How do these ideas make sense?
3. How can I use these ideas and skills?

Curriculum Connection Questions:

4. In what other ways can I use what I have learned?
5. How do I adjust my way of thinking and working when I encounter new situations as a result of this new context?
6. Why do people have different outlooks on the same issue and how are they founded?
7. What insight do you gain when examining the issues from these varied points of view?

Practice/Discipline questions:

8. What are the theories that govern the knowledge of the subject?
9. How do artists organize their knowledge and skills in this field?
10. How does the artist know what skills to use under given circumstances?
11. What are gauges of quality in the field?
12. According to what standards does the field measure success?

Identity Questions:

13. To what degree is this familiar, surprising, and/or intriguing to me?
14. When I am intrigued by an idea, what do I gain from that? What do I give as a result of that? What difference does it make?
15. What are the ethical principles at the core of the subject?
16. How do people in this field handle ambiguity, uncertainty, persistence, failure, success, collaboration, and compromise?
17. How do I handle those things?
18. How might I shape the field over time?
19. How might the subject shape me?

REMINDER
Students are required to complete a reflection sheet after attending a master class or no hours will be rewarded.

Appendix D. Identity Project Handout (Site 1)

VISUAL METAPHOR SELF PORTRAIT IDENTITY PROJECT

The use of **Visual Metaphors** is one of the most common ways of elaborating interfaces and visual representations.

A **visual metaphor** helps establish a "presence" and simultaneously creates personal coherence or style.

Metaphor is a term that refers to a *figure of speech* in which a word or phrase that literally denotes one thing is used figuratively for something else, as a way of suggesting likeness or analogy between the two. As such the metaphor conveys **additional or more complex meaning** beyond the literal meaning, often in a subtle way; it can be a way of `expressing the inexpressible' or `saying the unsayable'.

Identity is an umbrella term used throughout the social sciences for an individual's comprehension of him or herself as a discrete, separate entity. In sociology and political science, the notion of **social identity** refers to individuals' labeling of themselves as members of particular groups -- such as Nation, Social class, Subculture, Ethnicity, Gender, Employment, and so forth.

PROJECT:
The **Visual Metaphor Portrait** will challenge you to create metaphorical interpretations of a self-portrait in a creative and memorable way. Digital technology potentially offers expanded possibilities and considerations.

Begin by thinking of an appropriate metaphor in response to a prompt such as,

"I am like a _____."

A visual metaphor can be embellished with such identifying details characteristic of the metaphor artifact. The final product also includes text, such as a catchy title, supporting details, explanations, metaphorical comparisons and position statements on key issues that you wish to portray in your Metaphorical Portraits.

"The relationship between me and my world is like: relationship between... _____ and _____."

Your Visual Metaphor research should show how this metaphorical relationship worked through four categories such as:

Food	Art and Ritual	Technology
Shelter	Nature	**Etc……**

Sketching ideas for project:

1. Divide your paper into four panels or sections, one for each category/idea. For each panel, create a visual metaphor that captures a relationship between you and the topic you select. Use drawings, cutouts, photographs, and photocopies to tie your metaphor to related visuals.

2. Write a short explanation (On the back) for each of your visuals, using evidence, and examples to support your interpretation.

3. Give your project a bold title. Your title will probably include references to you and your particular metaphor.

EVALUATION:
Your final product will be evaluated on

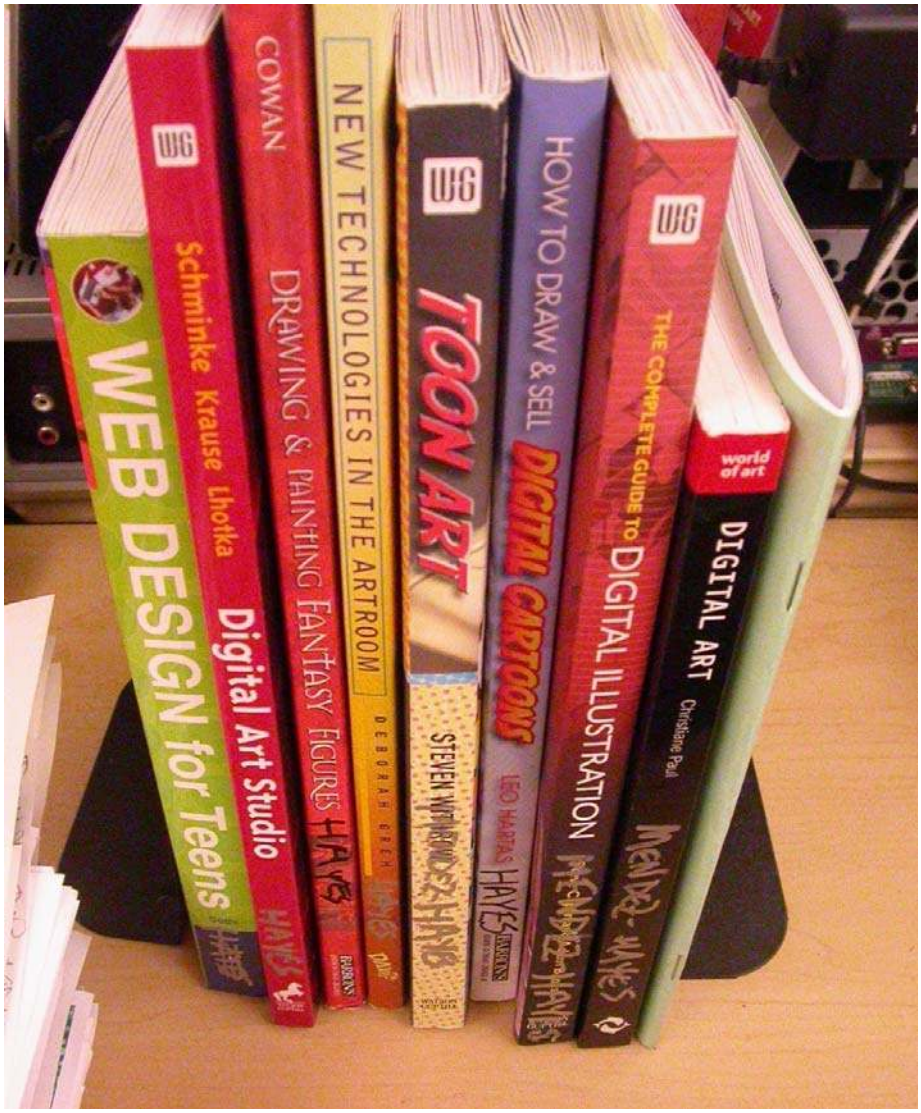
- how well you interpreted your metaphor visually with your self portrait
- how well you supported your interpretations with visual evidence.
- the quality of your visual presentation.
- the overall creativity of your work.
- completion of project requirements.

"We must constantly remind ourselves that the ultimate purpose of evaluation is to enable students to evaluate themselves. Educators may have been practicing this skill to the exclusion of learners; we need to shift part of that responsibility to students. Fostering students' ability to direct and redirect themselves must be a major goal--or what is education for?" Arthur Costa

Michelle Tillander, mdt167@psu.edu

Appendix E. Michelle's Books Titles

Michelle's Book Titles (Site 2)



Appendix F. Digital Video Handout/Activity (Site 2)

Machinima:

Making Animated Movies in 3D Virtual Environments

Machinima is a wholly new way of making films. Based on technology originally developed for computer games, machinima movies are created on virtual sets using virtual characters and 'filmed' within the real-time 3D graphics engines of games such as Quake, Halo and Half-Life. This means that any aspiring filmmaker with a home PC can create films in real time, without having to animate them painstakingly, frame by frame. **Ozymandias (2000)**

Ozymandias is a short filmic adaptation of Percy Bysshe Shelley's poem of the same name, created using the new filmic medium "Machinima", in the Lithtech Film Producer package. It was scripted and directed by Hugh Hancock, and filmed by Strange Company, both as a film in its own right and as a demonstration of Lithtech Film Producer's potential.



Ozymandias was made using real-time 3D generated film-making techniques- "Machinima". These techniques, using computing software mostly originally developed for the cutting edge of computer gaming, allow low-budget film-makers to create high-quality films rivaling the output of professional studios.

Lithtech Film Producer was the first one of these tools written with the sole intention of filmmaking use. ***Ozymandias*** was made using an early, "alpha" version of this software, intended at least partially as a demonstration of Lithtech Film Producer and the Lithtech 3D graphics engine's capabilities.

For more information on Machinima, visit Machinima.com, the portal site for all kinds of Machinima run by Strange Company. Lithtech Film Producer is sadly no longer in production. For more information there is an open letter available.

The Poem

I met a traveler from an antique land
Who said: 'Two vast and trunkless legs of stone
Stand in the desert. Near them, on the sand,
Half sunk, a shattered visage lies, whose frown,
And wrinkled lip, and sneer of cold command,
Tell that its sculptor well those passions read
Which yet survive, stamped on these lifeless things,
The hand that mocked them and the heart that fed.
And on the pedestal these words appear—
"My name is Ozymandias, king of kings:
Look on my works, ye Mighty, and despair!"
Nothing beside remains. Round the decay
Of that colossal wreck, boundless and bare
The lone and level sands stretch far away.'

–Percy Bysshe Shelly

Anna 23rd of February 2004 | 55 Mb
By: Fountainhead Entertainment

Description
Lyrical short film, chronicling the life of a flower in a gothic fairytale.

Appendix G. New Student Reflection (Site 2)

Computer Art & Design
Reflective Dialogue – How does Technology Inform or Misinform Us?
Guest: Mrs. Michelle Tillander, Pennsylvania State University, Doctorate candidate, New Media in Art Education

Name:_____

Below are questions for you to answer in your own words. We will convene to discuss your responses in a way that will help us as a class to better understand how we experience visual technology in a personal way, as computer artists and designers, and in a communal or societal way, in our environment and daily lives.

1. Give an example of how your experience with digital visual technology in computer art & design increased your understanding of digital visual technologies?

2. How has your experience with digital visual technology in computer art & design made you realize how much there is yet to learn about digital visual technology, or how you may have been misinformed about what it is?

3. Think about digital visual technology in this 21st century world—in the consumer world and your day-to-day world... how has this class informed (or misinformed) how your perceive the world of technology to function around you?

4. Give an example of a situation where you have had this kind of experience—perhaps when you were working on one of the software programs to communicate a message or mood, or maybe when you were taking images on your cell phone digital camera, or on a broader experience, when you went to the movies, or the mall or someplace where you saw or experienced visual digital technology as part of the environment? How did it expand your idea of what visual technology is?

What is Technology Anyway?
From her own experience, studies and reflections, Mrs. Tillander has offered three definitions, characteristics, philosophies of technology that are helpful:
(a) technology as tool or machine (hardware interfaces);
(b) technology as rules (software interfaces); and
(c) technology as system (includes tools/hardware and rules/software, knowledge, inventors, operators, consumers, marketers, advertisers, government administrators, and others involved in technology)
(d) technology as a cultural and/or sociological interface that includes the self situated in a, b, and c with issues of socially constructed beliefs, practices, and values as part of the mix.

Appendix H. Initial Student Reflection (Site 2)

Name: _____ **Section:** _____

Project: Image Ready Earth Animation **Course:** Computer Art & Design

Self-Assessment Sheet

What are you saying about the earth, about humanity?

For this **Image Ready** project, we created an animation based on the theme of the Earth that conveys a message or tells a story about the earth. First we brainstormed to develop ideas by creating a thought bubble, examining current animations about the earth, looking at Google Earth and discussed ideas among one another. Then we drew storyboards to illustrate the plot. We created our characters. Lastly we animated our story or message in Image Ready (Photoshop®).

Vocabulary:

Characters Story Board Animation Plot Protagonist Antagonist Action Scene Close Up Shot Distance Shot Conflict Resolution Tween Animation Palette Optimize .gif Scene Transitions Google Earth

Self-Assessment Questions: Please answer the following questions in complete sentences that create a full paragraph for each. Type and print your responses and place in the Inbox when finished. Take your time for a meaningful reply:

1. What is the message of your Earth Animation? What are you saying about the earth, about humanity or its living creatures?

2. Who is your protagonist? How did you design his/her or its characteristics? Who or what is the antagonist? Describe how the antagonist bothers the protagonist.

3. Conflict resolution is a difficult situation for the best of us. Describe how your protagonist resolves the situation in a meaningful way.

4. Go back and watch you animation. Then answer each of the questions thoroughly in a way that describes the design of your animation:
   a. How did you use color or values for effective story telling in your animation?
   b. What does your close up shot look like—how did you use that to show the viewer something they shouldn't miss
   c. What font and style did you use for your title and the end page? How does the font style support the overall mood or message of your animation? Does the type work on the page or does it distract from the animation?
   d. How did you create transitions from one scene to another?

Appendix I. Homework Reading Reflection (Site 2)

Computer Art & Design Majors
Homework

Name: _____

Project Earth
Image Ready Animation

Read *"Discovery's Streaming Video Comes to Google Earth"* and *"The Race to Dazzle: Map Sites Pile on Features"* from the Wall Street Journal. These articles focus mainly on Google Earth and its new amenities, as well as other mapping services.
Answer the three questions below, give thoughtful responses (boring one line ho-hum answers = ✓- . Some thought =✓. Thoughtful, insightful answers = ✓+ !!!)

1) You've been fascinated by Google Earth lately. What's your opinion of the *Discovery* streaming videos of landmarks, and the ability to navigate streets in a virtual car? Give me details about what you like, what you don't like.

2) I wonder what will happen in the future… Using your imagination, tell me what might happen next as these internet companies meet their goal of "closing the gap between the real world and the computer." (Your imagination, remember, this is art class—have fun!)

3) How do all these video cameras and computer technologies make you feel about privacy rights? Freaked out, could care less, concerned, maybe some laws should be enacted? What's your opinion? Even if you care less, tell why, ***because….***

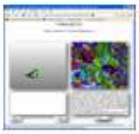
Appendix J. New Media Artists Handout (Site 3)

New Media Artists Handout (page 1 of 3)

Artwork	Artist title	Idea/description	New media discourse (can add to)
	**PEDESTRIAN** (2002) Shelley Eshkar and Paul Kaiser digital projection http://www.openendedgroup.com/artworks/pedestrian/pedestrian.htm	– *public sculpture,* – *digital projection merges with the rough surface we walk upon* – *tiny denizens in a trompe-l'oeil illusion* – *float both upon and within that surface*	– Shifts the focus away from the object – renders time in a unique way – renders space in a unique way – Interaction in public space
	*Errata Erratum* Launch date: November 2002 Paul D. Miller aka Dj Spooky that Subliminal Kid http://www.moca.org/museum/dg_detail.php?dgDetail=pmiller	*"relation between the unexpressed but intended and the unintentionally expressed"* Marcel Duchamp, "The Creative Act," 1957	– Opening spaces for [re] understanding and thinking representation – Point of view beyond traditional perspective (screen sense)
	**ON TRANSLATION - THE INTERNET PROJECT** http://adaweb.walkerart.org/influx/mountadas/project.html	– addresses issues of interpretation, transformation, and changes of meaning through the process of translation – the internet: the system and the network	– extremely fluid name/code allows for unique remixing – CONVERGENCE of ephemeral forms – translation
	*Sitestepper, Relational Architecture 10 (2004).* **Rafael Lozano-Hemmer** http://www.alzado.net/LA/index.html	– commercial tendency to add a 'theme' to everything – idea is to establish uncanny branded environments that reorganize information and boring web aesthetics into quotidian spaces of presumed neutrality	– Role in the global – Interaction in public space
	**COLLISION II** (2003) Richard Clar orbital debris site-specific artwork http://www.arttechnologies.com/	– *idea of creating from this orbital debris,* – *a site-specific artwork—in space*	– Opening spaces for [re] understanding and thinking representation –
	**SCREEN** (2003-pres.,) Noah Wardrip-Fruin, Jost Carroll, Robert Coover, Shawn Greenle, and Andrew Macclain http://www.aspectmag.com/issues/work.cfm?workID=27	– Cave-form virtual reality, bodily interaction, recombinant text – *reading and listening experience* – *the language of the text, together with the uncanny experience of touching words, creates an experience that doesn't settle easily into the usual ways of thinking about gameplay or VR*	– Opening spaces for [re] understanding and thinking representation – Shifts the focus away from the object – Rendering space in a new way –
	**The Visual Thesaurus** http://www.visualthesaurus.com/trialover.jsp	– a dictionary and thesaurus with an intuitive interface that encourages exploration and learning.	– Opening spaces for [re] understanding and thinking representation – extremely fluid name/code allows for unique remixing (computer art, multimedia art, cyber art, digital art, and new media art) CONVERGENCE of ephemeral forms translation – Point of view beyond traditional perspective (screen sense)
	*Arrangements* http://adaweb.walkerart.org/partners/protected/index.html	– *is aimed at becoming a worldwide sound/color collage.*	– extremely fluid name/code allows for unique remixing (computer art, multimedia art, cyber art, digital art, and new media art) CONVERGENCE of ephemeral forms translation

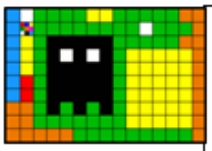
New Media Artists Handout (page 2 of 3)

Michelle Tillander 2006

	**START SOMA LAUNCHES START MOBILE** *the world's first retail art gallery to sell NEW ART for cell phones* http://www.startmobile.net/mstore/startinc.nsf/about.htm	START MOBILE, becoming the first retail art gallery in the world to sell NEW ART for cell phones. Curated by START SOMA founder John Doffing, THOUSANDS of original works of NEW ART from HUNDREDS of the world's most prominent emerging + underground artists can now be downloaded onto mobile phones across the United States	– Role in the global – Tools and processes ubiquitously integrated into contemporary everyday life
	**Mobile Feelings** (2002-2003) Christa Sommerer & Laurent Mignonneau http://www.interface.ufg.ac.at/christa-laurent/WORKS/	– explores the ambivalence of sharing personal information with an anonymous audience – Instead of communication via voice or images to people we know, "Mobile Feelings" lets people communicate with strangers through virtual touch and body sensations including smell and sweat using specially designed mobile phones	– Tools and processes ubiquitously integrated into contemporary everyday life
	VERBARIUM (1999) Christa Sommerer & Laurent Mignonneau http://www.interface.ufg.ac.at/~christa-laurent/verbarium/	– interactive text-to-form editor on the Internet	– extremely fluid name/code allows for unique remixing (computer art, multimedia art, cyber art, digital art, and new media art) CONVERGENCE of ephemeral forms translation –
	**the telegarden** (1996-2004) http://www.ieor.berkeley.edu/~goldberg/garden/Ars/	– linking garden to the World Wide Web – creating an intuitive interface for the control of the arm and camera, – artists transformed subtle rumination on the nature of the Commons	– Role in the Global
	**Life Writer** (2005-6) Christa Sommerer & Laurent Mignonneau http://www.interface.ufg.ac.at/christa-laurent/WORKS/index.html	– Text as Genetic Code – text-to-form editor links the characters and syntax of the written text to specific parameters in the creature's design	– extremely fluid name/code allows for unique remixing (computer art, multimedia art, cyber art, digital art, and new media art) CONVERGENCE of ephemeral forms translation –
	**agoraXchange** (2003) Natalie Bookchin and Jacqueline Stevens http://www.agoraxchange.net/index.php?page=218	– is a forum for the exchange of ideas, where participants are inspired to work together on the rules, design, and code which will ultimately result in a game	– Role in the global – Interaction in public space –
	**The Dumpster** (2006) by Golan Levin with Kamal Nigam and Jonathan Feinberg http://www.tate.org.uk/netart/bys/	– information visualisation using data from web logs to plot the romantic lives of teenagers	– extremely fluid name/code allows for unique remixing (computer art, multimedia art, cyber art, digital art, and new media art) CONVERGENCE of ephemeral forms translation –
	**Ecce Homology** (at the UCLA Fowler Museum Nov. 6, 2003 through Jan. 4, 2004) http://www.insilicov1.org/	– physically interactive new-media work visualizes genetic data as calligraphic forms – computer-vision interface allows multiple participants, through their movement in the installation space, to select genes from the human genome for visualizing comparative genomics	– extremely fluid name/code allows for unique remixing (computer art, multimedia art, cyber art, digital art, and new media art) CONVERGENCE of ephemeral forms translation –

New Media Artists Handout (page 3 of 3)

Michelle Villander 2008

	*Screening Circle* (2006) Andy Deck	– adapts the cultural tradition of the quilting circle and the participative round table into an online format for producing motion graphics. – Visitors Drawing Area to compose loops of graphics, affect, edit other's screens. – The pieces, or segments, can be made by one person by several people – arrangement of the segments can be haphazard or precise.	– Role in the global – Interaction in public space –
	**THRIFT STORE TAPE #3** (2001) BRENT WATANABE Video	– *found home video tapes* – *personal response to the quiet and complicated lives of "everyday" people.*	– Opening spaces for [re] understanding and thinking representation

Appendix K. Artworks (Site 3)

Rene (2005), *Art makes what was old, new,* mixed media, 24” x 18” (Site 3)

michelle**tillander**

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EDUCATION

2008	Ph.D.	The Pennsylvania State University, University Park, PA
1994	Virginia License Art Ed NK-12; additional Gifted Education Endorsement	
1984	MFA	Old Dominion University/Norfolk State University, Norfolk, VA.
1980	BA	Moravian College, Bethlehem, PA.

PROFESSIONAL **EXPERIENCE**

2005–present	Assistant Professor, University of Florida, Gainesville, FL
2004–2007	Advisory Board, Salem Arts Academy, Virginia Beach, VA
2003–2005	*Coordinator, Zoller Gallery*, School of Visual Arts, The Pennsylvania State University, University Park, PA
2004-2005	Instructor: A ED 488: Museum and Cultural Institutions Practicum, The Pennsylvania State University, State College, PA
1998–2003	*Chair, Visual Arts Department,* The Governor's School for the Arts, Norfolk, VA
1990–1998	*Chair & Art/Computer/Photography Instructor,* Old Donation Center for the Gifted and Talented, Virginia Beach City Schools, Virginia Beach, VA (*Chair 1995–1998*)

GRANTS/AWARDS

2008 *New Media Conversations,* Scholarship Enhancement Grant, College of Fine Art, University of Florida
2003 *Award of Excellence, Printmaking,* Hampton Bay Days 2003 Juried Exhibition, Hampton, VA.
2001 *Surdna Fellowship Grant,* Surdna Foundation, NY. NY.
1998 *Exemplary Arts & Education Showcase Award,* ITTE, Kennedy Center, Washington, DC.

PUBLISHED **WRITINGS & PROJECTS**

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PRESENTATIONS

Tillander M. (2008). Cultural Interface as an Approach to New Media Art Education. Presentation at The Fourth International Congress of Qualitative Inquiry (QI2008), University of Illinois at Urbana-Champaign.

Tillander, M. (2008). *Beyond Black Boxes: New Media Art, Identity, and Translations.* Presentation at the National Art Education Association, NYC, NY.

Tillander, M., Liao, C. (2008), *Blurring Boundaries: An interrogation of learning with new digital media and new media art.* Co-presentation at the National Art Education Association, NYC, NY.

Tillander, M. (2007). *Exploring the Paradoxes and Code of Contemporary Technology Issues Through New Media Digital Artists* NYC, Presentation at the National Art Education Association, NYC, NY.

Tillander, M. , Liao, C. (2007), A Historical Overview of Teaching Computer Art in K-12 Art Education", Co-presentation at the National Art Education Association, NYC, NY.

Tillander, M. (2006), Demystifying AP Studio: Finding a Concentration AP Studio, Princess Ann High School, Virginia Beach, VA.

Tillander, M. (2006, March). *Beyond the Walls of the Zoller Gallery* . Presentation at the National Art Education Association, Chicago, IL.

Tillander, M. (2005, November). *Cultural Interface as an Approach to New Media Art Education*. Presentation at the Pennsylvania Art Education Association, University Park , PA.

Tillander, M. (2005, March). *Computer Technology and Art Education: Through a Rear-View Mirror*. Presentation at the National Art Education Association, Boston, MA.

Tillander, M. (2004, October). *Exploring Technology and the impact in/on Art Education*. Presentation at the Pennsylvania Art Education Association, Lancaster, PA.