Integrating Art and Technology: an Action Research Case Study in a High School

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Chapter One:
The Problem Statement

The writing of a qualitative case study in education is itself an experiment. Qualitative educational research is not yet a fully developed methodology. There are many choices and creative possibilities open to the qualitative researcher in education today. The challenge is to further the social science conversation while simultaneously transforming the ground upon which the conversation presently rests. The standard explanation for the use of qualitative methodology in educational research is that education cannot be completely described, nor can education benefit, from an epistemological stance that ignores the concrete, the immediate, the affective and the personal; and these qualities are, by their nature, not reducible to quantitative description and analysis. In addition, education can be considered a relational act falling within the general conceptual field of communication research; and taking into account the relational, symbolic, and communicative nature of its praxis enlarges education. This study will be a qualitative research study.

Qualitative research requires a stance grounded in personal perspective. My perspective as a researcher can be characterized as an abiding interest in the nature of ethical behavior in human interactions, and the power of relationships to manifest inter- and intra-personal change. As an artist, I have not limited myself to any particular media. I have used theater, poetry, publishing, television and rock and roll as media for individual and group expression. My artistic interests revolve around creative group process and specifically, the power of text to

influence form. As a researcher, these same interests come into play: I am fascinated with how groups manage or do not manage to make meaning together and, further, how those group interactions and mutual interpretations affect the group's ability to create original (not previously existing) forms. I am intrigued by how comprehension of the textual (i.e. mental or actual scripts, books, rules, guidelines, philosophies, socially shared perceptions) affects what individuals in groups believe to be possible. What individuals consider possible is whatever they can imagine as achievable, creatable, realizable.

Finally, an anomaly in my perspective needs to be addressed: I indiscriminately use what is popularly understood as both sides of my brain. I never did better in English than in math or vice versa. All my artistic experiences and creative projects have involved right-brain activities (creative imagination, poetic consciousness, relational and emotional perspicuity) as well as activities considered to be dominated by the left-brain (organization, mathematical and geometric design, facility with machines and technology). This dual facility is not unique to me. The popularity of the World Wide Web has shown that many people today are capable of working with both technology (a supposedly left-brain activity) and visual arts (an example of right-brain activity). This flexibility of the mind, the ability to read, or to interpret, from both perspectives, might be a significant cognitive leap. In any case, our growing ability to bridge what used to be considered incompatible modes of thought and activity, will undoubtedly influence our conceptions of learning and education. This study aims to aid in building this conceptual bridge.

A NATIONAL PERSPECTIVE

The Goals 2000: Educate America Act made educational technology a funded educational priority. The same act recommended that art have a place in the core academic curriculum. Department of Education studies in technology integration have focused attention on the lack of teacher education in technology (MacPherson, 1994; White House 2000). Other studies have asserted that teachers are resistant to technology innovation in their classrooms (Hodas, 1993; Saba, 1999; Solmon, 2000; Slowinski, 2000). Many studies concerning technology integration into the curriculum concentrate on the value of technology for math and science (Boser, 1998; Cajas, 2000; Pannabeker, 1995; Petrina, 1998). Other studies concentrate on the expertise that can be channelled in from outside the physical boundaries of an individual school using distance learning technologies (Petrina, 1998). Only a few studies have attempted to analyze the potential value of technology for the arts curriculum (Ascott, 2000; Francastle, 2000; Petrina, 1998).

The goals of this study have been to: 1) contribute to a discussion of the value of communication technology in the art curriculum; 2) re-examine factors that may influence teacher resistance to technology; and 3) create, through an action research initiative in a particular high school, a viable technology-based element to their arts curriculum

Synecdoche is a figure of speech that uses a part to stand for a whole or vice versa. Discourse on education is inevitably synecdochal: either we speak of education as a generalized category of human social endeavor or we describe *a*

school or a specific educational experience. This study will alternate between both of these synecdochal perspectives, acknowledging that each is incomplete in itself but language and tradition make it impossible to speak from both perspectives at once.

In this chapter and the next, the emphasis will be on art and technology in general educational and philosophical terms. In the data and results chapters, there will be a more particular examination of the particular action research initiative that focused on integrating art and technology in a specific high school.

The following section of this chapter will address some issues presently of concern to art educators. There will follow a section concerning issues to do with technology education. Then social change and democratic process will be addressed as issues that are intrinsic to education initiatives in democratic environments. And, the final sections will consider the rationale for this study in the light of the preceding discussion.

ART IN ACADEMIA: VALUING AESTHETIC COGNITION

Some educational theorists firmly and fiercely devoted to the preservation of the centrality of art in an academic curriculum (Eisner, 1976, 1978, 1998, 1999; Bruner, 1985, 1986, 1990; Gardner, 1990) sought to justify this centrality through an assertion of art's cognitive value. These writers have asserted that, in order to keep art a valued element of the core curriculum, we must provide coherent evaluation methodologies that correspond to those of the other core subjects. Although I applaud these efforts, I am concerned that those of us committed to art in academia not allow ourselves to be swayed by the fallacy of

an illusive curricular coherence and subjugate teachers to the humiliation of teaching to the tests.

Another branch of educational literature, exemplified by the work of Maxine Greene (1978, 1988, 1995, 1998, 2001) and William Pinar (1975, 1981, 1992, 1998), encouraged research that would increase the valuation placed on individual perspectives and the unique power of learning moments that are mutual processes of self-discovery. Greene and Pinar insisted teaching itself can be a creative, ethical act.

There have been two main efforts in the struggle to promote art in the schools. The attempt to: 1) consider art from a generalized perspective and to develop forms of classification and evaluation to secure art a central place in the curriculum; and 2) explicate the centrality of art in every communicative endeavor, in order to reinvest all education with the spirit of creativity. Most readers will recognize that the second of these efforts is allied with John Dewey's philosophy as he described it in *Art as Experience* (1934) and *Experience in Education* (1938). I subscribe to the second view. This study was designed to explore the potential efficacy of this perspective in the context of an action research initiative that would integrate art and technology in a high school curriculum.

The next section will consider some issues facing technology education in the light of what has been discussed concerning challenges facing art education.

TECHNOLOGY IN EDUCATION: ETHICAL CONSIDERATIONS

Distinct from the issues and crises of legitimization daunting the art curriculum literature, educational literature dealing with the introduction, integration, and maintenance of computer technology and distance learning in schools seeks no self justification (Cajas, 2000; Georghiades, 2000; Slowinski, 2000; Solmon, 2000; Walton, 2000, Warschauer, 2000). At the beginning of the last century, Dewey led progressive educators in arguing for the inclusion of science and engineering into the curriculum (Dewey, 1938; Kleibard 1986, 1992). In the later part of the same century, curriculum specialists were continuing to promote the validation of constructivist principles (Kleibard 1986, 1992). Today, majority values in the United States are distinctly in favor of educational goals oriented towards a scientific, technological future. Dewey, it would seem, is at last victorious (See Appendix 1).

However, the technological revolution and the information age are not universally regarded as beneficial to human society. The vision of pervasive information technology in schools is not an uncontroversial educational issue. Information technology's role in education is highly contested in both formal and informal dialogues. Orwell's classic *1984* (1949) portrayed the terrifying possibility of a technology used simply as a buttress for the ancient powers of negation, authoritarianism and greed to further oppress the individual. Since the 17th century, enlightenment and humanitarian thinkers and writers have fought these ancient powers with a vision, explication and description of an ethical society. The enlightenment vision of an ethical society sought to reconcile the

needs of the individual and the needs of society by balancing a freedom to create a dignified life (individual need) with a freedom from oppression. Political oppression in this tradition is the result of an excessively detrimental impact on the individual occurring when the "needs of society" is in actuality the needs of an elite (Berlin, 1955; Freire, 1973, 1993; Spinoza, 1883; Shotter, 1993b; Apple, 1982). But science and technology have not traditionally been the fields from which ethics emerge. Today, new conceptualizations could emerge from art, psychology, education, and human resource development that would support ethical stances strong enough to balance the temptations of technological excess.

Teacher Attitudes towards Technology

Not only do issues regarding the ethical use of information technology in schools challenge humanitarian and enlightenment visions of education to a new articulation, but, in specific schools, in the practical application of technology, there are individual challenges to be addressed by practitioners and researchers. Teachers in the United States are pressed for time. Large class sizes and onerous reporting procedures limit face-to-face time with students and peers. When instructional technologists enter specific educational environments and suggest to teachers that they make time for their students to work with pre-packaged, pre-programmed computer-based learning programs, three primary objections are raised: 1) Time students spend on computers allows less time for face-to-face interactions; 2) Teachers do not necessarily trust information they do not provide, nor do they necessarily understand how to support their students in acquiring computer-delivered information; and 3) Teachers may not understand how to

work the computers and/or the programs. The first two objections are issues of relationship and relational knowing. The last issue is one of teacher experience and education.

Although the final consideration at first appears to be simply an issue of teacher training and exposure to information, the premise of this study was that these are also relational issues. My assumption was that teacher training and a teacher's comfort level with technology would be affected by the quality of the relationship the teacher experienced with the sources of technological information and expertise. My challenge as an action researcher and change agent was in part to affect a gentle, caring, and considerate relationship between myself as technology expert and the teachers and administrators who would be participating in the change effort. My analysis of the data will take into consideration how the quality of relational discourse did or did not affect technology skill acquisition and technology use in a particular high school.

In the next section will discuss art and its relationship to history, human biology, and science.

ART AND RITUAL.

In the development of human social systems and consciousness, art preceded science both as a mode of expression and as a techne (a shared procedural and linguistic system for the production of artifacts). Although it is often argued that the first tools were made for warfare and hunting, an equally persuasive argument can be made that the first technologies were for nurturing the body (cooking utensils, the manipulation of fire and ice, providing clothes, and

shelter) and soul (music, dance, and decoration). My assertion is that art and technology are covalent: developments in either cause alterations and developments in the other. This section will discuss some theories relevant to this perspective.

Ellen Dissanayake (1988, 1992) theorized that art is a behavioral, ethnobiological necessity. Dissanayake proposed that “making special” is a core drive intrinsic to human nature. The act of transforming objects and persons satisfies an innate need to celebrate and signify. The continuity of these acts of transformation develop into ritualized and symbolic forms of communication; while, on the other hand, the artistic act itself remains tied to intrinsic biological and psychological needs.

Jane Harrison’s landmark work (1913, 1962, 1973) was in classics and art history and revolutionized conceptions of the origins of religion in western civilization. In her book, *Art and Ritual* (1913) Harrison contended that intelligence derives from an instinctual need to handle fear and pain. In her example: a mother is on a train with her child, when her child hurts a finger. The mother, in order to distract her child from the pain, asks her daughter to identify what she can see from the window of the train. The ability to focus on the world around her distracts the child from the pain in her finger. Harrison stated that almost all early religions had gods of thunder and lightning because ancient people were scared of thunder and lightning and they created art forms, dances, music, and sculpted, carved, and painted representations of the powers that they feared. Over time, these art forms became ritualized. Although, there is a notable

similarity between Harrison's concept and Dissanayake's, Dissanayake does not include Harrison in her bibliographies. I assume Dissanayake has come to her conclusions following a different path. Similar conclusions arrived at by dissimilar methods is often a sign of a resilient possibility. The rituals, according to Harrison, preceded the invention of gods and goddesses. Harrison stated that religion is prior to theology; to prove her point that religion does not need gods and goddesses, she remarked that Buddhism is a present day example of a religion with no theology.

Harrison (1913, 1962, 1973) insisted that action precedes understanding. Harrison showed that religion developed from rituals rather than the other way around. Using the evidence of early Greek art, Harrison convincingly described the evolution of religion from ritual and the gradual independence of art from religion. She then explicated how science grew out of art and gradually came to be its own discipline. Early rituals, according to Harrison resulted from the primitive mind's complete association with surrounding events. People felt compelled to mimic the powers they perceived as affecting their lives and as their mimicry was repeated, in an effort to understand and control their fear, pain, and confusion, mimicry became ritual. Rituals are embedded in all social life. New cultural influences and discoveries were integrated into familiar forms. Harrison called this *new wine into old bottles* and insisted that this is the way all change occurred in ancient Greek society (1913, p. 146).

Changing the ritual.

I am committed to the centrality of art in the academic curriculum. And I agree with the literature that considers art to be fundamental to the life and consciousness of human beings. In this view art cannot be subsumed into science, math, language arts, or vocational training. Art defies definition. Art, as a form of human experience and cognition likely predates both language and science. Even though art may be a foundational human cultural experience, it does not surpass in importance later developments, nor can it be entirely subsumed into other symbolic systems (Cassirer, 1955d; Harrison, 1962).

Stages are often used in educational literature as a convenient and coherent way to characterize learning moments, cognitive development, and progressive mastery (Mezirow, 1991). But rarely do prior stages or experiences disappear entirely. Early stages and experiences tend to influence any process throughout its development. Art, language, science, and understanding evolve. Often it is in the realms of art and poetry that new concepts, relationships, visions and values are experimented with and articulated. Art has often inspired scientists. And scientific advancements, both technical and theoretical have influenced the subjects of art and the methodologies, technes, and lived realities of artists. It is my assertion that the mutual influence of science and art can and should be formally acknowledged and perhaps even manipulated by educators searching for methodologies suitable for pedagogical practice in the information age. Grounding in scientific principles provides learners with the intellectual tools needed to question facile or manipulative artistic assumptions. And, exactly the

same is true in reverse: grounding in artistic principles makes it possible to pose challenges to any pose of neutrality asserted by some scientists and technologists.

Art and science are different enough in their methodologies and praxis that they are able to both support and critique each other. A complex democratic society, dependent upon a variety of technologies, including information technology, requires its members to be sufficiently dexterous in both scientific rationalism and creative imagination to be able to participate autonomously as citizens (Apple 1982; Arendt, 1977, 1978; Bennett, 1996; Freire, 1998). The challenge facing educators today is how to integrate domains while maintaining their fundamental diversity. We see this challenge being played out in such areas as ethnic and gender diversity, collaborative learning, technology integration, and the place of art in the schools. In a culture like ours, heterogeneous, committed to individuality and democracy, the challenge to integrate and remain diverse reflects the continuing attempt to honor education's basic values: to strive, to grow, to learn, and to change.

In *The Educational Situati*on (1902), John Dewey reported feeling frustrated by what he perceived to be non-substantive change in schools, merely new wine into old bottles. He complained that no matter how many times the progressive educators tried to introduce reforms, the reforms never changed the fundamental nature of school. If we allow ourselves to inherit Dewey's frustration with what Harrison believed to be a necessary part of the process of social change, we may cripple our change efforts. In the course of this action research initiative, there were many times when I chose to take Harrison's perspective

rather than Dewey's. However, the following section will examine some of the issues in which Dewey's perspective was certainly the salient one, issues of democracy and education.

LEARNING, CHANGE AND DEMOCRACY

According to the college textbook, *Human Anatomy and Physiology* (Hole, 1993), the ten characteristics of life are all processes. They are movement, responsiveness, growth, reproduction, respiration, digestion, absorption, circulation, assimilation, and excretion (p. 7). Life is undoubtedly a process. The life sciences define, delineate, and manipulate life processes. Learning is also a process, and it seems perfectly logical to contend that learning is a process that promotes life. Perhaps, to those of us committed to educational research, learning might seem to be the most critical of life processes. My point is that learning is not a thing, an object that can be examined, nor can it be iteratively articulated as a series of behaviors. The goal of action research is to create change. This sort of change is considered to be educative (in Dewey's sense) and therefore a kind of learning. It follows then that the goal of my study was to participate in a learning process in the school. This section will examine some of the elements that went into my formulation of the type of learning I was hoping would occur during the consultancy.

Thought is another process. When thinking changes, learning occurs and usually, actions follow suit. Art is the realm in which changes in thought and emotion are closely examined. The results of these close examinations are then, more or less laboriously, applied through a means of expression, a medium.

Finally the experience represented in the medium is shared with others. The first step of the process is self-reflective learning. The second step is procedural or constructivist learning. The final step is situational or collaborative learning. Depending on the media, the second and first steps will have elements of interpersonal communication and collaborative learning as well.

My assertions are that: 1) Art and the artistic process cannot be separated, because 2) art is a way to work with ontological comprehension in order to 3) share perspectives with others for the purpose of 4) making the world a less terrifying and more habitable place. 5) The value of art education consists in the articulation of these four processes so that the isolation experienced by individuals can be significantly ameliorated.

Art examines and explores the values and experiences in human (and occasional animal, superhuman, and alien!) life. In *The Miracle Worker* (Gibson, 1975), the moment Helen Keller is at last able to associate a word with her awareness is simultaneously the moment that allows her to communicate with another human being, and is also the moment that allows her to become a human being. This scene illustrates Vygotsky's (1962) point that thought, language, and relationship grow in correlation.

This subsection has discussed thought, learning and art as possibly correlative. The next subsection will consider the relationship of these processes to issues affecting 21st century democracy.

In *On Revolution* (1963), Hannah Arendt described the American Revolution as the only successful democratic revolution. She defined success as

the establishment of a permanent political democracy. According to Arendt, the success of the American Revolution could be credited to the fact that democracy was already the native, local political process. The constitution of the United States was therefore, not a vision statement, but a description of our political praxis, how we were then constituted. We were a practicing democracy. Our legal constitution reflected, and set out to guarantee that future Americans (us) would be able to continue the experiment. According to Arendt, and Dewey (1916), it is the democratic process that is the basis of democracy.

What is democratic process? According to Dewey and Arendt, the democratic process is not simply voting for the candidate most likely to get us what we want but rather, democratic process is a relational stance in which people engage in dialogue. The nature of democratic dialogue is itself worthy of explication. Democratic dialogue rejects the premise that the strongest will win. Democratic dialogue is an enlightenment concept based on a belief in the inherent value of individuals, of their right to a dignified existence and of their responsibility to participate in the creation and maintenance of that existence through collaborative exploration of mutual rights and responsibilities. Democracy is not an easy process. Enlightenment scholars never asserted that democracy was a natural state. In fact, it is often stated that the educational system in the United States, and the commitment to universal literacy, came about as a result of the realization that democracy requires educated citizens able to choose autonomously and to work collaboratively.

In James Tarrant's homage to and extension of John Dewey's book of the same name, *Democracy and Education* (1989), Tarrant put forward a well-founded claim that the moral element of education in a democracy consists in the commitment to educate citizens. Tarrant defined citizens as people capable of making the political and personal choices that affect their lives. Tarrant has further expanded his argument (1991) to specifically criticize the utilitarian philosophies of life and education. Utilitarianism asserts that people act for their own good, and that the ultimate good that people strive for is their own happiness. The educational philosophy that has emerged from that viewpoint justifies training people to work without teaching them how to effectively question the nature and the value of work.

In *Democracy and Education* (1916) and in *Experience and Education* (1938), Dewey made the claim that democracy is an experience, and that the educational experience in a democracy must be a democratic one. Dewey's interpretation of democratic experience in education focused on the dignity and respect of persons, regardless of their class or background. In Dewey's view, the teacher was to take seriously her student as an individua with rights and responsibilities. Teachers were to engage in an experiential, relational discourse with students. This discourse would develop the knowledge of democratic process that students could utilize and further develop as educated adult citizens.

Arendt, Tarrant and Dewey have asserted that, before democracy can be a functioning political reality, it must first be a lived experience. Furthermore, Tarrant has asserted that there is a moral responsibility inherent in Dewey's

description of a democratic education. The moral obligation of a democratic education, according to Tarrant, is to teach students the skills of critical and self-evaluative analysis. As students matriculate and become citizens, these skills will be called upon in those realms particularly necessary for the democratic process to exist: continuous participation and choice.

Democracy can be understood as a living process. Living forms must reproduce themselves. Reproduction is not to be confused with cloning. Reproduction results in unique representations of the potentials of the originating system. According to Dewey and Tarrant, education is an arena wherein the reproduction of democracy is an ethical imperative. The ways in which this action research study influenced the democratic processes in the high school will be explored in the data and analysis chapters.

The next section, the last in this chapter, will provide my rationale for this study.

RATIONALE FOR THIS STUDY

There is very little research literature on the integration of art and technology in the curriculum. I thought that a qualitative study would be a good place for me to begin because the methodology supports subtlety and interpersonal meaning making. Because the literature on technology integration suggested that there might be resistance to the integration of technology into any part of the curriculum, I needed a methodology that would be flexible enough to be modified continuously according to what would occur on site. Qualitative research would provide this methodology.

I decided to attempt the integration of art and technology in a high school in which I had been invited to do research. I saw the need for even more flexibility than qualitative research afforded, and so I chose to integrate action research methodology with qualitative research. I embarked upon a project the purposes were multifaceted but the focus was to be the improvement of the school web site. This activity provided an opportunity to explore my research question. Would we learn something by taking seriously the ethic of care in an action research project? Action research has long been concerned with social justice but there have been no articulations of the ethic of care as an alternative moral perspective within that methodological approach.

In order to help the high school art department integrate their curriculum with the available information technology, I assumed that I would have to use artistic processes. In fact, I was thrilled to be offered an opportunity to work with art teachers *because* I could examine the efficacy of artistic process during the course of an educational change initiative. And this afforded an opportunity to examine how engaging in artistic process might affect the oft reported teacher-resistance-to-technological–innovation.

I approach technology as an artist: I explore possibilities that the tool/media affords for communicative creative action. The vast opportunity that computers afford for artistic and ethical purposes is not well explored. I saw a parallel between the literature on democracy in education and the literature on integrating diversity into the curriculum. I felt that a study that explored alternative methods for integrating technology, methods that were intrinsically

relational and conversational, would make a contribution to both the fields of technology and art in education. Because the World Wide Web embodies in its design, the principles of collaborative meaning making discussed in this chapter as fundamental to both art and to democracy, it seemed particularly valuable to use the Web as the media for the change initiative.

My perspective is exploratory and creative. This study seeks to explore the notions of democracy in education as manifested in socially responsible conversational interactions during a change initiative. The action initiative sought the creation of a viable environment for continuous technological integration into the curriculum by pursuing one particular technology initiative in such a way that the participants would be encouraged and enheartened to continue the process of change on their own, once the researcher had gone.

Further, I hoped that this research study would contribute to the conversation concerning conversation itself. The power of conversation as a tool for change has long been acknowledged in the field of clinical psychology but is less well studied in the fields of art or technology education. This study will closely examine the nature of conversational interactions during the course of the action research initiative.

Finally, all these factors notwithstanding, the fundamental research purpose of this study was to apply the ethic of care during a change initiative and to describe what occurred. I hoped that a care perspective on the part of the change agent, myself, would ameliorate the anxiety surrounding the integration of art and technological activities and methods. I also hoped that a care orientation

would ameliorate resistance to change based on fear. And, lastly, I hoped that a care orientation would appreciably increase the possibility of collaborative, co-equal practice that Dewey and others describe as the essence of democratic practice and education.

Chapter II:
Literature Review

INTRODUCTION: WEAVING A WEB

Ellen Dissanayake, in her book, *What is art for?* (1988), described in her introduction her explicatory procedure: because she was attempting to synthesize a variety of literatures, she chose to describe each one separately and in the final chapters, bring her analyses into the synthesis that she stated was the purpose of her book. The metaphor she used was a paint-by-numbers picture: she would paint in all the green, then all the red until at last she could show the picture as a whole to the reader. I share Dissanayake's procedural concerns: in order to synthesize several literatures, I need to describe each one before, asking the reader to appreciate that these literatures present a variety of intersecting perspectives on conversation, change and democratic education. All the perspectives are salient to this study. Although I share Dissanayake's procedure, my metaphor would be of weaving rather than of painting. Each perspective has contributed a strand that is vital to the strength of the whole fabric. Describing the fabric without giving each strand its own distinctive coloration would muddy the picture in the reader's mind. The image I am hoping to invoke is a fabric of many colors and textures whose

aggregate strength is philosophically monumental. This fabric supports a tapestry that tells a story honoring pluralism, humanitarianism and democratic practice. As stated in the introduction, writing about education is synecdochal. I trust the reader to understand that this chapter will weave specificity and philosophical perspective into an overview of the literature relevant to this study.

In the following sections of the literature review, I will be building on a foundation of premises covered in the introduction. These premises are that art is a fundamental human activity and, as domains of pedagogy, praxis, and cognition, art and science are mutually responsive and interdependent. Information technology can benefit both the art and the science curriculum, and the moral obligation inherent in democratic education is to provide experiences and environments in which democratic processes can be practiced, emerge and evolve.

The following sections are titled according to the themes discussed therein: 1) art in schools: theory; 2) justice, responsibility, and care; 3) conversational reality; 4) motivation and learning; 5) adult education; 6) action research; 7) art in schools: practice; and 8) technology in schools. The first six sections are primarily theoretical and philosophical explorations. The last two sections discuss research studies concerned with concrete manifestations of theories in practice.

We begin the next section with John Dewey's perspective on art, education, experience and democracy.

ART IN SCHOOLS: THEORY

Democracy and Education (1916), *Art as Experience* (1934), and *Experience and Education* (1938): It always seemed to me that there was one book missing in Dewey's astounding trilogy, a book that would bring together Dewey's vivid descriptions of living democratic action with his equally vivid depiction of thinkers as creators. I want Dewey to have written a book called *Democracy as Art*, and then a further elucidation entitled, *Art and Education.* I cannot produce these non-existent works by John Dewey, instead, in this study I offer to describe how the relationship between democracy, education, experience, and art was supported during an action initiative to integrate technology into a high school art curriculum. The philosophical questions this study explores concern the interrelationship between art, experience, education and democracy interrelate and how their co-operative evolution might be supported by technology. My wondering on these issues is continuous and drew me to work as a consultant in education.

Since the purpose of this study was to integrate technology into the art curriculum, we will begin the literature review with a discussion of art education theories that are particularly relevant to issues that affect the participant art teachers and their curriculum.

The following section will an overview of the work of theorists who have made significant contributions to the present understanding of art curricula in our educational system: John Dewey, Eliot Eisner, Jerome Bruner, Arthur Efland, Nelson Goodman, Howard Gardner, and Maxine Greene.

Art in the Curriculum

Dewey pointed out that knowledge is embedded in, and derives from, experience. And that, for democracy to exist, democratic experiences must play a significant role in education. For Dewey, art's cultural significance primarily lay in its practice. Dewey understood artistic praxis as a process involving simultaneous engagement with the tangible and the intangible. Dewey's thrilling assertion that people are the means *and* the ends of education, art, experience *and* democracy has yet to be realized but remains a focus of many educational efforts.

Eliot Eisner (1976, 1978, 1985a, 1985b, 1994, 1998, 1999) argued eloquently that art belonged in the core curriculum. Eisner's argument focused on the necessity of creating standards, and evaluation systems that would guarantee art the standing of an academic subject. Eisner's thought derive from and art criticism perspective. First introduced by Eisner, the concept of discipline-based art curricula, presently practiced in the state in which this study occurred, is now supported by the J. Paul Getty Foundation. Discipline-based arts as a cognitive and organizational structure for the art curriculum, makes assessment and evaluation more coherent for educational practitioners steeped in the ethos of pragmatic efficiency. Eisner has been successful: the justification for the centrality of art in the curriculum has been incorporated in the national standards and perhaps needs no further argument at this time (See Appendix 2).

Jerome Bruner (1985, 1986, 1990, 1996) is another theorist who has contributed a great deal of writing in support of creative thinking as an indispensable element of cognitive constructivism. Bruner's appreciation of art

education located art within a socio-constructivist philosophy of education. In Bruner's model teachers are responsible for creating learning situations and environments in which students are able to actively participate in activities that purportedly lead them to comprehending extant theoretical models in the particular domain. Art and science are equally well suited to Bruner's hands-on, participatory model of education because a melding of theory and practice is crucial in the practice of both disciplines.

Arthur Efland (1990, 1996) is another theorist who has had a fundamental impact on art education theory. Efland is an art historian whose work illuminated cultural attitudes manifesting in the purposes and values of art education. Efland suggested that the use of educational objectives forced educators to treat knowledge as a commodity rather than a process. Based on available information and skill, through the co-creation of meaning, within the context of living moments of experienced reality and relationship, knowledge emerges from synthesis. This view of knowledge Efland opposed to the view of knowledge as made and available for distribution. He asserted that the conceptualization of knowledge as a commodity, as already having been made, contributed to the sustenance of illegitimate social control. In Efland's view, knowledge to be distributed is inimical to a democratic conception of learning.

Efland used Polanyi's (1966) definition of tacit knowledge to argue that understanding that is present but not yet articulated would always be greater than articulated knowledge. If art educators were allowed to recognize and value tacit understanding, there would be an appreciable difference in their curricular

assessments and evaluations. Efland's position poses a strong counter-argument to the work of the discipline-based arts theorists.

Whatever theoretical position one prefers with respect to art education, it is clear that the discussion surrounding evaluation and assessment has occupied a central place in the theoretical discussion on art education. Perhaps there is room for a few new approaches to art education. This study would like to share relational descriptions from the point of view of exercising the ethic of care in a democratic change initiative involving art and technology in the hope of complicating and extending the conversation of what is appropriate for serious theoretical discussion in art education.

The following subsection will consider aspects of Gardner's and Goodman's theories of art and intelligence salient to this study.

Creative and Critical Thinking

Two theorists who have had profound effects on art education have been involved in Project Zero, Nelson Goodman and Howard Gardner. Founded in 1967 by Nelson Goodman, Project Zero is a research group based at Harvard investigating aesthetic education, and the relationship between critical and creative thinking. When Nelson Goodman founded Project Zero, it was for the purpose of supporting research that would lead to the improvement of the teaching of art. The reason given for naming the project "zero" was that there were zero studies on art education that Goodman thought worth mentioning at the time. Gardner was co-director of Project Zero from 1972 until 2000.

Goodman was an art collector and from ran an art gallery in Boston for several decades. In his book, *Ways of Worldmaking* (1978), Goodman contended that art is a way of making worlds. According to Goodman, there are many different worlds contained in our one world; and no necessary antagonism need exist between a pluralistic concept of experience and the notion of a unified world because these are compatible perspectives. From the particular point of view of individual experience, there are many, unique worlds. From the point of view of shared reality, we are living in one world together. The many worlds described are our lived, experiential worlds, reminiscent of Habermas' concept of the lifeworld (1973, 1984). Goodman's concept of the world we share is essentially an epistemological word developed to empirically describe the world in which our individual existences take their part. Goodman's idea of worldmaking was that people engage in a process of making the world, and that art is the means through which we explore possible worlds before we commit to living them. Therefore possible worlds are the possible futures from which people will extract elements for making their lived worlds.

Another important idea that Goodman contributed to the arts education conversation is summarized in phrasing that has a distinctly Zen qualities. Goodman stated that he would have us rid ourselves of the onus of trying to solve the famously unanswerable question, "What is art?" and ask instead, "When is art?" When is art was meant to throw the focus of analytic attention and conversation onto the living moments, and the processes involved in the making, and in the interpretation of art. Goodman wrote extensively in the areas of logic

and was a brilliant example of someone fully capable of working with all types of cognition; he was particularly capable in combining critical and creative thinking.

Developed under the aegis of Project Zero, Gardner's (1983) theory of multiple intelligences proposed a complex view of education. Gardner contended that there were seven types of intelligence (bodily-kinesthetic, linguistic, spatial, musical, interpersonal, intrapersonal, and logical-mathematical). Gardner's premise brought forward questions concerning how we might teach for the development of multiple intelligences and how we might assess and evaluate learning and teaching in multiplicity of modes. Gardner's premise has also increased awareness regarding the value of all types of intelligence and the contributions each has made to society. Interestingly, all Gardner's types of intelligence are practiced in the arts. It is important to remember also that there really is no limit to the possible combinations of types of intelligence. For instance, we can easily find examples of linguistic-kinesthetic, spatial-logical-mathematical, and musical-intrapersonal.

Gardner's theory is compatible with that of Hirst (1974) who claimed that there are fundamental knowledge domains that embody, in their epistemological structure, different types of reasoning. Hirst's suggestion was that each knowledge domain was cognitively unique; therefore every domain should be included in the curriculum to ensure the development of a fully rounded cognition. The theories of Gardner and Hirst have been used to argue in support of experimental forms of education, such as team teaching, collaborative learning, inter-disciplinary, and arts-based curricula. Information technology has been

thought to be effective support for a variety of learning styles; and a great deal of research has developed around computer supported collaborative learning. (Baecker, Grudin, Buxton & Greenbert 1995; Bostrom, Watson, & Kinnet 1992; Chan & Chou 1997)

The following discussion on the philosophy of Maxine Greene, will be the last subsection in this section on art theory in the schools.

Becoming Who We Are

Maxine Greene (1978, 1988, 1995, 1998, 2001) dedicated herself to creating an awareness of the kinship between the educational and the artistic process. From Greene we learn that art has the power to educate. Greene inspired many teachers and administrators to use art for personal and professional inspiration. Greene is credited as being a founder of the Lincoln Center Institute for the Arts in Education. This organization provides workshops, lectures, and programs for pre-service teachers, practitioners, and entire schools. An interdisciplinary program dedicated to the integration of the arts and artistic process into the curriculum; this project has had immense impact on practitioners.

Greene's educational philosophy is eclectic. She combines a sensitivity to women's issues, and a sense of the teacher as artist, with the understanding of teacher as a professional practitioner. She is an advocate for democratic practice in all aspects of education. Education, according to Greene, is about people, about learning to participate in a continual act of becoming through self-reflection, discipline, and celebration. Greene furthered the educational conversation by imagining a place for art, artists, and the artistic process in education. Greene

often repeated the phrase, “I am not yet” (Pinar, 1998). We are always not yet fully who we might be; we are always in a process of becoming, and art is the quintessential medium for exploring issues of becoming who we are.

Just as a natural scientist observes nature attempting to find meaning in natural phenomena, Greene, Harrison (1913, 1962, 1973), and Dissanayake observed art in an attempt to find meaning in cognitive-spiritual imagination. Greene called on educators to mine works of art for the resonant truth, awkward beauty, and complexity of goodness that can be found there. She contended that the experience of studying and making art in the classroom was a liberating experience, both for the student and for the learner. Greene explained how teachers can honor their own learning process.

The book s that I wish Dewey had written, *Democracy as Art* and *Art and Education* would have addressed the living, creative, process nature of culture and how education might support and guide this process in the direction of democratic possibilities. These imaginary books would have combined Dewey’s understanding of art as a disciplined conversation between human beings and their ontological conceptions, a conversation that creates expressions that lead us into the future, with Dewey’s perception of democracy as a practical, rational attempt to live in ethical relationship with others. Maybe he would have written these books in collaboration with Maxine Greene, as they have as much or more in common than Dewey did with his famous friend, Jane Addams. Enough fantasy!

Summary: The Practicality of Diversity

There is commonality between Greene's conception of art as an act of becoming, and Vygotsky's (1962, 1971) and Shotter's (1993a) explications of the role that conversation plays in generating cognition, theories that are discussed later in this review, in the section on conversational reality. Greene's philosophy is also compatible with Dewey's theory of art and education as experience, and education as democratic practice. Goodman's concept of worldmaking and Gardner's concept of multiple intelligences support a pluralistic concept of cognition and the realization of alternative forms of education. Hirst also argued for the need to offer education that responds to a diversity in cognitive forms. Maxine Greene and John Dewey wrote and argued for person-centered education that honors the immediate, relational, and self-reflective experience, the sort of experience that is intrinsically aesthetic *and* practical. The potentials of technology to support, serve, and perhaps even extend these worldmaking and pluralistic concepts was the potential that excited and inspired me to pursue this action research study.

In this section art education theory was discussed; the following section will initiate a second thread in the discussion. The next section will discuss moral orientations and the applicability of an ethic of care to educational projects in democratic institutions.

JUSTICE, RESPONSIBILITY AND CARE

Carol Gilligan's work changed my life. *In a Different Voice* (1993), and *Meeting at the Crossroads* (Brown & Gilligan, 1992), articulated and delineated a

critical difference between the way men and women use language and the way that men and women understand justice, responsibility, and care. For me, as a young woman, Gilligan's articulation helped me to have confidence in my own tendency to value care, even while historical exigencies found me seeking social justice.

Moral Orientations

Gilligan's premise was that men tend to work with generalized principles while women think and attempt to act in response to particular situations. Many objections have been raised against Gilligan's assertion that gender is the primary reason for the difference in moral orientation (Benhabib, 1987). Rarely, however, have I read any objection to Gilligan's assertion that there are two moral orientations. Researchers arguing against Gilligan's gender orientation have suggested that the generalized perspective is practiced primarily in the public sphere while the focus on the particular is appropriate in the realm of the personal. Feminists have responded that relegating women and women's perspectives and values to the private sphere is an artifice of patriarchal practice (Ibid.).

Meeting at the Crossroads (Brown & Gilligan, 1992) described how a group of female researchers, in the process of studying young girls' transition into adolescence, were forced to change their research methodology and the way they used language in order to communicate respectfully with their research participants. The researchers found that speaking respectfully and intimately to participants elicited the type of self-revealing anecdotes that the researchers were hoping to use for data. The lessons I learned from this book affected all my

teaching activities and much of my personal and creative life. The assertion made was that professional language can mask as well as reveal, that people asking questions or in any role of authority or power could chase away the very knowledge they were seeking simply by speaking in a manner that was associated with power and authority. This assertion still fascinates me. What is it about power and authority that silences? How can we speak intelligently without alienating those to whom we wish to speak?

Meeting at the Crossroads also examined the way young girls make choices to silence themselves; how girls take on specific cultural roles and along with those roles, a manner of speaking and relating. All of this seemed very familiar to my experience growing up. Some of the times I had felt most lost and betrayed by my friends were apparently when they were assuming a feminine role that required a denial of the kind of harsh truth I was accustomed to speaking and living.

After I read *Meeting at the Crossroads*, I read *In a Different Voice* (1993). *In a Different Voice* described Gilligan's theory of moral orientation. This book helped me to maintain a sense of inner coherence as I worked through issues in my marriages and in my working life. The issues I am referring to have to do with what I had learned about myself by reading *Meeting at the Crossroads*. I had learned that I needed to speak as close to my personal truth as I possibly could; this would aid me in becoming what I had always wanted to be: my true self. It seemed to me an obvious corollary to Gilligan's approach, that the coherence of my personality was dependent upon the way I used language. The reason I needed

to stay in touch with my true self, was that I wanted to be an artist and my understanding of the artistic process was that it involved the artist as a filter. The clearer the filter, the greater the art. The way to make the filter clear was to be as honest as possible; something that was clearly much more difficult linguistically for women to achieve than for men.

The next subsection in this section on justice, responsibility and care, will consider the work of two educational theorists, Nel Noddings and Lisa Goldstein, who have contributed to our understanding of the ethic of care as applied in educational environments.

Care in Particular

Women's sensitivity to particulars, whether socially conditioned or biologically determined, nevertheless affects how we handle social reality and political and moral choice. Nel Noddings is the theorist who first brought the ethic of care into educational literature (Noddings, 1981; Raywid, 1981). The ethic of care is a principle that educators may choose to assume whereby they take responsibility for their share of the affect in an educational situation. The ethic of care, Noddings was careful to point out, does not require educators to love in the same way as they would in the privacy of their personal life. But the ethic of care does require the educator to accept an interpersonal responsibility for feeling states that is co-created in educational situations.

Noddings' concept of interpersonal responsibility is closely examined and further illuminated by Lisa Goldstein in her book, *Teaching with Love* (1997). In Goldstein's study the ethic of care, as practiced in a specific early education

classroom, was revealed to consist of complex, non-trivial, and anything-but-stereotypical encounters and attitudes. One of Goldstein's points was that, because care is, by definition, something that occurs between real people in real time, it will always be unique. Each participant, each researcher, each reader, must take the responsibility to consider her own values and represent them with consideration and respect for others. Every practical example of the ethic of care, if it is genuine, will be unique and may cause participants and observers to question their values. This is not to be seen as a compromise of the validity of the ethic or of the research but rather is the proof of its living nature, of its embeddedness in a relational architecture of experience. This type of reasoning has furthered Dewey's constructs concerning experience and education, to include the affective and (more traditionally considered) personal as factors worthy of consideration, study, and analysis.

The ethic of care does not have to be seen as in opposition to a principle-based ethic. To dichotomize the specific and the general and to separate personal (private) experience from shared (political, social) experience is unjustified because in lived experience they are part of a continuum. Rather, I prefer to understand the practice of a situation-based ethic of care in education as an addition to, or an extension of, adherence to principle-based rules, generalized guidelines, and state and federal laws. An ethic of care takes as fact that the emotive content, and the affective context of conversations will always affect not only the interpretation of events but the substance of their occurrence. An ethic of care is in no way inimical to rule-based justice and it is a mistake to see it as such.

Care and justice occur on a continuum of moral understanding. The sort of continuum that contains and connects seeming oppositions will be further explored later in this chapter, in the discussion of the philosophy of Paul Ricoeur.

In her book, *Maternal Thinking* (1989), Sarah Ruddick shared a philosophical perspective on the ethic of care. Ruddick interpreted the ethic of care as a form of justice and moral responsibility that comes about through the practice of mothering. In Ruddick's view, mothering is a labor, a praxis, and generates, as all praxis does, a language and value system particular to its practical exigencies. Ruddick extended the theory of moral responsibility and the ethic of care by showing how the practice of mothering can be generalized to principles that can be understood as fundamental to a Gandhian philosophy of peace action. In other words, Ruddick extended further the concept of the ethic of care by bringing it closer into the rule-based, generalized, public arenas of international relations, and political, peace activism.

Summary: The Ethic of Care

Ruddick (1989) contended that the process of nurturing other provided the ground for an epistemology of non-violent, active participation in social relationships. Ruddick's purpose was to delineate a nurturant moral orientation that has as its basic value the creation of safety and decency for people. Noddings (1981) contended that educators have a moral responsibility to engage in a dialogic relationship with their students that conveys care. Noddings asserted that a respect for individuality in the abstract requires teachers to model that respect by assuming an interpersonal, conversational, and relational stance of care for

their students as particular individuals. Goldstein (1997) illustrated the specific methodologies that she and the teacher she observed used to self-reflectively manifest the ethic of care in a unique educational situation. These studies and analyses built on the studies and theoretical perspectives initiated by Carol Gilligan (1982, 1987, 1988; Brown & Gilligan, 1992)). Gilligan worked with the premise that language and conversation are not only a form of data available to researchers interested in understanding social realities, but also a form of agentic action that can be used to affect social reality.

The following section begins a new thread: conversational reality theory. We have previously explored art education theory as supportive of cognitive pluralism. We have discussed conversation and care used as extensions of the ethical imperative of democratic process operating in educational situations. In the next section we will expand our understanding of conversation and relationship, and briefly examine the roles they play in re-creating and sustaining culture.

CONVERSATIONAL REALITY

John Shotter's explication (1984, 1989, 1993a, 1993b) of the dynamics of conversational reality and social ecology provided a practical-theoretic for this action research study. Shotter's premise was that people recreate and reinforce, invent, and invest in their reality, through the co-creation of conversations with others. Shotter was influenced by Vygotsky's (1962, 1971, 1993) assertion that language is the tool culture uses to create itself. In an action research study, the researcher's goals include social change. It is my view that social structure

depends on mental and emotional habits (Dewey, 1916). If I were to influence social structure, I would only succeed if I could influence how participants in the change effort were thinking. In *Thought and Language* (1962) Vygotsky delineated a process of the origination of thought. In Vygotsky's view, not only thought, but culture, emerges as a result of dialogic interactions.

The first subsection will examine one aspect of Vygotsky's thought in greater detail, the Zone of Proximal Development, and what opportunities and limitations apply when change agents wish to fully utilize the potentials of this zone.

The Zone of Proximal Development

Vygotsky's perspective was popularized in the United States when Jerome Bruner, an educator of creditable achievements in educational change efforts, published *Acts of Meaning* (1990). In this book, Bruner interpreted Vygotsky's concept of the Zone of Proximal Development by creating the co-constructivist metaphor of *scaffolding* to describe what an educator's role might be in a learning interaction. Unfortunately, the way the two metaphors do not connote nor do they elicit the same relationship between the learner and the educator. Bruner's definition of scaffolding conveyed a constructivist view of education: knowledge is a co-construction. The educator's role is to hold the structure steady with scaffolding while the student develops concepts and practices within the basic structure and scope provided by the teacher. This is significantly different from Vygotsky's description of the Zone of Proximal Development. In Vygotsky's description, the ZPD is a potential, a form of understanding implicit, or tacit, in

the learner, earned through prior experience and ready to be actualized, articulated through participation in a dialogue with a person of greater facility in the domain. According to Vygotsky, the result of the dialogue is circumscribed to some degree by the prevailing cultural assumptions embedded in the linguistic and procedural concepts, however, the dialogue elicits strength already present in the learner. The value-add is in the articulation, the creation of communicable schema.

The difference between Bruner's and Vygotsky's perceptions is crucial, especially when applied to adult education and working with peer teachers, as was the case in the present study. If the change agent, the person in the role of expert, or consultant, anyone perceived in the moment as having more information or knowledge, *scaffolds* a peer, the learner loses the opportunity to struggle for self-definition and self-determination in conceptual re-structuring is much less likely. If the consultant, on the other hand, takes Vygotsky's explanation as a working definition, she perceives the client as capable, as having developed an awareness that is waiting for articulation through a negotiated conversation, in which meaning-making and relationship co-develop.

I have found Bruner's scaffolding metaphor to be useful when the task is to relay stringent procedures. However, I agree with Freire's (1973, 1989) position that when teaching and collaborating with adults and peers, an educator is bound to guard against assistencialism. Freire defined assistencialism as a surreptitious element in our pedagogical ideology that allows the educator to assume a superior position in relation to students. This superiority, when it manifests itself as assistencialism, does not appear to be in any way cruel, rather,

it appears to be kind, helpful. Freire insisted, however that an assistencialist position humiliates the student and is a form of cultural oppression that makes true democratic practice impossible.

The metaphor of scaffolding implies that the learner does not have the internal resilience and strength to create meaning. Vygotsky's concept of the ZPD connotes a subtle responsibility for relational care much closer to Shotter's descriptions of conversational reality than to Bruner's explication of scaffolding.

In any case, an assumption of weakness, no matter how well intentioned, can backfire during a social change effort, by subtly furthering individual feelings of inadequacy and a sense of disempowerment. The literature on critical pedagogy (Apple, 1979, 1982; Giroux, 1981) masterfully delineates how ideologies in education can disempower members. Rather than concentrating on any metaphors or assumptions of weakness, a social change agent is attempting to build confidence and courage in herself and the clients so that their collaborative struggle for individual autonomy and mutual understanding will not be subtly sabotaged by subliminal reinforcements of inferiority and inability.

The next subsection in this section on conversational reality continues to examine the work of John Shotter but this time from the perspective of another of his intellectual inspirations, the work of Ilya Prigogine.

Co-creating Futures

Shotter (1993b) further developed his concept of conversational reality into a more diverse and complex dynamic he called social ecology. Shotter defined social ecology as the inter-relationship of a plethora of intersecting

conversations. Shotter's social ecology construct is reminiscent of Kurt Lewin's (1935, 1936, 1948, 1951) formative field theory of psychology and social dynamics. Lewin, considered the originator of action research, proposed that individuals were embedded in fields where forces acted on them and within them. A social change agent's responsibility, in Lewin's terms was to analyze the forces acting on individuals, ameliorate forces acting negatively, and support those forces tending toward cooperation. Lewin's theories will be discussed more fully later in this chapter.

Shotter reported that his concept of social ecology was greatly influenced by Prigogine's work on chaos and complexity. Prigogine (1979, 1984, 1985, 1988, 1996) in turn credited Henri Bergson as inspiring him to reinterpret time. Shotter contended that Prigogine's chemistry theories could be applied to social systems. Prigogine's descriptions were applicable to all living systems. In order to appreciate fully Shotter's concept of social ecology, we will briefly explore Prigogine's contributions to theoretical and practical science.

Prigogine won the Nobel Prize in 1977 for his work in chemistry. I was able to interview Prigogine as part of this study on May 14, 2001, in his office at UT, Austin. The first thing that Dr. Prigogine said to me at the start of the interview was, "The question I have always been interested in is this: Are we in it or not?" What he meant and continued to explain was that theoretical positions had been taken in the interests of objectivity that led to fallacious mathematical and philosophical stances. Educational researchers have argued the same position,

that objectivity applied to human systems may not be the interpretive mechanism that will allow us to understand the potentials and affect change.

According to Prigogine, in all living systems, where the factors are greater than two, every moment is qualitatively and quantitatively different after every interaction that takes place in the system. Equations concerning process must take into consideration that the foundation, the context of the process, will be changing during the course of the event. It is no longer possible to consider a beginning state that leads directly to an end state. In Prigogine's view, every initial state holds within itself a multitude of factors that have greater or lesser statistical probability of occurring. Although in most cases a process will stay within a range of possible outcomes determined by initial conditions, process behavior is unpredictable. This is similar to Vygotsky's description of the ZPD, where the culture binds and controls the possibilities but only so much, after that, the interactions make many new things possible.

A correlative understanding is Prigogine's concept of *the arrow of time*. The arrow of time is the mathematical, chemical, and philosophical concept of the uni-directionality of time. Prior to Prigogine, mathematicians, chemists and physicists used theoretical computations based on what is known as the reversibility of time. Obviously, in our human experiences, time is not reversible. Prigogine's breakthrough was incorporating a human-centered understanding of development through the uni-directionality of time into a scientific analysis and description of natural processes. As Prigogine described it, the arrow of time concept requires researchers to take into consideration *change over time*. For

instance, when an action research study begins, the researcher has an agreed upon set of purposes with the host organization. As the work progresses, because the work is part of life and as Prigogine has shown, every life process builds on itself, the researcher must continuously build into her work an awareness of incremental change.

Living systems have inherent patterns and will follow those patterns until an anomaly is introduced. After the introduction of a new phenomenon the system will fluctuate until it finds a new sustainable pattern and then will continue to grow. I believe that we will see evidence of this type of growth in social systems because social systems are living systems, aggregates of individual lives interacting, creating larger, living systems.

The next subsection in this section on conversational reality will discuss systems theory in more detail.

Systems Theory

Ludwig von Bertalanffy (1975) was a refugee from Nazi Europe who came to live and work in the United States. Working in biology, using assumptions similar to Prigogine's, Bertalanffy developed the organismic theory, the theory of open systems, and general systems theory (Davidson, 1983). Systems theory described the internal consistency of systems, their interrelationship with other systems, the self-regulatory nature of living systems, and the freedom inherent in growth processes. Bertalanffy showed how the smallest alteration in the pattern of a system's process could lead to enormous alterations in the system. Lorenz's (1993) famous example was based on his

experimental computer models of weather patterns. Lorenz claimed that, when a butterfly flapped its wings on one side the earth, some time later, on the other side of the earth, a storm emerges. This statement refers to systems theory's poetic recognition of the connectedness of all activity. All systems in which human beings are participants are affected, not just superficially but radically, at their root, on ontological, definitive levels, by every spoken and non-spoken act. "A sensitive dependence on initial conditions" was Bertalanffy's description of how system dynamics function and it was also a guiding principle I was able to use to help me remember that small, caring, relational, discursive activities could bring about significant change.

Most action research projects, including this one, take place in large organizations. Schools are complex organizations. How can an action researcher control this environment? She cannot and it is important to remember that the goal is not to control the situation, but to affect circumstances in such a way that conditions arise that in turn give rise to change. Any interaction can be thought of as an initial conditions. Instead of trying to bring the whole school into the project, a researcher can move as delicately as a butterfly and, if Bertalanffy, Prigogine, and Lorenz are correct, the school will be affected. It is not necessary to control a system in order to affect it, it is only necessary to participate. Participation is an axiom of democratic commitment held and articulated by Lewin (1948) and Arendt (1963) and many others. The goal of action research is to increase the possibility of social, egalitarian harmony, which is also the

necessary environment and basis for democratic practice. Action research and the work of Kurt Lewin will be more fully discussed later in this review.

In this section we have discussed a several aspects of conversational reality, the zone of proximal development, the fact that the future is unwritten and our embeddedness in interaffecting, living systems. The final subsection in this discussion will be on the analysis and interpretation of conversations.

Relational Discourse Analysis

Two theorists have influenced my understanding of the analysis of particular conversations, Diane Schallert and Paul Ricoeur. A small part of each of their theoretical frameworks will be presented in this section.

Schallert's research on classroom discourse provided an methodology for analyzing how meaning is made in educational conversations. Schallert found that certain conversational moves are likely to end conversations while others seem to promote further exploration. In the research of this dissertation, I was aware that in the moment, at the site, on the telephone, and in e-mails, I was affecting the course of the action and the meaning making of the group involved in the change process. My goal was to remain as aware as possible of the manner of my conversational contributions. My premise was that conversation was the ground from which the co-creation of change would emerge. My hope was that I would be able to gently manipulate my conversational role in order to create a feeling of personal acceptance and aid in removing perceived barriers to the change effort. Schallert's analytic procedures will be utilized in analyzing the e-mails and the

informal interviews. These procedures are discussed more fully in the methods chapter.

Ricoeur (1986, 1991, 1992) evolved his way of reasoning from an ecclesiastical training in hermeneutics. Hermeneutics is an ancient form of textual analysis often described as biblical exegesis. The premise was that holy texts required ongoing interpretation. Ongoing interpretation was necessary because human conditions change and though holy words remain holy, their application to changing human circumstances must continuously be reinterpreted. Ricoeur has developed hermeneutics beyond the exegetical.

Ricoeurian hermeneutics refers to a type of analysis that is also a synthesis. Ricoeur illustrated a way of interpretation that could be called conceptual ecology. He showed again and again how concepts that at first appear to be polarized come together when thought of as a dynamic, a wholistic synergy. He called this type of analysis the hermeneutic circle. The hermeneutic circle begins with a particular stance, an understanding, a statement, or a concept. When that stance is communicated, it takes on a form. The meaning of the communication reaches out to a listener, or a reader. The listener, reader, interpreter is also reaching out towards the meaning. Where the reaching called expression meets the reaching called comprehension, Ricoeur called *the horizon*. Ricoeur's hermeneutic circle is a description of the process that underlies Shotter's conversational reality theory. Conversations are co-creations wherein the participants are stretching themselves. Conversations are hard work.

Summary: Conversations Just-in-Time

Shotter, Vygotsky, and Prigogine proposed an interactive view of reality. In this view, a variety of personal perspectives are not inimical to a healthy human environment but rather conducive to a vital social ecology. Conversations play a pivotal role in social change because they can create new initial conditions in the mind and heart conducive to change. The future is not only affected by the way we are with each other in the present, it is actually created by how we are with one another. In fact, Prigogine, Shotter, and Vygotsky seem to imply that even the smallest human interactions might be able to influence the events taking place in the larger system of understanding and activity.

We are all frightened of change to one degree or another. However, as Harrison pointed out, learning can mitigate fear. Conversations that focus on articulating knowledge build confidence in the conversants, freeing them to engage in further experiences and further articulations. The change agent's role in this view is to manifest sensitivity, to respond to the subtle hints people share when they are ready to engage in discussion. The consultant’s primary roles are listener and responder and her primary focus the response-ability to provide just-in-time learning. The fear that conversation is not enough is ever present. But it is my assertion that educators can trust conversation, ally ourselves with Vygotsky in his view that language is the preeminent tool for social development.

The following section will continue the discussion of relationship, care, and conversation, focusing on individual, motivational, and relational stances that can influence individual development.

MOTIVATION AND LEARNING

We have seen how different theorists perceive the future being created by individuals in mutual interaction. As we all know from experience, levels of motivation affect interpersonal interaction. Educators who wish to convey knowledge run afoul when the learners are not motivated to participate. The literature on technology integration in schools pointed to a lack of positive motivation towards the proposed changes. In this section we will explore some factors that might affect participants' ability to take part in change efforts requiring interpersonal and intrapersonal growth and change.

This study takes as given that a change agent can affect the future of a given social system. The questions that remain are whether the change agent's behavior is ethical and initiates and motivates participant empowerment. All change can be considered educational but I have previously stated that I was not interested in any change effort that did not also support democratic practice. In this section the discussion of conversational reality theory and feminist psychology will broaden to include Third Force Psychology as embodied in the work of two psychologists, Abraham Maslow and Carl Rogers. Third Force Psychology was the name that Maslow (1968) gave to describe a type of psychological investigation concerned with the dynamics of interpersonal relationships. Maslow described that Third Force Psychology as describing the interpersonal, relational arena leaving Freudian psychology to describe internal states and Behavioral psychology to study observable behavior. The key elements

of Third Force Psychology discussed here will be self-determination and intrinsic motivation towards self-actualization.

The first subsection in this section on motivation will discuss Abraham Maslow's hierarchy of needs and his theory of becoming.

Self-actualization

Maslow (1955, 1968, 1971) developed a theory of becoming based on what he called self-actualization theory. It was Maslow's feeling that psychological research had focused attention primarily on the pathological, neglecting the meaning and constitution of psychological health. The purpose of Maslow's conceptualization of self-actualization was to illuminate a possible model of psychological health so that clinicians and individuals might appreciate what they were trying to develop in themselves and others. The core schema in Maslow's conceptualization he called a hierarchy of needs. In this hierarchy, needs are divided into two major categories, B-needs and D-needs. According to Maslow's theory, everyone has an intrinsic need to develop. Psychological development will follow the pattern that satisfaction of basic needs, or D-needs, will be attempted before the satisfaction of being needs, or B-needs.

The *D* in D-needs, stands for *deficiency*. D-needs, in hierarchical order are the needs for: 1) physiological maintenance; 2) safety; 3) belongingness; and 4) esteem. D-needs are motivated from an insufficiency. When we lack safety, for instance, we have a drive to become more safe. In Maslow's model, D-needs must be met before people could achieve the satisfaction of their "being" needs.

The *B* in B-needs, stands for *being*. The B-needs, in hierarchical order are the need for: 1) knowledge; 2) aesthetic pleasure; and 3) transcendence from ego-based rationality towards the realization (actualization) of interpersonal potentials in the personality. B-needs increase inversely in relation to the degree to which they are satisfied. In other words, although the need for safety and belongingness becomes greater as feelings of safety and belongingness decrease, the need for aesthetics and knowing increase the more they are satisfied.

There is no stasis point in Maslow's model. A self-actualizing person is always in the process of becoming. Maxine Greene did not credit Maslow for her famous phrase, "I am, not yet" (Pinar, 1998). But there is little doubt that she was referring to a process similar to Maslow's description of self-actualization. Perceiving change as interpersonally created through conversation and hoping to initiate and sustain a change effort in my action research study, I considered it necessary to be able to appreciate the need levels of participants. Was technology perceived by individual participants as a D-need or a B-need? How would this affect their participation and my ability to work with them?

Maslow and Rogers were acquainted with one another and familiar with each other's work. There are many similarities in the work of the two theorists. In the next and final subsection of our examination of motivation, we will focus on an aspect of Roger's work that is particularly relevant to this study, his ability to let people find their own way of doing and being.

Self-organizing

Rogers (1967, 1980) was a clinical and educational psychologist. At Teacher's College, Columbia University, Rogers studied with W.H. Kilkpatrick, a student of John Dewey's. Roger's theories concern the interpersonal dynamics of learning and therapy. Rogers believed that teachers and clinicians took too much responsibility in their relationship to their students and their patients. Rogers espoused a position of co-equal, mutual development with his patients and his students. He felt that it was important to acknowledge his own search for knowledge and self-understanding. If he was to be fully present as a human being in interaction with someone, he asserted that he had to acknowledge his true self and not play a generalized helping role.

Rogers did not use the term *self-organizing systems*, but his descriptions fit observations of system theorists that human systems are self-organizing. Rogers believed that genuine psychological help and relevant teaching required the facilitator to relinquish control of the process and acknowledge that the student or the client must do the work. Rogers encouraged people to actualize their potential in the context of a co-therapeutic relationship. Rogers thought he ought not to tell people what to do or how to negotiate their challenges, but rather, by not telling people what to do, but continuing in conversational relationship with them, he was supporting them in finding their own solutions. He was able to show that human beings, acting as individuals and in groups, are capable of organizing themselves into functional and healthy systems. Situation-based, constructivist, and discovery learning models are based on a similar principle, that

knowledge gained through autonomous activity is more resilient than any model of learning based on the transfer of information.

Summary: Self-determination

Change in the high school curriculum would be my attempt to support the self-actualization of others, but would require that I engage in the change process, allowing myself to learn as well as teach. Self-actualization, then, would be a collaborative process. Seen from the vantagepoint of the particular, the self-actualization of individuals would be the critical consideration during the change process. Seen from a generalized point of view, the self-actualization of the arts program through the use of technology innovation would be the hoped-for result of the interpersonal, collaborative, self-actualization of individual understanding and skill.

Dewey (1916) and Tarrant (1989) considered educators responsible for aligning their pedagogy with democratic practice. It seemed to me that, in order to create an atmosphere that would not only permit but encourage democratic practice among participants, I would need to exercise care in my conversations. This care would have as its primary purpose to illustrate to my co-conversationalist that I was interested in her constructs and that I had faith in her ability to achieve what she wished to achieve. I did not wish to fake consideration for others but to genuinely find in myself a democratic citizen's respect for another citizen cooperatively engaged in creating an educational environment we shared. I was free to be as sad or as silly as I liked, to contribute ideas, and share knowledge. I was bound, however, to be patient with other people's sadness and

silliness, to seriously listen to their ideas, and to honestly learn from them when they sought to share knowledge with me.

My hope was that through the exercise of self-reflection and self-discipline in my conversations, I would make room in my own understanding for the generation of a group understanding. The essence of self-actualization is the ability to transcend our ego-needs to be right and in control in order to allow situations to emerge in which we take part fully and wholeheartedly and yet are open to being changed by what others are bringing to the situation. Since my goal was partly to increase the participants' comfort with communication technology, and part of that process is to satisfy D-needs such as safety, belongingness and esteem with regards to sharing information and knowledge, I wanted to participate in making us all, myself included, feel safe and comfortable. If I could leverage my role as expert by consciously sharing expertise with participants, perhaps our self-determination would emerge, individually and as a group. And self-determination is a powerful motor for autonomous learning.

Autonomous learning and independent thinking are hallmark concepts of adult education theory. The next section will explore these concepts, how they are considered elements of democratic practice, and how they can be developed using care and relational discourse.

ADULT EDUCATION

Introducing change into an educational institution is essentially an act of adult education. The change agents are attempting to convert adults to a new set of behaviors, in other words, the technologists want the teachers to use the

technology. In Farhad Saba's article, *New Academic Year Starts with Controversy over the use of Technology* (1999), faculty anxiety and lack of institutional support staff are blamed as the culprits in the failure of technology integration in the school. Saba's study reported yet another example of teacher resistance to technology. In this case the resistance was attributed to individuals feeling insufficiently trained and insufficiently supported by technicians. Saba pointed to the cognitive paradigms that were operative in the environment as holding back teacher participation.

It is tempting to wonder if perhaps the symbol systems in the cognitive approaches to technology were incompatible. Perhaps what Saba was noticing in terms of cognitive approaches could be characterized as a clash of symbolic representations between what was occurring and what people's expectations were about how things ought to happen. For instance it was conceivable to me that the cognitive paradigms that Saba reported and the use of systemic solutions Saba characterized as inappropriate read to me as symptomatic of culture clash or a meeting of incompatible narratives. The rigidity of the school system that the technologist perceived in attempting to integrate technology into the school, might also be perceived as a clash between two sets of rigidities. My thought, reading the article, was that perhaps the technologists were failed to perceive their own thinking as paradigmatic. Perhaps the technologists also felt anxiety and lack of institutional support, but it would be humanly and professionally difficult to write that in a research article unless the researchers were committed to self-reflective qualitative research and the ethic of care.

Adult education is a meeting of peers around real life issues, problems and situations. Research on change efforts that involve peer learning might benefit from the researcher examining her own relational research practices at the same time that she is describing the situation, the site and the participants. The first subsection in this section on adult education will explore elements of adult education that are applicable to change efforts involving adult peers in educational situations.

Adult Learners

Realistically, entering the high school as a technology consultant and university-based researcher put me definitively in the role of expert teacher. As a teacher of my peers, the issues I faced came under the theoretical purview of adult education. In Brookfield's (1987a,b,c, 1985) extensive writing on adult education. He identified four main elements of adult education, and admits that every one of them is problematical. Experiential learning is one element that Brookfield identified. Experiences were not hard to come by in the daily life of a high school, so we were sure to have plenty of experiential learning. As we know, Dewey was an advocate of experiential learning.

Learning to learn is another element that Brookfield identified as an important factor in adult education. I was expecting there to be significant issues surrounding learning how to use software and learning to feel comfortable with the oft-noted fact that technology changes very fast and learning in that field is practically a constant. Learning to learn about technology would likely be a factor in this study. Learning to learn is well covered in the literature on metacognition

that I assume is familiar to the reader (Metcalf, 1994). Essentially, the educational literature on metacognition asserted that higher level, or second order thinking enables the learner to take control of her learning and become a more independent learner. Second order thinking is also sometimes known as thinking about thinking.

Self-directed learning is the third element that Brookfield stated facilitates adult learning. Self-direction is the ability to chose one's own learning path. For the adult educator, it is not always a simple task to share enough information with the learner about a domain so that the learner is able to chose her learning path and tasks. Perhaps, in practice, self-directed learning is an ideal form that is not necessarily desirable as a complete reality. Rather, learning might best be thought of as something that occurs in relationship, that the growth in learning to learn is in the direction of self-direction and self-actualization, without losing sight of the significance of others.

Brookfield's final criterion for adult learning is critical reflection. I did not intend to teach participants critical reflection, but I was committed to practicing it myself. Critical reflection is the ability to withdraw from the practical, strategic type of thought that is closely connected to action, and to concentrate on internal, motivational, affective and theoretic aspects of one's own schema, symbolic systems, and drives. Since I intended to be in conversation with participants, I was certain that they would hear some of my self-reflections as we worked together.

Brookfield has been active in keeping the work of Eduard Lindeman available to adult educators and scholars. His book *Learning Democracy: Eduard*

Lindeman on Adult Education and Social Change (1987), explored Lindeman's thought and work. I would like to aid the promotion of Lindeman's ideas by briefly describing who he was and the kind of education for democracy that he promoted.

Eduard Lindeman was himself the product of adult education. There is some evidence that Lindeman was almost illiterate when, in 1902, at the age of 22, he entered a special program for at Michigan Agricultural College (p. 2). Eventually, Lindeman would teach at the New York School of Social Work (later the Columbia School of Social Work), the New School for Social Research in New York City (where Hannah Arendt also taught), Temple University in Philadelphia, Stanford University in California, and the University of Delhi. He was Chair of the American Civil Liberties Union Commission on Academic Freedom. He wrote four books, one being *The Meaning of Adult Education* (1926). Lindeman's career is astounding considering that he learned to read as an adult.

Perhaps because he was himself an adult learner, Lindeman's concepts and theories of adult learning are passionate and, I write now from 20 years as an adult educator myself, accurate. Lindeman was a friend and colleague of John Dewey's and he shared Dewey's belief that learning is now, that learning takes place in the lived moment experienced between individuals. Both Gilligan (Brown & Gilligan, 1992) and Arendt (1976) describe similar constructs. According to Lindeman, because adult learning occurs in lived moments, discussion is the primary means to use in adult education. The validation of

discussion is reminiscent not only of Dewey's constructs, but also of Freire's (1993), Vygotsky's (1962), and Shotter's (1993a). All of these educational theorists have asserted that the teacher must engage fully as a collaborator in the educational moment, to participate in discussion with the learner.

Lindeman, like Freire, attacked forms of adult education that treated learners as passive absorbers of information. He did not use Freire's term, assistencialism, but he articulated the same perception that the assumption of intellectual superiority and instrumentalism inherent in teacher-centered curricula reinforced authoritarianism and should not be tolerated. Lindeman believed, as did Dewey, that the ultimate purpose of education in a democracy was simply democracy itself. The content of the learning situation is determined by historical circumstances. The means, democratic practice, evolves in style but remains the core methodology of progressive education. Lindeman perceived democracy as a living, growing social organism, originally made possible and constantly recreated through the interactions of individuals pursuing self-discovery in the context of their peers' pursuit of self-discovery. Lindeman asserted that self-discovery is the same as learning.

Although Lindeman did not write about self-actualization, his understanding of the purpose of adult education can, with no fundamental theoretical loss, be thought of as self-actualization in the context of democratic responsibility.

In the next subsection the discussion will widen to include the social context of adult learning. We will be concerned with how the social, structural,

context influences learners and how learners might in turn take responsibility to influence that environment.

The Self Guiding Society

Amitai Etzioni's (1951, 1968, 1971) perspective was more structural than Lindeman or Brookfield's. Etzioni studied and described how structures and roles within organizations influence the dynamics that affect the experience of people working in those organizations. Etzioni examination of the forces acting on individuals owes much to Lewin's field theory of psychology and group dynamics. In these theories, the individual has internal and external forces acting on her and a consultant must try to assess the nature of these forces. Then the task is to restrict the negative impact of forces so they cease restraining active participation and to increase the strength of those forces that support personal and group development.

Etzioni is also the founder of the Communitarian movement that seeks to create a national conversation on the role of community in democracy. Etzioni's focus was to encourage local responsibility. His point, not yet covered in this literature review was that the democratic concept of rights is linked to the democratic concept of responsibility. Rights, in this sense, result from the exercise of responsibility. Many educators are familiar with learners becoming more able when they are encouraged to take more responsibility. Facility can be compared to rights and experience can be seen the responsibility through which facility is earned. The democratic process requires the active participation of its members, this is a responsibility. This active participation in turn creates an environment in

which rights are respected. Applied to this study, Etzioni's theory might look something like this: teachers who wish to have more computers in their classrooms might consider becoming active participants in computer-supported learning activities. This active participation might create a climate in which their right to more computers would be recognized and satisfied. This possibility was explored in the study.

The next subsection returns to focusing on the individual adult learner. If self-actualization is conceived of as a learner's right, then perhaps self-revealing can be considered the corresponding responsibility. The following subsection is the last in this section on adult education will consider Arthur Comb's construct of self-revealing as a possible conversational catalyst for self-actualization.

Self-revealing

Arthur Combs (1979, 1982, 1999) has written extensively on adult education. His perspective was one of person-centeredness. All learning, Combs asserted, comes from perception and perception is our most unique expression of individuality. Combs' ideas converged with Maslow's, whom he often credited. Combs was also influenced by systems theories and asserted that people are open systems, constantly exchanging with the environment. Combs stated that teachers of adults must be "self-revealing" (1982, p. 172). Here we can see the influence of Carl Rogers. A teacher of adults, in these theoretical frameworks, is meant to co-engage in learning. Combs would agree with Greene's statement, "I am not yet."

Being vulnerable is not an easy task in a professional situation, and consultancy is a professional relationship. The distinction between the private and

the public that has permeated our societal structures seems to be breaking down but how do we protect ourselves if there is no distinction between public and private? In theory, these are terrible fears to contemplate, but in practice, relationships are rarely completely, purely, in any one particular mode. We more often find ourselves in a turmoil of forces, as Lewin described, pulling us in a variety of directions and we attempt to steer a course that meets our understanding of our selves, our values, and our circumstances. In my experience, self-revealing can be a powerful tool but can also overwhelm the learners. The purpose of self-revealing is two-fold, to encourage an appreciation of one another as flawed and yet accomplished adults, and to mitigate against authoritarianism by ensuring that the educator is vulnerable to the learners. When self-revealing itself becomes oppressive, it is no longer meeting its purposes in an educational situation.

When I was very young, we used to play a game at the beach. One person would start digging a hole in the sand, as deep as one could. The other person would start digging another hole, directly in the path of the first hole. Eventually, the two digging hands met under the sand and a tunnel was formed. How do I convey except to state the giggling joy when two sets of wiggling, struggling fingers met under the sand? Often, as I have worked on this study, I have had the image of science and math educators' fiercely digging towards a justification of their purposes, while the arts and humanities educators are doing the same from an opposite direction. In my imagination, information technology is the tunnel where the hands will join.

Summary: Lifelong Learning

No one theorist is given credit for articulating the concept of lifelong learning. Lifelong learning is an idea that emerged, not from theory so much as from a description of reality. The learning organization is a nomer applied to business organizations that ask personnel to commit to a perspective of growth and change. However, the learning organization can also be applied to us all in every walk of life. In the Darwinist, evolutionary view, all organic systems must continuously adapt or die. Continuous adaptation is learning, but it is a D-need-motivated kind of learning. The type of learning that the learning organization and lifelong learning promote is B-need-motivated learning. Educators who use the terms *lifelong learning* and the *learning organization* are promoting an open systems view of education. In this view, formal education is perceived as a small, deliberated element within an ongoing, living, all-encompassing, process.

Many adult learning theorists agree that discussion is a key factor in adult education. The educational dialogue called discussion is described as a co-equal engagement in a process of self-discovery whose purpose is both to create growth in the individuals involved and to support the growth of the group as a whole. The benefits of discussion skills last a lifetime and are as essential to lifelong learning as the ability to read and interpret what has come before. An active citizen in a participatory democracy requires the skill to interpret the past through engaging in communication with the artifacts from that past. A democratic citizen also has the right and the responsibility to bring her understanding into public, present, shared arenas and the skill required to do so is discursive conversation.

The context for conversations is the organization from which the participants' roles take their definitions and in which their relational experiences are embedded. Theoretically, if social systems are living systems, then participation by individuals mutually interacting ought to influence the enveloping systems as much as the individuals themselves.

We have covered art theory, conversational reality theory, motivation theory and adult education theory. In the next section we will explore action research methodology and principles.

ACTION RESEARCH: METHODOLOGY AND PRINCIPLES

Action research and the ethical system underlying participatory democracy developed from the theories of social justice described and promoted by enlightenment scholars as early as the 17th century. Spinoza (1883) can be considered the first enlightenment scholar although, in the realm of educational discourse and historical analysis, Kant (1965) is usually credited with the origins of a philosophy of the ethical society. Spinoza wrote and lived for religious freedom. The world of 17th century Europe was one filled with religious warfare and violence for the sake of religious doctrine. Spinoza asserted that god and nature are one and that all different religions can co-exist. In a sense, this is the first western European assertion of pluralism. Kant is credited with the origin of an intellectual, empirical, logical, and epistemologically oriented argument for the fundamental validity of ethical behavior. The task Kant set himself was to explain how some people might feel a moral imperative when logic leads to the unmistakable conclusion that acting exclusively in one's self-interest is the way to

the good life. Kant's critique of reason is that it is only able to come to the conclusion of selfishness. And yet many of us feel the drive to work cooperatively and for the good of the group; Kant believed that this was a different sort of logic that did not work the same way as the logic that leads to what we now call a utilitarian view.

Recalling the discussion concerning Gilligan's assertion that there are two moral orders, we can see that this concept goes back at least as far as Kant. I would assert that what Gilligan called the justice orientation is what Kant was describing as pure reason. And that what Gilligan called the care orientation is the first articulation of an internally consistent conceptual basis for exploring the dynamic structures of Kant's concept of the moral imperative. Further, the discussion of Ruddick's assertion that mothering and the ethic of care could be the source for an articulation of values that would further large scale peace efforts, dovetails with the earlier work of enlightenment scholars to define and structure the ethical society.

Intellectuals in twentieth century Europe were faced once again with what seemed to be interminable warfare. Both world wars presented intellectuals with challenges to cherished perspectives. Hannah Arendt, Ernst Cassirer, and Kurt Lewin, three European intellectuals who lived through World War II posed the particular challenges that are relevant to my work. These thinkers were all concerned with explaining the social and psychological damage perpetrated on society through the use of technologies such as gas chambers and atomic bombs. They each contributed work that described, explained or ameliorated the

confusion and psychological devastation perpetrated on society through the misuse communications technology: the media manipulation of Nazi and Stalinist propaganda and censorship. All of them wrote on the potentials and pitfalls in the re-organization of social groups through the manipulation of linguistic-based meanings. They each made significant contributions to our understanding of the metaphoric or symbolic nature of meaning and meaning making.

This section on action research will begin by examining ideas of Hannah Arendt, Ernst Cassirer, and Kurt Lewin as they affect action research principles and methodology. The section will conclude with a subsection describing some of the ideas of Oscar Mink and Ronald Lippitt as they apply to group knowledge.

Thinking

The ideas of Hannah Arendt (1954, 1964) were formative in my education as a young adult. The application of her theories has been foundational in my work as an educator. I adopted the concept, from *On Revolution* (1963), that lasting social change emerges out of practical application and not from inspiration, guidelines or law. I have experimented with the concept, from *The Life of the Mind: Thinking* (1978), that thinking is an act inherently ethical when it is inherently non-utilitarian.

Arendt's idea of thought is close to Vygotsky's conceptualization. Vygotsky (1962) maintained that thinking is conceptual thought capable of handling both analysis and synthesis of, within, or among a variety of concepts. Other activities often thought of as thinking, for instance generalization, and classification, belong to earlier stages of cognition. Arendt's conception is that

thinking is a pure exercise, during which the mind follows its pursuits, without the necessity of solving any practical problem; thereafter, when called upon to solve particular problems, the mind can quickly extrapolate relevant concepts and apply them to the problem at hand. Arendt's contention was that this type of thinking is inherently ethical and stood in contrast to the "banality of evil" which consisted of a type of rule abiding regardless of the large context in which those rules placed the participant. Arendt coined the term the banality of evil in her book *Eichmann in Jerusalem* (1977) to describe the supreme ordinariness of the way the Nazi Eichmann thought about his duties and what he had done. He had been told what to do and he did it. Perfectly simple. Arendt's contention was that thinking creates complexity, what we might call a relativity, and this complexity makes it impossible to take part in the banality of evil. And, the first point mentioned, takes us back to the ideas of Dewey and Tarrant, that democracy is a lived experience.

Arendt is considered a neo-Kantian. Her approach to political science was an unreserved approval of plurality and multi-culturalism. For me, she is the most down to earth philosopher whose appreciation of the relationship between concrete, daily life and historicity is unsurpassed by any other writer. Arendt positioned herself firmly against totalitarianism in all its forms. Her thought and theories support and illuminate attempts at social change to preserve and promote democracy, and individuality.

The next subsection in this section on action research will describe the theoretical perspective of another neo-Kantian, Ernst Cassirer and its applicability to conversational analysis and interpretation.

Symbol Systems

Cassirer (1955a,b,c,d), was also a neo-Kantian. He began his intellectual pursuits examining the history of science but soon came to believe that symbol systems underlay all historical understanding. He is credited with originating a philosophy of symbolic forms. Cassirer was a refugee from Nazi Germany. He taught briefly at Oxford and then became a Swedish citizen. Cassirer came to the United States to teach at Yale in 1941. He taught at Columbia and at UCLA before he died in 1945. It was Cassirer's contention that all meaning is made on a foundation of symbols. This developed from Kant's description of the formal organization of mental constructs. Later research (Lakoff, 1980) has explored the metaphoric and allegorical nature of meaning making.

The salient point for this study was the active presence in Cassirer's work of symbolic systems in cognition. Symbol systems underlie operant schema through which the conversations took place. In order to analyze the conversations with a view to organizational change, my attempt was to decipher the fundaments of the symbol system used by the participants. In the midst of the sturm und drang of communicating in groups for organizational change, sorting out where people are coming from can be aided not only by understanding the type of logical schema they, but by attempting to interpret the symbolic bases of their mental representations. Often the symbolic basis of a someone's orientation is related to,

or even determined by, the pedagogy and epistemology that they teach. Often there is an affinity between how people like to organize their minds and the subject area that they choose as their concentration. This is reminiscent of Gardner's and Hirst's views discussed in the section on art education theory. Symbols are harder to alter than narratives. When participants hold personal narratives that are thwarting their full participation in the change effort, these narratives are fairly accessible to the change agent through conversation (Gersie 1990, 1997). However, if a participant's schema derive from symbolic representations inimical to the proposed change, it is extremely difficult for the change agent to affect change solely through conversation. This type of reasoning will figure in the data analysis of this study.

The next subsection in the section on action research will discuss the ideas of Kurt Lewin, the founding father of action research.

Social Organization

Kurt Lewin is credited as the founder of action research. Lewin (1935, 1936, 1948, 1951), like Arendt and Cassirer, was a refugee from Nazi Germany who came to live, work, and teach in the United States. Lewin introduced the idea that researchers not only have the potential to influence the events that they are studying, but the moral imperative to do so in those cases when our knowledge can improve the lives and circumstances of participants. (Nussbaum 1998) Lewin's perspective was that individuals experience their situations as filled with forces acting on them. The aim of an action researcher is to try and understand the complexity of forces acting on individuals in order to facilitate social realities

beneficial to both the group and the individuals. Lewin did not use the terms social ecology or systems thinking, but his methodology required a similar examination of intersecting, overlapping, and inter-relating systems.

With Lewin as its philosophical father, action research has always maintained a socio-political agenda of increasing social harmony and disabusing authoritarianism. However, action research does not necessarily share critical pedagogy's purposes of teacher empowerment through the illumination of oppression described in terms of neo-Marxist economics. The critical perspective is that radical intellectual conversation can free the minds of oppressed people so that they may come to view their situation as oppression and then take action to ameliorate the situation.

Although there are aspects to the theoretical stance of critical pedagogy, particularly in the work of Freire (1973, 1989, 1993, 1994, 1998) and Apple (1979, 1982), that are illuminating and inspirational, because of its essentially polarized and politicized methodology, it was not suitable for the kind of action research I wished to pursue. I did not interpret action research as revolutionary in an aggressive sense. I interpreted action research as a call to participate as an engaged individual with a supra-personal agenda of contributing to democratic process. The approach will be more fully described and explored in the results chapter.

The emphasis in action research is on process: when an action researcher is asked to enter an environment, it is for the purpose of social change. However, an action researcher is not the same as a labor organizer. An action researcher,

working with Lewinian constructs is attempting to clarify and ameliorate social inequities through the participation in and analysis of social praxis in the environment.

The last subsection in this overview of action research methodology and principles provides a brief discussion of groups generating knowledge and change in organizations.

Group Knowledge

Oscar Mink and Ronald Lippitt have contributed greatly to our understanding of many aspects of organizational development, this section will consider only one of these, how groups learn.

Mink (1970, 1979, 1993a,b,c, 1994) provided inspiration and guidance for the coherence of this action research study. Mink's work in organizational change, the learning organization, and knowledge management, all reinforce the concept that personal development works synergistically in groups. Mink's concept was that change in organizations relies upon the change agent's ability to identify and support individuals in the organization. The support must simultaneously manifest in the form of an attitude of acceptance toward individuals as people and in concrete, pragmatic efforts to accomplish group-defined goals.

Group synergy emerges, according to Mink, when intersecting human systems are able to support each other within the context of the larger organization. For individuals to become self-organizing in this manner, they must feel accepted and they must not be too severely thwarted by circumstances. As far

as I know, it is impossible for human systems to achieve continuous support or for change agents to completely remove the barriers thwarting emergence. But in my experience, and in this study, there were many examples of these two factors successfully supporting technology integration.

Lippitt (1978, 1982) has collaborated with both Mink and Lewin. One of Lippitt's most original contributions was in the creation of the T-group model. T-groups are training groups, small groups of people who come together in an organization in order to work with the change agents. The T-group members, once they have been through the process, facilitate change throughout the organization. T-groups are not simply seminars. Lippitt's concept of the T-group is of a group that actively participates in creating the change model. Through conversation and experience, the T-groups with the guidance of the external consultant, co-create solutions. According to Lippitt, T-groups act as organizational microcosms. Once the T-group members have understood the process and made significant meaning together, the rest of the organization is inevitably changed. There is a notable similarity between the premise underlying this technique and the systems theory premise of sensitivity to initial conditions. The small group is the butterfly whose actions create new initial conditions. The new knowledge generated in the T-group acts as a strange attractor creating a new focal point around which organizational patterns emerge. The T-group technique was used successfully in labor negotiations and is credited with initiating the organizational change movement. This action research study used a form of T-group methodology. There was a small group of active participants. These few people worked together

to change their ideas and their practice. Their actions effected change in other parts of the school.

Summary: Self-organizing Systems

In his article, *Action Research and Social Movement: a Challenge for Policy Research* (1993), Stephen Kemmis described action research as a form of social action creating new social practices by initiating discussion and shared experiences. According to Kemmis, the aims of action research is to help people to understand themselves as agents of social change by supporting activities in which they can experience their agency. The theories discussed in this section have ranged from historical interpretations of democratic, social action to the symbolic organization of knowledge. In between were the theories concerning group action and the way groups can learn and collaborate for the purpose of organizational and personal learning and self-actualization. All the theories support the idea that people have within themselves the ability to create new patterns and options. The historical thrust of the work covered in this section is towards greater autonomy and a coordination of principles of self-actualization and social responsibility.

The last two sections of this literature review are concerned with the application of art and technology into educational environments. The final section will consider research and theories on the integration of technology in schools. The first section will cover some recent research on the practicalities influencing how art education occurs in schools.

ART IN SCHOOLS: PRACTICE

This section on practical aspects of art education will describe a variety of research on art education. The first subsection, art in the schools, discusses studies that found conflicting paradigms operating in school environments and how art loses when pitted against other academic subjects. The second subsection will report some evidence that student participation in art can contribute to improvement in academic achievement. the final subsection in this section will describe research studies that indicate that the strength of an art program in a school will depend on significant community support.

Art in the Schools

An advantage of working within a qualitative research design is that one is permitted, perhaps even encouraged, to use personal experience as knowledge. Therese Quinn's and Joseph Kahne's article (2000), *Wide awake to the World: the Arts and Urban Schools. Conflicts and Contributions of an After-School Program* (2000), reported issues that friends of mine who teach art in Manhattan have confided to me in person; my friends' anecdotes confirmed Quinn and Kahne's assertion that some urban schools were doing away with arts altogether. Because urban schools are pressured to increase math and English literacies, curricular decisions were made that time spent in art is a waste of time when there needs to be an improvement in basic skills. The research that reported the beneficial relationship between art experiences and other academic proficiencies has either been unknown or ignored. Quinn and Kahne asserted that there need to be more policies and practices that acknowledge the importance of art in the schools. They

stated that, nearly half the schools in the United States do not have full time arts teachers. And, tragically, they reported that, Eisner's position notwithstanding, the current national emphasis on standards and standardized testing has forced the elimination of the arts in many urban schools.

Quinn and Kahne reported their case study of a multi-year, after school program whose effectiveness was undermined due in part to technical challenges, and in part due to unaddressed conflicts regarding values. Interestingly, these issues are precisely the ones that I have found challenging in my study. The work of Argyris and Lewin, discussed in the action research section of this literature review, will carry this discussion of unaddressed conflicts further. The technical challenges facing the art department will be addressed in the results chapter.

Yaroslav Senyshyn's article, *The Passionate Teacher and the Curriculum Police: Perspectives on Modes of Subjectivity and the Curriculum as Art* (1999), confirmed Quinn and Kahne's assertion that artists in the schools attempting to provide creative exploration ran afoul of school staff who were emphasizing control, order, and academic achievement. Senyshin characterized the struggle as between educational authoritarianism and creative freedom and suggested that the curriculum itself could be viewed as art and handled more creatively.

The following subsection will discuss art and academic performance.

Art and Academic Performance

Eliot Eisner has been undaunted in his support for the arts in education. He tackles all criticisms that are thrown in the way and responds elegantly and with practical solutions. Eisner has not only focused on the issues of assessment in art

education, he has also been vocal in his assertion that schools as a whole lose when administrations cut funding for arts programs (1999). Eisner (1998) has written that participation in the arts improves student academic performance. Although this is good news and important information, I would contend that art is an academic subject. Each art form requires the exercise of at least two of Gardner's intelligences and two of Hirst's domains; that this intrinsic multi-disciplinary aspect of art means that the disciplines stretch cognitive abilities beyond simple polarities and hierarchies and forces the mind to create syntheses.

Joyce Riha Linik, in her article, *Picasso in the Wilderness* (1999) reported that not only does participation in art raise student test scores, but participation in art causes a rise in self-esteem. In *Gaining the Arts Literacy Advantage* (1999), Laura Longley built on Eisner's concepts of assessable skills in the arts and the beneficial effects of arts practice on academic achievement. She further asserted that there is a set of abilities called art literacy and that this literacy in the aggregate improves student learning, cognition and educational achievement. She felt that all public schools should give students what she called the arts literacy advantage.

The next subsection will discuss research studies that indicate that community support is a necessary element in a successful arts program.

Community Support

In his article, *Imagineering Future Learning Designs* (2000), Don Glines contended that communities' attitudes have an influence on what is taught in schools. He suggested that what is needed is the development of new social and

educational, person-centered paradigms. In order to create new paradigms or even to communicate new paradigms, Glines suggested that what was most needed were innovative leaders and imagineering. Imagineering he described as a technique by which people co-imagine a future that they would like to experience.

Glines' position is that communities must first have a view of education that supports art and creativity before schools will be able to accommodate these domains of experience in their curricula. His position is reinforced by findings reported in two articles by Harriet Maya Fulbright and Richard Deary, *Make Room(s) for the Arts* (1999) and *The Arts Advantage* (1999). Fulbright and Deary, in a two-year study of arts education in districts in four states found that community and district support were the two most critical factors in the success of an arts curriculum. In fact, often communities extended space as well as resources to support arts programs in the schools.

Summary: Strength in Numbers

Art education research indicated that communities were the source of strength for arts programs in schools. Studies revealed a beneficial relationship between participation in art and academic achievement. However, studies also reported that communities of teachers and students within some schools were resistant to supporting art in academia, perceiving art as taking time away from more academic pursuits. Additional factors reported to support art in education were funding and assessment.

In the next and final section of the literature review, I will continue to discuss curriculum issues, but from the perspective of information technology integration efforts in education.

TECHNOLOGY IN SCHOOLS

To reiterate, the aims of my study were to improve the school's web site; to explore conventional notions of "technology refusal" in schools; and to co-create a conceptual space from which art and technology would emerge in partnership.

The first subsection of this section on technology integration will be a discussion of the nature and purpose of the World Wide Web. The second subsection will discuss several recent research studies in the area of technology in the schools. The third subsection will examine some of the ideas put forward in Wolhee Choe's, *Toward an Aesthetic Criticism of Technology* (1989).

Connectivity and Collaboration

The World Wide Web was invented by Tim Berners-Lee (1999) who then gave it to the world so that no one could ever own it, so that everyone would have the right to work with it. Berners-Lee received his doctorate from Oxford in classification systems.

Berners-Lee's created the basic elements of the WWW at the Conseil Européenne pour la Recherche Nucleaire (CERN), a High-Energy Particle Physics lab, in Geneva, Switzerland. Physicists come from all over the world to work with the particle accelerators (these extend for miles under the mountains

and are invaluable for understanding the behavior of sub-atomic particles). The challenge was to enable the scientists working at CERN to share their knowledge even though their computers were using all different kinds of operating systems and could not directly decode one another's work. The solution was the creation of HTML, hypertext markup language. The development of hypertext and the WWW is a fascinating story but not particularly relevant to this study. However, the originating concept to facilitate collaboration, Berners-Lee's beneficence to insist that the web be free and available to everyone, and his concept of a world-wide shared mind is the inspiration that delights my hopes. This inspiration led me to a concept for technology integration in the arts program that I thought would succeed: to improve the school web site. (See Appendix 3)

In his book, *Weaving the Web* Berners-Lee stated, "The vision I have of the web is of anything being potentially connected to anything. It is a vision that provides us with new freedom, and allows us to grow faster than we ever could when we were fettered by the hierarchical classification systems into which we bound ourselves" (Ibid., p. 1). I interpreted this statement as a call for educators interested in using the web, to explore collaborative and heterarchal organizations of material, information, and relationships.

The following subsection describes five recent studies in technology education.

Research in Technology Education

This subsection will discuss five studies and articles in technology education and integration that influenced this study: 1) Steven Hodas',

Technology Refusal and the Organizational Culture of Schools (1993); 2) Fernando Cajas', *Research in technology education: what are we researching? A response to Theodore Lewis* (2000); 3) Petros Georghiades', *Beyond conceptual change learning in science education: focusing on transfer, durability and metacognition* (2000); 4) R.T Pithers' and Rebecca Sodden's, *Critical thinking in education: a review* (2000); and 5) Richard Hansen's, *The role of experience in learning: giving meaning and authenticity to the learning process in schools* (2000). I will briefly report pertinent issues from each of the articles and then move on to the final subsection in this section on technology integration. The final subsection will describe an aesthetic approach to technology.

Technology Refusal

Reading Steven Hodas article, *Technology Refusal and the Organizational Culture of Schools* (1993) challenged my intellectual curiosity. Because this article was so critical to my thinking and so valuable in my understanding, I will examine some of his points in depth in this subsection.

First, Hodas asserted that technology is "never neutral," so the integration of technology carries with it a set of practices that will either be in alignment with or contrary to the organization of the school. Further, technologists dream of technology changing the way schools work and they are continuously disappointed by not taking into consideration the fundamental stability of the school organizational patterns. Technicians, according to Hodas, are hoping to make schools efficient and they consider this efficiency a feature of enlightenment. Technicians also, according to Hodas, make the assumption that

schools are also technologies and can be changed in a similar fashion. I found all these points were in line with my experiences with technologists and my experiences as a consultant in schools when I taught television production (another kind of technology).

Hodas characterized school cultures and organizations as being self protective, extremely hierarchical and profoundly conservative. But my previous experiences introducing television technology into the schools as an artist-in-the-schools had not been that schools were cultures were self protective, rather they were centers of intense gossip and constant social, emotional, and political manipulation. In my experience, school cultures were not homogeneous and did not act in self-protective interest. In fact, periodically one did hope that schools would act more consistently in their own interests, they seemed so often to take the brunt of every strong breeze that blew across the political landscape. Schools themselves did not seem to me to be extremely hierarchical. However the bureaucracy that runs schools and generally handles the funding for schools did seem extremely hierarchical and with too many levels to the hierarchy, a problem endemic to corporate capitalism in general. The conservatism of schools was even a more problematic statement. Although the curriculum is often in the hands of conservatives, in my life I have experienced both as a student and as a teacher periods of time when the schools take the lead in progressive social and political action and discussion.

Hodas' characterization of teachers I also found problematic. He characterized teachers as less intelligent than technologists and therefore less

innovative. He used the criteria of how much teachers read as how intelligent they were. I have a hard time believing that we have an accurate statistic regarding teachers' reading habits. Further, Hodas asserted that teachers were: a) comfortable with the premises of conservative educational bureaucracy; b) without other career options; and c) for those who felt a "call" to be teachers, soon rid of that idealistic stance and given to a drudging trudge to retirement. I must have been hanging out with very different teachers than Hodas was. The teachers I have known have not all been thrilled with their role but most of them are dedicated, intelligent, caring, hard working, self sacrificing, progressive in the sense of believing in the future, and aware of choosing their career over other options available. Some teachers I have worked with have changed my life in profound ways. Many teachers I have worked with have taught me to see deeper into the world as it lives in the people I come in contact with. Many teachers I have worked with have challenged me to open my mind and my heart to the teaching the world affords.

Hodas' view of the "culture of technology" and the "culture of refusal" was illuminating and corresponds closely with my experiences with corporate and academic instructional technology. Hodas asserted that computers were developed within the factory model of industry and work. Further, he contended that the basic purpose of educational technology was to facilitate the transfer of skills and information. "The culture of refusal," in Hodas' view, is a "struggle over the soul of the school…[a struggle between] self interest and self definition." This last point was fascinating to me and I wanted my study to add confirmation to this or

find reasons to deny it. Would I find that teachers perceived technology as soulless? I certainly do not feel that technology's role in education is simply the delivery of pre-packaged information but I have seen and read about other technologists who do feel that technology's role is to make teachers redundant. I think what intrigued me the most about Hodas' point of view was the hopelessness of the positions as portrayed. Perhaps, I thought, I could facilitate technology integration that would clearly, incontrovertibly support the soul of the school. Perhaps then there would be less resistance, or perhaps more. I wanted to find out, to get in the environment and see what would happen as I promoted technology use in the art curriculum.

Technology Literacy

Cajas' article (2000) was a call for a definition of technology literacy so that it would be easier for technology advocates to argue for its place in the curriculum as a discreet subject. Cajas was concerned that technology pass from a craft to a science and he proposed that the way to effect this change was through a definition that would encourage an academic orientation considerably different to the one we have now, wherein technology is considered a tool. Cajas called for research that would "help clarify" technology literacy. I do not agree with Cajas that technology is at present deserving of its own place in the curriculum. However, I do imagine that eventually, technologists will be willing to consider their values and at that point perhaps the subject would reach the level of the other disciplines. In the meantime, I agree with Cajas that more research is needed in

order to define the constituent factors of technology literacy and I hoped that my study would make this sort of contribution.

Conceptual Change

Georghiades' study (2000) was in conceptual change learning (CCL). CCL is a focus of science and math education that is concerned with the cognitive step students must take in order to comprehend concepts that do not correspond to common understanding. In this field, the challenge is to aid the student in comprehending non-intuitive concepts. The shocking thing for me was that CCL has never, as far as I know, been allied with art education, nor have art educators been interested in this facet of science education. This astounded me because art is famous for changing people's understanding of how the world works. Certainly this should be considered conceptual change? Surely there is room for a merging here of the goals and pedagogies science and art. I would hope that my study begins to examine a ground for this potential merging.

Creative Thinking

Pithers' and Sodden's study (2000) observed that definitions of critical thinking often leave out and even purposely exclude creative and imaginative thinking. These researchers contended that education should concern itself with the development of wisdom. Wisdom, in their view, would be a merging of critical and creative thinking. Note that there is no mention in this article of Project Zero and their research in this area; because this study falls in the area of technology and that falls usually in the realm of science, these researchers were

apparently unfamiliar with Project Zero. This gave me another reason to research technology from an arts perspective; perhaps readers interested in technology education would be exposed to literature in the arts that would help them.

Conditions for Learning

Hansen's study (2000) concerns action research, a topic covered in the next section of the literature review and technology. Hansen's point was that action research is the perfect modality for technology educators because technology education is already based on situated, constructivist, experiential learning. Hansen asserted that technology teachers have a bias towards Kurt Lewin's (whose work will be covered more fully in a later section) concept of creating an environment that is conducive to learning rather than procedural or information transfer teaching. Hansen quoted Einstein as having said, "I never teach my pupils; I only attempt to provide the conditions in which they can learn" (Ibid., p. 24). One final point of interest in this study was Hansen's understanding of technology education as providing a balance between "the discursive and the manual." (Ibid., p. 30) He then stated that the fields of art, medicine and agriculture have traditionally provided the same balance. This was the only study I found in technology education in which there was a statement concerning a compatibility between technology and art.

Educational technology has been influenced by research in cognition. Cognitive science has long been the meeting ground for technology and education. Jerome Bruner's concepts have been widely used in the field of educational technology. Unfortunately technology designs seem to have been

more interested in Bruner's extension of Piaget's stages of learning concepts and much less interested in Bruner's work in co-construction of meaning and relational knowing.

The next and final subsection in this section, technology in schools, will consider technology from an aesthetic point of view.

An Aesthetic Critique of Technology

I initially chose to read Choe's book, *Toward an Aesthetic Criticism of Technology* (1989), because I was designing CD ROM based learning materials for a software division of a large computer company. I was looking for an analysis of why technologically based design seemed to be so limited conceptually. What I found was a gold mine of theoretical and philosophical reasoning focused on the essentially similar nature of aesthetic and technological work. This book was so important to my thinking regarding what I was hoping to accomplish at the research site during my consultancy, that I must go into some detail.

On the very first page of Choe's magnificent book, I found the following statement, "the primary human activity is shaping reality for oneself and contributing an aspect of shape to reality, through both physical and mental acts of construction." (1989 p. 1) Right there, Choe had put together the aspects most salient to this study, of the Bruner-Vygotsky constructivist paradigms, Tarrant's, Dewey's, Greene's art-experience-democracy triptych, Freire's, critical pedagogists', and reconceptualists' conception of agentic, engaged educators having a direct effect on social construction.

Choe stated that his purpose was to bring "the notion of formal choice in technology to the fore" (p. 3). What he referred to was the notion that aesthetics is the discipline wherein formal choice in the making of objects, events, and experiences is discussed and interpreted. He went on to say that, "artistic and technological discoveries are both grounded in system building, which is far from being unique to science" (p. 10). I will discuss systems theory in the section of the literature review concerning action research.

Choe asked, whether, "the process of experimenting and making technical adjustments [is] confined to technological intentions, or is it a constant in all form-constructing processes?" (p. 31). This line of questioning would be helpful for Cajas' (2000) research agenda, discussed in the previous section; when examining the place technology should have in education, the concept of form-construction seems altogether appropriate for analysis. What form-constructing processes are taught in school now? Both English and math classes require students to produce knowledge forms. A discourse might evolve concerning the cognitive abilities developed through the various form-production disciplines. This discourse could create a common ground in the divide between *knowledge how* and *knowledge that*, (Degenhart, 1982; Hyland, 1993) a divide that presently could be understood as crippling both the areas of academic and vocational training. It is crippling because those trained primarily to understand function and form (vocational) are not given an education in values and reasoning sufficient to question the roles they play, the activities they engage in and the products they produce (Tarrant, 1989; Dewey, 1916). By contrast, those trained primarily to

understand purpose and meaning (academic) are not given an education sufficient in the practical application of concepts, either to objects or to persons and relationships.

Choe contended that it is the “non-utilitarian structures [that] have stretched the limits" (p. 129) of our understanding of natural processes. In other words, Choe agreed with Harrison (1913, 1962), and Dewey (1934) that art spurs scientific and technological progress. Perhaps, then, in the context of schools, a study like mine, seeking to integrate technology in the arts curriculum, might spur a similar integration in science and math curricula; and, perhaps further the development of conversations on values underlying the use of technology in education.

I will end the discussion of Choe’s book with two quotes that I find particularly inspirational. First, “When making and judging (practice and recognition) are integrated with the self, an aesthetic criticism of technology becomes a genuine reality. In the aesthetic context, one is no longer merely a consumer of technological products a, but a producer of experiences that contribute to building a creatively habitable world.” (Ibid., p.11) And, that, “technology, like poetry, creates form and material for further activity of the mind” (p. 111).

Summary: Aesthetic Technology

Choe’s argument for an aesthetic view of technology adds substantial complexity to Maxine Greene’s argument that learning is a mutual, interpersonal engaging in artistic process. What if Greene’s definition of artistic process were

expanded to include creatively using technology and, even further, to the creation of technological forms themselves? It seemed to me that as we expand our understanding of the place of art and technology in education, we see more and more an overlap of intention, value, activity, and process.

Choe stated that, “Technology, if taken merely as a cognitive form or an instrument of communication and power, does not help the self to initiate a new perspective nor create new patterns of reality." And, "we do not make technological objects solely to gain power but to be human: to aspire, to dream as well as to survive” (p. 173). If Choe is correct, then technology’s borders fall well within those of domains whose epistemologies question perspectives on humanness and patterns of reality: art and psychology.

CONCLUSION: SEEKING AN ARTICULATION

A complete articulation of the ethical use of information technology in education would require all of Gardner’s intelligences and the representation of all of Hirst’s domains of knowledge. This study can only begin the struggle towards articulation by concerning itself with the integration of information technology with one aspect of academia, the arts curriculum.

We have established that knowledge is embedded in, and derives from, experience and that, for democracy to exist, democratic experiences must play a significant role in educational experience. Further, we have discussed art’s educational significance being primarily in the nature of its praxis, not in the value of its products. In addition, we addressed adult education strategies based on self-actualization and group knowledge. We have explored the

interrelationship of art and science and the fallacy inherent in their polarization. We have endeavored to describe the power of delicacy and the strength of care for initiating change. Most importantly, we have reiterated that, above and beyond all other concepts, the most critical to this action and qualitative research study is the realization that people are the means *and* the ends of education, art, experience *and* democracy.

Before moving on to the method chapter, I would like to share some of the hopes that I carried with me upon entering the research site. First, by helping a small group in a particular school develop the confidence to engage in participatory creativity, I hoped to contribute to a process of creative conflict that would last well beyond my consultancy. I dreamt that this process of creative conflict once initiated, would establish itself as a ritual and then a custom widely held and evolved enough to support all manner of negotiated meanings. I hoped, by articulating an experience of art and technology integration in a specific high school, I might join my efforts with those of other artists, technologists, and educational theorists who wish to diminish the destructiveness of educational mythologies that polarize and divide.

Method

This study uses a mixed methods approach to data gathering and analysis. The methods used are action and qualitative research. Although these methodologies have values that overlap but are not contiguous, they do not necessarily follow one another. And, as it is a new methodology, still exploring its own meaning and narrative structure, I can indulge my pleasure in participating in

formal, structural, development by contributing to the growing literature of examples of qualitative research.

The reason I used action research as the methodology for participation in the school was that I felt that it would be irresponsible to withhold information needed by individuals or the group to contribute to the integration of technology into the curriculum. Not being capable of denying anyone information, I would not be capable of initiating a primarily ethnographic-style qualitative study requiring me to keep distance and objectivity between my own worldmaking propensities and those of the participants. Instead, I chose a methodology that would encourage me to get as involved as necessary. My choice of methodologies is also due to the simple fact that many educators and psychologists who have worked to develop the philosophies underlying action research are heroes of mine. A dissertation is meant to be the culmination of a researcher following her deepest interests, action and qualitative research made it possible for me to follow my heart.

This chapter will describe the research site, the participants, the data sources, the procedure I chose to follow, my role as a researcher, and data analysis.

THE SITE

According to the fact sheet, given out by the High School in 2002, Captain Dewey High is "located in the heart of [the state capital].. opened in 1953… [The] school population of 1,742 consists of a diverse group of students from all sections of this city of 567,500. While we are one of the smallest of eleven public

high schools, the ethnic make-up of our student body is almost an exact microcosm of our city … we have 17% African-American, 24% Hispanic, 58% Anglo, and 1% Other. The size of our school ensures individual attention, widespread athletic and extra-curricular involvement, and a feeling of belonging for all students."

The same document reported that Captain Dewey High "is a comprehensive school, grades 9-12, and is accredited… The school offers a comprehensive college preparatory program and vocational courses for job training and business careers. In addition [Dewey High has] a unit for orthopedically challenged students, and the DELTA program for high risk and drop-out students. The… Fine Arts Academy is our school district's only designated fine arts academy."

The Fine Arts Academy is an additional program of work that a student can elect to pursue. That and the Administrator are the only factors that set the Academy apart from the high school in which it takes its material part. However, there are clear lines of demarcation between those staff who participate in the purposes of the Academy and those staff who do not. My research primarily involved staff and administrators who were involved with the Fine Arts Academy. Art teachers at Capt. Dewey High provided art classes to all students. Students in the Academy were required to take more classes than the rest of the student body but no art class was off limits except on the basis of pre-requisites.

The fact sheet also reported on the curriculum: Capt. Dewey High "provides an education program for all students. Regular, honors, and advanced

placement courses (in English, mathematics, social studies, foreign language, and fine arts. Second in the district in the number of students who placed out on AP exams. Received an award as an Outstanding Advanced Placement School from the region." And, finally, the college enrollment information given in the fact sheet was as follows: 1) in the year 2000, the percentage of the student body going on to post-secondary education was 50% (35% to four-year colleges, and 15% to two-year colleges); 2) in the year 2001, the percentage of the student body going on to post-secondary education was 53% (35% to four-year colleges, and 18% to two-year colleges); and 3) the projection for 2002 was that, the percentage of the student body going on to post-secondary education would be 55% (37% to four-year colleges, and 15% to two-year colleges).

THE PARTICIPANTS

There were three primary participants in the study. That is, there were three people who worked closely with me for the entire duration of the project and beyond. They were: 1) the Fine Arts Academy Coordinator; 2) the Chair of the Capt. Dewey Art Department; and 3) the High School English Teacher of the Year for 2000-2001. The Fine Arts Academy Coordinator requested my entrance into the site and that relationship remained throughout the primary connection I had to the high school.

There were twenty-five other participants who contributed significant data and/or participated in relevant communication with me during the course of the study. These participants consisted of: 1) 10 teachers; 2) 8 staff (including administrators and other kinds of staff who were not primarily in the high school

as teachers); 3) 4 parents of students; and 4) 3 university professors; 2 in fine arts, 1 in science.

DATA SOURCES

The data sources collected were in the form of: 1) e-mails between myself and the participants as well as emails concerning issues brought about as a result of the research; 2) journals, fieldnotes and photographs I made during the action research; 3) questionnaires concerning technology integration that were formally approved by the district; 4) informal interviews, the only record of these is in my journals and my memory; and 5) a variety of artifacts, such as flyers, and school reports concerning technology. Each of these sources will be discussed briefly in what follows.

e-mails

This data source consists of approximately 500 e-mails that were sent between myself and the participants as well as to and from people concerned in some way with the action research initiatives, including, but not limited to: teachers, parents, Capt. Dewey staff, and District staff. The nature of these e-mails varies. There are business-like e-mail messages conveying concrete information such as meeting times and resource allocations. There are passionate pleas from myself and participants for aid in achieving goals or meeting deadlines, or commitments. There are introductory e-mails in which participants are introducing themselves to me or vice versa. In short, there are many categories of e-mail messages, ranging from the very personal to the extremely formal.

The first e-mail was sent Friday, November 3rd, 2000. There are elements of initiatives that we continue to work on together, meaning that the e-mails will continue until this document is finished (date to be determined), 2002.

Journals, Fieldnotes, and Photographs

In keeping with qualitative tradition, I kept extensive journal and fieldnotes. These writings are extremely personal in nature and deal both with factual occurrences and with my attempts at understanding what was going on. The journal has drawings I made when words were not expressing the feeling I was hoping to capture. Similarly, there are photographs pasted in the journal, from times when words were just not adequate. In the results chapter, there will be examples of the journal entries; and in the discussion chapter, there will be an attempt to analyze those entries in terms of the growth in my comprehension of what was emerging as a result of the action research initiatives. Initiatives, as mentioned in this context, refers to the specific projects that the core group of participants, myself included, attempted as elements of our overall goal of technology integration into the Fine Arts Academy curriculum. These initiatives will be discussed in great detail in both the results and the discussion chapters.

Questionnaires

I developed questionnaires consisting of the following four questions: 1) how would you characterize the technology support system that exists in your school and in your out-of-school environment? Do you feel supported? In what ways do you feel supported? Please also describe ways that you need more

support. 2) In your opinion, what role would technology play in your classroom to be most appropriate and effective? Please feel free to describe your ideal. If your ideal is a classroom without technology, please feel free to say so. If your ideal is to participate in a teaching environment that is completely integrated with distance learners and video and computer technology, feel free to say so. If you have a completely different vision from the ones you have read here, please feel free to share it. 3) As far as you are concerned, what limits the use of technology in the curriculum? How do you feel about these limitations? and, 4) Every teacher has their own approach to the enactment of the curriculum, in what ways does (or might) technology support your particular approach to teaching?

The title of the questionnaire was, *Technology Use in Your School: Feelings, Thoughts, Opinions and Experiences*. The directions included the following statements: 1) This questionnaire seeks to elicit your thoughts, your feelings, your experiences as well as your hopes for and trepidations regarding technology integration into your curricular practice. 2) If any question does not seem pertinent to you, please feel free to interpret the question or ignore it altogether. If you have more to say than the space allows, please feel free to add additional sheets. You may append any additional material you feel is relevant to the discussion. 3) The responses to this questionnaire will be used by myself in a study that is part of my doctoral program at UT Austin. My study will be written as a narrative/analysis. I am hoping to benefit general awareness/understanding regarding staff and teacher responses to the changes they are experiencing in their professional practice because of the introduction of computers into classrooms.

The questions were given to the three core participants, nine of the participant teachers, four of the participant staff, and to all # departments heads at Capt. Dewey High. A total of six questionnaires were returned; five were filled out, one was not. All three core participants filled out questionnaires.

Informal Interviews

There were hundreds of informal interviews in the course of the action research. Teachers, technology staff, and school administrators were most comfortable with this means of conveying information to me concerning their thoughts, feelings, and opinions. It is easy to see why this was the case: this means of communication is the least likely to rebound negatively on the speaker. Throughout the course of my presence at Capt. Dewey High School, I made sure that everyone I spoke to understood that I was there as a researcher, that I intended to write about the experiences, conversations, and events that transpired. My choice is to present here to the reader my version of these informal interviews than put anyone's job in jeopardy by quoting them directly. All the names used in the study are pseudonyms. Information that might compromise someone will be reported in as neutral a manner as possible. It would be utterly hypocritical for me to assert that this study was for the purpose of helping people to develop themselves through the democratic process of negotiated meaning making, and then to open people's vulnerability to a public audience. If the reader feels that this in some way compromises the data, so be it. I believe that it will be possible to report the information I gained from these informal interviews without

endangering the participants; if it means risking the occasional tendency to generalize, in those instances, I will make sure that I report the reason why.

Artifacts

There are a variety of artifacts used as data in this study. These documents relate high school curricula, information regarding district technology policy, school budgets, documents related to the activities we carried out, and documents given to me by the participants. For instance, an example of documents given to me by a participant is the paperwork the District High School English Teacher of the Year, who was a core participant, sent in to the application committee.

PROCEDURE

The procedure I followed with regard to data gathering and the action research study consisted of following the classic consultancy phases: 1) initial contact; 2) establishing a helping relationship, formulating a contract; 3) Identifying the problems through diagnostic analysis 4) setting goals and planning action; 5) taking action and cycling feedback; and 6) completing the contract, continuity, support, and termination (Lippitt & Lippitt, 1976).

Initial contact was made by me as a result of an e-mail the Fine Arts Coordinator sent to the coordinator for an arts-based research conference in 2000. The e-mail contained a description of the school and an introduction particularly to the Fine Arts Academy within Capt. Dewey High. The Coordinator was requesting any researchers interested in doing research at the Academy to please contact her (See Appendix 4). I contacted the Coordinator just before

Thanksgiving 2000 by telephone. We arranged a meeting. We met several times and I was introduced to a variety of teachers. After several weeks of meetings and telephone conversations, none of this stage was conducted over e-mail, we were able to formulate a verbal contract.

Our verbal contract, made between myself and the Coordinator included the Lippitt's third and fourth stages. While we were developing an understanding that I was there to help the school, we were identifying the problems the Academy might be facing that I had any ability to ameliorate. And, in the course of these conversations concerning the technical communication levels (my area of expertise as a consultant) at the Academy elicited enough information from the Coordinator that we were able to do some superficial diagnostic analysis and some premature goal setting all at the same time. This action research study, like all others, required a recursive process of goal setting, taking action, resetting goals, and taking more action. In this case, the initial goals were set in the original meetings with the Coordinator. These initial meetings in person and on the telephone lasted # weeks.

My entrance into the school as an active participant began with my meeting with the teacher council the first week in February 2001. This meeting was to confirm the validity of our goals with representatives from all the departments. There were no objections at that meeting, simply requests for more information and my presence at a variety of meetings involving parents and committees overseeing technology use in the school. I began to visit the school more regularly in February 2001 and continued in that manner, taking some

actions and receiving some feedback (the Lippitt's fifth stage) when I was hired by the school as a technology coordinator in May 2001. This shift in my role is a result of a complexity of factors so intermingled that I will ask the reader to wait until the results chapter for a full explication of this turn of events.

I worked from May 2001 until August 2001 as an internal consultant, hired by the district and Capt. Dewey High to integrate their technology programs. The goals that the Coordinator and I had established of improving the Fine Arts Academy's web site were subsumed into this larger project of technology integration into the general curriculum. There were new actions taken during this phase and many participants received and gave a great deal of feedback.

From September 2001 until December 2001, I returned to my original role as Fine Arts researcher promoting the use and improvement of the school web site. At the end of December 2001, my official data-gathering contract with the district and the university expired. At this point in time I work at the school, tutoring and setting up technological support systems two to three times a week. I am at Capt. Dewey High approximately ten hours a week.

We intend to complete our contract only when the dissertation is complete. The participants will be invited to the dissertation defense and all interested participants will have access to the dissertation itself. The district requires receipt of their own copy of the dissertation. As regards the rest of the Lippitt's final stage, in several ways we are already in a process of continuity, support, and termination. In order to cover the three goals of consultancy as described by Peter

Block (1981), my relationship with the Academy may last even after I have physically left the area. Of the three goals, we have already met the first which is to establish a collaborative relationship that maximizes the talent and skills of the participants; and the third which is to ensure that attention is given to both technical/practical problems and relationship issues. But, in order to meet Block's second goal, to solve problems so that they stay solved, I will be available to the participants be e-mail for as long as they wish to stay in contact with me.

The procedure I followed with regard to data analysis will be described in the final section of this chapter.

RESEARCHER'S ROLE

There are two different roles I played in the course of this study. One is as an action researcher and the other is as a qualitative researcher. These two roles were not at odds but neither did they require the same sort of intelligence, or attitude towards data. Each role will be addressed separately below.

As an Action Researcher

During data gathering, I thought of myself as an action researcher. What this way of perceiving meant to me was: 1) People came first at all times, regardless of any temptation to achievement; 2) Participation was mandatory: I was not to excuse myself from active participation, emotional, intellectual, and physical; and 3) I would exercise thematic, self-reflection as often as possible. These three perceptions will be briefly explored in the paragraphs that follow.

People come first at all Times

If I was to be consistent with the set of theories outlined in the literature review, I would have to put the needs of individuals-in-the-living-moment ahead of all other concerns. Although this sounds easy enough, in practice there were tremendous temptations to sacrifice relationships for the sake of strategic goals. The tension between these perceptive-action orientations will be addressed in the discussion chapter.

Participation was Mandatory

A researcher has the ability to escape into an intellectual perspective. This luxury is to be avoided in action research as it is reported to have detrimental effects on the cognitive apprehension of surrounding events. What this meant in practice was that, rather than retreating to a theoretical position when confronted with challenges, I had to discipline myself to participate as an active member of the group. This is also not as easy as it sounds. The issues that confronted us were often highly charged emotionally and I had to choose to allow myself to feel and put those feelings in primacy over my tendency to analyze. I tried to make sure that I was analyzing during self-reflection, not during participation. The theories behind action research propose that an engaged researcher is, in fact, the more effective change agent; and this was something I needed to find out for myself by attempting to practice the method as described.

Exercise Thematic Self-Reflection

To readers of contemporary educational literature, the concept of self-reflection is now familiar. Briefly, self-reflection is an affective-cognitive technique for someone who wishes to increase her awareness of her relationship to the events in which they have taken, or intends to take, part. I define thematic, self-reflection as an affective-cognitive technique for someone who wishes to increase her awareness of her relationship to a specific goal set. For example, in my case, the themes I was interested in were: 1) collaboration; 2) conversation; 3) care; and 4) communication.

Collaboration was a theme of my self-reflection in that I would question repeatedly, how, and to what degree, and in what manner, my actions, emotions, and cognitions were affecting the change effort. Conversation was a theme of my self-reflection, in that I would go over the conversations that had occurred on the phone, in person, or in e-mail that concerned the change effort. What I was looking for in the self-reflections concerning conversations, was more structural than what I was examining in my self-reflection on collaboration. My self-reflection on conversation revolved around communicative patterns that I had noticed emerging. I was looking to understand affective, as well as symbolic, perception, and cognitive patterns emerging from the conversations. This was an extremely challenging aspect to my self-reflections. If I could find a possible pattern, I then needed to examine what role I was playing in maintaining that pattern. Then I would need to question whether or not I wished to continue

participating in that manner. And finally, if I did not wish to continue, what my alternatives might be.

My self-reflections on the theme of care were the most personal. I imagine that this was so because the ethic of care has been articulated primarily by women and primarily in the context of nurturing relationships. In my experience, nurturing relationships have been primarily in the realm of the personal. I have had many nurturing teachers, and I have often used my memory of my experiences with those teachers as schema, or models to emulate. But, still, my tendency was to collapse the boundaries between the personal and the professional and I was hoping, in my self-reflections, to remind myself of the parameters I set for myself as appropriate. All of these self-reflections will of course be considered in the discussion chapter.

My self-reflection on the theme of communication was once again, more structural. I am interested in the mechanisms that underlie communication. I am interested in all the mediated forms that have been developed to aid communication. I am also interested in the symbolic apperceptions that undergird those communicative forms. And I am equally fascinated with content forms. My self-reflections on communication concerned also the social formations, the way role definitions were affecting communication. And, finally, I was interested in how the nature and communicative style of the inter-personal relationships was affecting the goals of the action research.

The following subsection will consider the role I was playing as a qualitative researcher during the course of this study.

As a Qualitative Researcher

During data analysis, synthesis of data, and theory development, and in writing this dissertation, my role was that of a qualitative researcher. The primary values I had in playing this role were to be: 1) patient; 2) fair; and 3) accurate.

Patience

It required disciplined thought and the exercise of patience, to avoid jumping to conclusions. Sometimes, it took a long time before a pattern in the data emerged; rushing that process always seemed to lead to unacceptable levels of interpretative confusion. My goal was to be as patient as possible with my process of understanding.

Fairness

Being fair was really the most challenging aspect of this whole process for me. Balancing my personal opinions with those of the group, in order to represent what happened as accurately as possible, meant that I had continuously to search for the broadest possible perspective that I could achieve in relation to the data. Stretching myself this way was an invaluable growing experience for my cognitive abilities but often challenged my emotional self.

The Heart of Accuracy

Accuracy is a myth. Unfortunately, or perhaps fortunately, it is a myth I was trained to uphold. My readings in postmodernist ethics have alerted me to the problems concurrent with an adamant assertion of the need for accuracy. However, I was not entirely able to give up the desire to achieve the kind of

clarity of exposition that I think of as accuracy. My solution was to merge my concept of accuracy with my understanding of conversational reality and worldmaking. This merger gave me permission to admit that, no matter how much I would try to be accurate, I would be creating a world of meaning from my interpretation. My goal would then be to capture the heart of the meanings the data held for me, and to convey them to the reader as coherently as possible.

The following, final section of this chapter will describe the intended method of data analysis.

DATA ANALYSIS

Data analysis will be hermeneutic, recursive and self-reflective. I will use Schallert's (Schallert, 2002; Reed & Schallert, 1993) methods of conversational flow analysis to interpret the e-mail conversations and informal interviews that took place during the course of the action initiatives. Then, I intend to create a narrative description of my work as an action researcher co-constructing technology integration into Capt. Dewey's curriculum. The narrative will of necessity embody values and meanings that are in one sense qualitative analysis; however there will be further layers of analysis in the final chapter.

The analytical goals are to describe perceptions of the social forces at work at the school, the level of technological expertise, and the availability of technological resources both cognitive and material. In addition, I will be interested to see if an analysis of conversational flow and interpersonal meaning making in the e-mails and the informal interviews reveals any perceptible patterns. I am also interested in how the conversational flows emerge in relation

to events and how events might or might not be seen to have influenced conversational flow.

Further, the analysis will consider whether and how availability of resources did or did not and/or to what extent influenced the previously mentioned social forces and the level of technological expertise among the teaching staff. Finally, there will be an attempt to describe how changing levels of needs affecting participant ability to participate in the integration of technology into the curriculum.

The expected outcomes of the analysis are as yet unknown. My intention is to view the year's collaborative work through the various theoretical lenses described in this paper in the hope that patterns and connections will emerge that will contribute to our shared understanding of transitions occurring in our schools as we move into the information age.

Appendix I - The State Guidelines for Technological Education

Chapter 126. A Southwestern State Essential Knowledge and Skills for Technology Applications
Source: The provisions of this §126.12 adopted to be effective September 1, 1998, 22 SWReg 5203.Chapter 126. A Southwestern State Essential Knowledge and Skills for Technology Applications Subchapter C. High School Statutory Authority: The provisions of this Subchapter C issued under the A Southwestern State Education Code, §28.002, unless otherwise noted.§126.21. Implementation of A Southwestern State Essential Knowledge and Skills for Technology Applications, High School.The provisions of this subchapter shall supersede §75.123 of this title (relating to Computer Science) beginning September 1, 1998. Source: The provisions of this §126.21 adopted to be effective September 1, 1998, 22 SWReg 5203.§126.22.
Computer Science I (One Credit).
(a) *General requirements*. The prerequisite for this course is proficiency in the knowledge and skills described in §126.12(c) of this title (relating to Technology Applications (Computer Literacy), Grades 6-8). In addition, it is recommended that students have proficiency in the knowledge and skills for Algebra I identified in §111.32(b) of this title (relating to Algebra I (One Credit)) or the equivalent knowledge and skills. This course is recommended for students in Grades 9-12. School districts may use the knowledge and skills described in subsection (c) of this section, the computer science course descriptions for the College Board Advanced Placement or International Baccalaureate programs, or a combination thereof.
(b) *Introduction*.
(1) The technology applications curriculum has four strands: foundations, information acquisition, work in solving problems, and communication.
(2) Through the study of technology applications foundations, including technology-related terms, concepts, and data input strategies, students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes theidentification of task requirements; the plan for using search strategies; and the use oftechnology to access, analyze, and evaluate the acquired information. By using technology as select the technology appropriate for the task, synthesize knowledge, create a solution, andevaluate the results. Students communicate information in different formats and to diverseaudiences. A variety of technologies will be used. Students will analyze and evaluate theresults.
(c) *Knowledge and skills*.
(1) Foundations. The student demonstrates knowledge and appropriate use of hardwarecomponents, software programs, and their connections. The student is expected to:
(a) demonstrate knowledge and appropriate use ofoperating systems, software applications, andcommunication and networking components; (b) compare, contrast, and appropriately use the various input, processing, output, and primary/secondary storage devices; (c) make decisions

regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency; (d) delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity; (e) differentiate current programming languages, discuss the use of the languages in other fields of study, and demonstrate knowledge of specific programming terminology and concepts; (g) differentiate among the levels of programming languages including machine, assembly, high-level compiled and interpreted languages; and (h) demonstrate coding proficiency in a contemporary programming language.

(2) Foundations. The student uses data input skills appropriate to the task. The student is expected to: (A) demonstrate proficiency in the use of a variety of input devices such as keyboard, scanner, voice/sound recorder, mouse, touch screen, or digital video by appropriately incorporating such components into the product; and (B) use digital keyboarding standards for the input of data.

(3) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to: (a) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods; (b) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; (c) investigate measures, such as passwords or virus detection/prevention, to protect computer systems and databases from unauthorized use and tampering; and (d) discuss the impact of computer programming on the World Wide Web (WWW) community.

(4) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to: (a) use local area networks (LANs) and wide area networks (WANs), including the Internet and intranet, in research and resource sharing; and (b) construct appropriate electronic search strategies in the acquisition of information including keyword and Boolean search strategies.

(5) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to: (a) acquire information in and knowledge about electronic formats including text, audio, video, and graphics; (b) use a variety of resources, including foundation and enrichment curricula, together with various productivity tools to gather authentic data as a basis for individual and group programming projects; and (c) design and document sequential search algorithms for digital information storage and retrieval.

(6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to: (a) determine and employ methods to evaluate the design and functionality of the process using effective coding, design, and test data; and (b) implement methods for the evaluation of the information using defined rubrics.

(7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to: (a) apply problem-solving strategies such as design specifications, modular top-down design, step-wise refinement, or algorithm development; (b) use visual organizers to design solutions such as flowcharts or

schematic drawings; (c) develop sequential and iterative algorithms and codes programs in prevailing computer languages to solve practical problems modeled from school and community; (d) code using various data types; (e) demonstrate effective use of predefined input and output procedures for lists of computer instructions including procedures to protect from invalid input; (f) develop coding with correct and efficient use of expressions and assignment statements including the use of standard/user-defined functions, data structures, operators/proper operator precedence, and sequential/conditional/repetitive control structures; (g) create and use libraries of generic modular code to be used for efficient programming; (h) identify actual and formal parameters and use value and reference parameters; (i) use control structures such as conditional statements and iterated, pretest, and posttest loops; (j) use sequential, conditional, selection, and repetition execution control structures such as menu-driven programs that branch and allow user input; and (K) identify and use structured data types of one-dimensional arrays, records, and text files.

(8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to: (a)participate with electronic communities as a learner, initiator, contributor, and teacher/mentor; (b) demonstrate proficiency in, appropriate use of, and navigation of LANs and WANs for research and for sharing of resources; (c) extend the learning environment beyond the school walls with digital products created to increase teaching and learning in the foundation and enrichment curricula; and (d) participate in relevant, meaningful activities in the larger community and society to create electronic projects.

(9) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to: (a) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product; (b) use correct programming style to enhance the readability and functionality of the code such as spacing, descriptive identifiers, comments, or documentation; (c) seek and respond to advice from peers and professionals in delineating technological tasks; (d) resolve information conflicts and validate information through accessing, researching, and comparing data; and (e) create technology specifications for tasks/evaluation rubrics and demonstrate that products/product quality can be evaluated against established criteria.

(10) Communication. The student formats digital information for appropriate and effective communication. The student is expected to: (a) annotate coding properly with comments, indentation, and formatting; and (b) create interactive documents using modeling, simulation, and hypertext.

(11) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to: (a) publish information in a variety of ways including, but not limited to, printed copy and monitor displays; and (b) publish information in a variety of ways including, but not limited to, software, Internet documents, and video.

(12) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to: (a) write technology

specifications for planning/evaluation rubrics documenting variables, prompts, and programming code internally and externally; (b) seek and respond to advice from peers and professionals in evaluating the product; and (c) debug and solve problems using reference materials and effective strategies.

Source: The provisions of this §126.22 adopted to be effective September 1, 1998, 22 SWReg 5203.§126.23.

Computer Science II (One Credit).

(a) *General requirements*. The prerequisite for this course is proficiency in the knowledge and skills for Computer Science I as identified in §126.22 (c) of this title (relating to Computer Science I (One Credit)). This course is recommended for students in Grades 10-12. School districts may use the knowledge and skills described in subsection (c) of this section, the computer science course descriptions for the College Board Advanced Placement or International Baccalaureate programs, or a combination thereof.

(b) *Introduction.*

(1) The technology applications curriculum has four strands: foundations, information acquisition, work in solving problems, and communication.

(2) Through the study of technology applications foundations, including technology-related terms, concepts, and data input strategies, students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

(c) Knowledge and skills.

(3) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to: (a) identify object-oriented data types and delineate the advantages/disadvantages of object data; (b) demonstrate coding proficiency in contemporary programming languages including an object-oriented language; and (c) survey the issues accompanying the development of large software systems such as design/implementation teams, software validation/testing, and risk assessment.

(4) Foundations. The student uses data input skills appropriate to the task. The student is expected to: (a) demonstrate proficiency in the use of a variety of input devices such as keyboard, scanner, voice/sound recorder, mouse, touch screen, or digital video by appropriately incorporating such components into the product; and (b) use digital keyboarding standards for the input of data.

(5) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to: (a) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods; (b)

demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; (c) investigate measures, such as passwords or virus detection/prevention, to protect computer systems and databases from unauthorized use and tampering; and (d) code modules for the World Wide Web (WWW) community.

(6) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to: (a) construct search algorithms including linear and binary searches; and (b) compare and contrast search and sort algorithms including linear and binary searches for different purposes and search time.

(7) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to: (a) acquire information in and knowledge about electronic formats including text, audio, video, and graphics; and (b) use a variety of resources, including foundation and enrichment curricula, together with various productivity tools to gather authentic data as a basis for individual and group programming projects.

(8) Information acquisition. The student evaluates the acquired electronic information. The student is expected to: (a) determine and employ methods to evaluate the design and functionality of the process using effective coding, design, and test data; and (b) implement methods for the evaluation of the information using defined rubrics.

(9) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to: (a) use appropriately and trace recursion in program design comparing invariant, iterative, and recursive algorithms; (b)manipulate data structures using string processing; (c) use notation for language definition such as syntax diagrams or Backus-Naur forms; (d) identify, describe, and use sequential/non-sequential files; multidimensional arrays and arrays of records; and quadratic sort algorithms such as selection, bubble, or insertion, and more efficient algorithms including merge, shell, and quick sorts; (e) create robust programs with increased emphasis on design, style, clarity of expression and documentation for ease of maintenance, program expansion, reliability, and validity; (f) apply methods for computing iterative approximations and statistical algorithms; (g) define and develop code using the concepts of abstract data types including stacks, queues, linked lists, trees, graphs, and information hiding; (h) identify and describe the correctness and complexity of algorithms such as divide and conquer, backtracking, or greedy algorithms;(I) develop software to solve a school or community problem such as customer relations, design, modular programming, documentation, validation, marketing, or support; and (j) research advanced computer science concepts such as applied artificial intelligence, expert systems, robotics, depth-first/breadth-first and heuristic search strategies, multitasking operating systems, or computer architecture, such as reduced instruction set computer (RISC) and complex instruction set computer (CISC).

(10) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to: (a) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor; (b)

demonstrate proficiency in, appropriate use of, and navigation of local area networks (LANs) and wide area networks (WANs) for research and for sharing of resources; (c) extend the learning environment beyond the school walls with digital products created to increase teaching and learning in the foundation and enrichment curricula; and (d) participate in relevant, meaningful activities in the larger community and society to create electronic projects.

(11) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to: (a) demonstrate the ability to read and modify large programs including the design description and process development; (b) analyze algorithms using "big-O" notation, best, average, and worst case space techniques; (c) compare and contrast design methodologies including top-down and bottom-up; (d) analyze models used in development of software including software life cycle models, design objectives, documentation, and support; and (e) seek and respond to advice from peers and professionals in delineating technological tasks.

(12) Communication. The student formats digital information for appropriate and effective communication. The student is expected to: (a) annotate coding properly with comments, indentation, and formatting; and (b) create interactive documents using modeling, simulation, and hypertext.

(13) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to: (a) publish information in a variety of ways including, but not limited to, printed copy and monitor displays; and (b) publish information in a variety of ways including, but not limited to, software, Internet documents, and video.

(14) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to: (a) write technology specifications for planning and evaluation rubrics documenting variables, prompts, and program internally and externally; (b) seek and respond to advice from peers and professionals in evaluating the product; and (c) debug and solve problems using reference materials and effective strategies.

Source: The provisions of this §126.23 adopted to be effective September 1, 1998, 22 SWReg 5203.§126.24.

Desktop Publishing (One Credit).

(a) *General requirements*. The prerequisite for this course is proficiency in the knowledge and skills described in §126.12(c) of this title (relating to Technology Applications (Computer Literacy), Grades 6-8). This course is recommended for students in Grades 9-12.

(b) *Introduction*.

(1) The technology applications curriculum has four strands: foundations, information acquisition, work in solving problems, and communication.

(2) Through the study of technology applications foundations, including technology-related terms, concepts, and data input strategies, students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of

technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

(c) *Knowledge and skills*.

(3) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to: (a) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components; (b) compare, contrast, and appropriately use the various input, processing, output, and primary/secondary storage devices; (c) make decisions regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency; (d) delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity; and (e) demonstrate knowledge of technology terminology and concepts relating them to desktop publishing.

(4) Foundations. The student uses data input skills appropriate to the task. The student is expected to: (a) demonstrate proficiency in the use of a variety of input devices such as mouse, keyboard, disk/disc, modem, scanner, voice/sound recorder, or digital camera by appropriately incorporating such components into the product; and (b) use digital keyboarding standards in word processing such as one space after punctuation, the use of em/en dashes, and smart quotation marks.

(5) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to: (a) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods; (b) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; and (c) analyze the impact of desktop publishing on society including concepts related to persuasiveness, marketing, and point of view.

(6) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to: (a) use strategies to obtain print and digital information from a variety of electronic resources including, but not limited to, reference software, databases, and libraries of images, citing the source; and (b) use strategies to navigate on and access information from local area networks (LANs), wide area networks (WANs), the Internet, and intranet.

(7) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to: (a) acquire information in electronic formats including text, audio, video, and graphics, citing the source; and (b) demonstrate the ability to import and export elements from one program to another.

(8) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to: (a) use desktop publishing methods in foundation and enrichment curricula; (b) identify the tasks in a project and use the tools needed for completion such as word processing, pagination, utility, indexing, graphics, or drawing programs; (c) use electronic productivity tools such as the word processor to edit text including move, copy, cut and paste, and spell check; (d)mselect and use the categories of type, font, size, style, and alignment appropriate for the task; (e) apply the basic elements of page design including text, graphics, headlines, and white space; (f) distinguish design requirements as they relate to purposes and audiences including one-surface objects, multiple or bound pages, stationery, book jackets/magazine covers, pamphlets, magazines, brochures, and labels; and (g) read and use technical documentation.

(9) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to: (a) develop technical documentation related to desktop publishing; (b) demonstrate the use of technology to participate in self-directed and practical activities; (c) extend the learning environment beyond the classroom through the creation and sharing of electronically formatted and published documents via electronic networks; (d) synthesize new information from data gathered from interviews, print, and electronic resources; and (e) demonstrate that tasks can be accomplished through technological collaboration and participate with electronic communities as a learner, initiator, contributor, and teacher/mentor.

(10) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to: (a) create technology specifications for tasks and evaluation rubrics to evaluate process and product against established criteria; (b) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product; (c) resolve information conflicts and validate information through accessing, researching, and comparing data; and (d) seek and respond to advice from peers in delineating technological tasks.

(11) Communication. The student formats digital information for appropriate and effective communication. The student is expected to: (a) define the purpose of the product and identify the specified audience; (b) use terms related to typography appropriately including categories of type and type contrasts; (c) use the principles of page design to create a product including, but not limited to, leading/kerning, automatic text flow into linked columns, widows/orphans, and text wrap; (d) create a master template to include page specifications and other repetitive tasks; (e) apply the basics of type measurement for inches and picas; (f) use type techniques as graphic elements such as drop cap, decorative letters, or embedded-text frames; (g) apply color principles to communicate the mood of the product for the specific audience; (h) incorporate the principles of basic design including, but not limited to, balance, contrast, dominant element, use of white space, consistency, repetition, alignment, and proximity; (I) identify the parts and kinds of pages including inside margin, outside margin, gutter, title, and inside pages; and (j) use a

variety of strategies to create effective designs, such as varying line widths and patterns, and use manipulation tools to stretch, bend, screen, rotate, follow a path, or mirror type.

(12) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to: (A)use appropriate media for creating a knowledge base with a broad perspective and communicating to the worldwide community; (B)use printing options such as tiling, color separations, collation, and previewing; (C) distinguish design and printing requirements as they relate to purposes, audiences, and final output; and (D)use styles (style sheets) including a variety of type specifications such as typeface, style, size, alignment, indents, and tabs.

(13) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to: (a) identify and employ a method to evaluate the project for design, content delivery, purpose, and audience; (b) use electronic project management tools to set milestones for completing projects and reviewing progress; (c) seek and respond to advice from peers in evaluating the product; (d) create technology specifications for tasks and evaluation rubrics; and (e) demonstrate that products and product quality can be evaluated against established criteria.

Source: The provisions of this §126.24 adopted to be effective September 1, 1998, 22 SWReg 5203.§126.25.

Digital Graphics/Animation (One Credit).

(a) *General requirements*. The prerequisite is proficiency in the knowledge and skills described in §126.12(c) of this title (relating to Technology Applications (Computer Literacy), Grades 6-8). This course is recommended for students in Grades 9-12.

(b) *Introduction*.

(1) The technology applications curriculum has four strands: foundations, information acquisition, work in solving problems, and communication.

(2) Through the study of technology applications foundations, including technology-related terms, concepts, and data input strategies, students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

(c) *Knowledge and skills.*

(3) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to: (A) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components; (B) compare, contrast, and appropriately use the various input, processing, output, and primary/secondary storage devices; (C)make decisions

regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency; (D)delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity; (E)use the vocabulary as it relates to digital graphics and animation software; (F)distinguish between and correctly use process color (RGB and CYMK), spot color, and black/white; (G)identify color mixing theories and apply these theories to the creation of new colors in the digital format;(H)compare, contrast, and integrate the basic sound editing principles including the addition of effects and manipulation of wave forms; (I)distinguish between and use the components of animation software programs including cast, score, stage, and the animation control panel; (J)select and connect task-appropriate peripherals such as a printer, CD-ROM, digital camera, scanner, or graphics tablet; and (K)distinguish and use the different animation techniques of path and cell animation.

(4) Foundations. The student uses data input skills appropriate to the task. The student is expected to: (A) demonstrate proficiency in the use and graphical integration of a variety of input devices such as keyboard, scanner, mouse, graphic tablet with pen, or digital camera; and (B) compare and contrast digital input devices.

(5) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to: (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods; (B) model respect of intellectual property when manipulating, morphing, and editing graphics, video, text, and sound; (C)demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; and (D)research the impact of digital graphics in society and as an art form.

(6) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to: (A) use strategies to access research information from different resources, including local area networks (LANs), wide area networks (WANs), the Internet, and intranet; and (B) obtain print and digital information from a variety of resources including, but not limited to, encyclopedias, databases, and libraries of images.

(7)Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to: (A)use the Internet and retrieve information in electronic formats including text, audio, video, and graphics, citing the source; (B)demonstrate the appropriate use of digital imaging, video integration, and sound in documents; and (C) import sounds from a variety of sources including, but not limited to, audio CD, tape, and microphone.

(7) Information acquisition. The student evaluates the acquired electronic information. The student is expected to: (A) compare and contrast the rules of composition such as rule of thirds or the golden section/rectangle with respect to harmony and balance as well as discord and drama; (B) evaluate the fundamental concepts of a graphic design including composition and lighting; (C) analyze the designs to decide the point of interest and the attributes that determine

prominence and support of the subject; and (D) distinguish among the categories of typefaces while recognizing and resolving conflicts that occur through combined usage.
(8) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to: (A) combine graphics, images, and sound for foundation or enrichment curricular projects; (B) integrate the productivity tools including, but not limited to, word processor, database, spreadsheet, telecommunications, draw, paint, and utility programs into the digital graphics; (C) use perspective including backgrounds, light, shades/shadows, and scale to capture a focal point and create depth; (D) use the basic principles of proportion, balance, variety, emphasis, harmony, symmetry, and unity in type, color, size, line thickness, shape, and space; (E) use repetition of color, shape, texture, spatial relationships, line thickness, and size to develop organization and strengthen the unity of a product; (F) create three-dimensional effects using foreground, middle distance, and background images; (G) apply a variety of color schemes to digital designs including monochromatic, analogous, complementary, primary/secondary triads, cool/warm colors, and split complements; (H) use the basic concepts of color and design theory to work in a bitmapped mode, creating backgrounds, characters, and other case members as needed for the animation; (I) use the appropriate scripting language to create an animation or movie; (j) read, use, and develop technical documentation; (k) edit files using appropriate digital editing tools and established design principles including consistency, repetition, alignment, proximity, ratio of text to white space, image file size, color use, font size, type, and style; and (l) use a variety of techniques to edit, manipulate, and change sound.
(9) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to: (A) demonstrate the use of technology to participate in self-directed, meaningful activities in the larger community and society; (B) demonstrate proficiency in, appropriate use of, and navigation of LANs, WANs, the Internet, and intranet for research and for sharing of resources; and (C) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor.
(10) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to: (A) create technology specifications for tasks and rubrics for the evaluation of products and product quality against established criteria; (B) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product; (C) evaluate data by using criteria appropriate for the purpose; (D) resolve information conflicts and validate information through accessing, researching, and comparing data; and (E) seek and respond to advice from peers in delineating technological tasks.
(11) Communication. The student formats digital information for appropriate and effective communication. The student is expected to: (A) identify pictorial qualities in a design such as shape and form, space and depth, or pattern and texture to create visual unity and desired effects in designs; (B) use a variety of lighting techniques including shadows and shading to create an effect (C) define the design attributes and requirements of products created for a variety of

purposes including posters, billboards, business cards, stationery, book jackets, folders, booklets, pamphlets, brochures, and magazines; and (D)use proximity and alignment to create a visual connection with other elements.

(12) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to: (A) publish information in a variety of ways including, but not limited to, printed copy or monitor display; and (B)publish information in saved files, Internet documents, CD-ROM discs, or video.

(13) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to: (A) determine and employ technology specifications to evaluate projects for design, content delivery, purpose, and audience; and (B) seek and respond to advice from peers in evaluating the product.

Source: The provisions of this §126.25 adopted to be effective September 1, 1998, 22 SWReg 5203.§126.26.

Multimedia (One Credit).

(a)General requirements. The prerequisite for this course is proficiency in the knowledge and skills described in §126.12(c) of this title (relating to Technology Applications (Computer Literacy), Grades 6-8). This course is recommended for students in Grades 9-12.

(a) *Introduction.*

(1)The technology applications curriculum has four strands: foundations, information acquisition, work in solving problems, and communication.

(2)Through the study of technology applications foundations, including technology-related terms, concepts, and data input strategies, students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

(c) *Knowledge and skills.*

(3) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to: (A) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components; (B) analyze demands for accomplishing multimedia tasks to appropriately use input, processing, output, and primary/secondary storage devices; (C) make decisions regarding the selection, acquisition, and use of software in a multimedia classroom/lab taking under consideration its quality, appropriateness, effectiveness, and efficiency; (D) delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity; (E) use necessary vocabulary related to multimedia; (F) install and configure appropriate software; (G)

distinguish between and correctly use process color (RGB and CYMK), spot color, and black/white; (h) identify color mixing theories and apply these theories to the creation of new colors in the digital format; (I) identify and distinguish among the basic sound editing principles including the addition of effects and manipulation of the wave form; (j) identify and use compression schemes for photo, animation, video, and graphics; and (k) distinguish between and determine the appropriate application of bitmapped and vector graphics into a multimedia project.

(4) Foundations. The student uses data input skills appropriate to the task. The student is expected to: (a) demonstrate proficiency in the use of a variety of electronic input devices including the mouse, keyboard, scanner, voice/sound recorder, disk/disc, video, and digital camera by creating files to be used in multimedia products; (b) use digital keyboarding standards for data input such as one space after punctuation, the use of em/en dashes, and smart quotation marks; (c) use strategies when digitally capturing files that conserve memory and retain the image integrity; and (d) differentiate among audio input.

(5) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to: (a)discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods; (b) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; (c) model respect of intellectual property when manipulating, morphing, or editing graphics, video, text, and sound; and (d) provide examples of the role of multimedia in society.

(6) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to: (a) use strategies to access research information from different resources, including local area networks (LANs), wide area networks (WANs), the Internet, and intranet; and (b) apply appropriate electronic search strategies in the acquisition of information including keyword and Boolean search strategies.

(7)Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to: (a) acquire information in electronic formats including text, audio, video, and graphics, citing the source; and (b)identify, create, and use available file formats including text, image, video (analog and digital), and audio files.

(8)Information acquisition. The student evaluates the acquired electronic information. The student is expected to: (a) identify and employ a method to evaluate the design, functionality, and accuracy of the accessed information; and (B) use fundamental concepts of graphic design including visual composition and lighting when analyzing multimedia.

(9) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to: (A) use foundation and enrichment curricula in the creation of multimedia products; (B) select and integrate computer-based productivity tools, including, but not limited to, word processor, database, spreadsheet, telecommunications, draw, paint, and utility programs to develop and modify solutions to

problems and to create new knowledge for multimedia products; (c) use technology tools to create a knowledge base with a broad perspective; (d) apply color principles to communicate the mood of the product for the specific audience; (e) integrate path and cell animation modules appropriately into multimedia products;(f)use the appropriate scripting language to create a multimedia sequence; (g)edit files using established design principles including consistency, repetition, alignment, proximity, ratio of text to white space, image file size, color use, font size, type, and style; and (h) read and use technical documentation.

(10)Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to: (A) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor and use technology to participate in self-directed and practical activities in the larger community and society; (B) demonstrate proficiency in, appropriate use of, and navigation of LANs, WANs, the Internet, and intranet for research and for sharing of resources; (c)integrate and use efficiently and effectively a variety of multimedia programs and tools including linear/non-linear authoring tools, image/video editing tools, compression programs, draw/paint/text creation tools; (d) extend the learning environment beyond the school walls through the creation and linking of multimedia products via electronic networks; (e) develop technical documentation related to multimedia; (f) participate in different roles and jobs of a multimedia production crew including project manager, lead programmer, writer, art director, sound engineer, researcher, animator, and presenter; (g)distinguish among and appropriately integrate 3-D modeling, animation, and rendering software into multimedia products; (h) import video into the digital format for integration into multimedia products; and (I)capture, record, and integrate sampled and Musical Instrument Digital Interface (MIDI) sound in different sound rates, resolutions, and channels.

(11)Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to: (A) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product; (B) seek and respond to advice from peers and professionals in delineating technological tasks; (C) create technology specifications for tasks and rubrics to evaluate products and product quality against established criteria; and (D) resolve information conflicts and validate information by accessing, researching, and comparing data and demonstrate that products and product quality can be evaluated against established criteria.

(12)Communication. The student formats digital information for appropriate and effective communication. The student is expected to: (A) identify quality in multimedia design such as consistency, alignment, repetition, and proximity; (B) use content selection and presentation for the defined audience and communication purpose; and (C) format the multimedia project according to defined output specifications including target audience and viewing environment.

(13) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to: (A) publish information in a variety of ways including, but not limited to, printed copy or monitor display; and (B) publish information in saved files, Internet documents, CD-ROM discs, or video.

(14) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to: (A) determine and employ technology specifications to evaluate projects for design, content delivery, purpose, and audience; and (B) seek and respond to input from peers and professionals in evaluating the product.

Source: The provisions of this §126.26 adopted to be effective September 1, 1998, 22 SWReg 5203.§126.27.

Web Mastering (One Credit).

(a) *General requirements*. The prerequisite for this course is proficiency in the knowledge and skills described in §126.12(c) of this title (relating to Technology Applications (Computer Literacy), Grades 6-8). This course is recommended for students in Grades 9-12.

(b) *Introduction.*

(1) The technology applications curriculum has four strands: foundations, information acquisition, work in solving problems, and communication.

(2) Through the study of technology applications foundations, including technology-related terms, concepts, and data input strategies, students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

(c) *Knowledge and skills.*

(3)Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to: (A) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components; (B) compare, contrast, and use appropriately the various input, processing, output, and primary/secondary storage devices; (C) make decisions regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency; (D) delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity; (E) use vocabulary related to web mastering and delineate between the Internet and an intranet; (F) summarize the technical needs of a World Wide Web (WWW) server including Random Access Memory (RAM), hard disk capacity, Central Processing Unit (CPU) speed, methods of connectivity, and appropriate software; and (G) summarize the development of Internet protocols including, but not limited to, hypertext transfer protocol (http), gopher, file transfer protocol (ftp), telnet, and wide area information system (wais).

(4) Foundations. The student uses data input skills appropriate to the task. The student is expected to: (A) outline differences among a variety of electronic input devices; and (B) demonstrate proficiency in the use of a variety of electronic input devices such as keyboard, scanner, voice/sound recorder, mouse, touch screen or digital video by incorporating such components while publishing WWW pages.

(5) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to: (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods; (B) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; and (C) analyze the impact of the WWW on society through research, interviews, and personal observation.

(6)Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to: (A) use local area networks (LANs) and wide area networks (WANs) including the Internet and intranet in research and resource sharing; (B) construct appropriate search strategies in the acquisition of information from the Internet including keyword and Boolean search strategies; and (C) obtain Uniform Resource Locators (URLs) and distinguish among the protocols including hypertext transfer protocol (http), gopher, file transfer protocol (ftp), telnet, and wide area information system (wais).

(7)Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to: (A) acquire information in electronic formats including text, audio, video, and graphics, citing the source; and (B) identify, create, and use available file formats including text, image, video (analog and digital), and audio files.

(8) Information acquisition. The student evaluates the acquired electronic information. The student is expected to: (A) determine and employ methods to evaluate the design (for content delivery) and functionality (for navigation and interaction) of WWW pages and compare the method with other established methods; (B) demonstrate skill in testing the accuracy of information; and (C) investigate and choose electronic security methods for a web server to protect from unauthorized access and negative intentions.

(9)Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to: (A) use technology tools to create a knowledge base with a broad perspective; (B) select and integrate appropriate productivity tools including, but not limited to, word processor, database, spreadsheet, telecommunication, draw, paint, and utility programs into the creation of WWW documents; (C) use foundation and enrichment curricular content in the creation of WWW pages; (D) create WWW pages using specific authoring tools such as text-based editing programs or graphical-based editing programs; (E) read, use, and develop technical documentation; (F) create and edit WWW documents using established design principles including consistency, repetition, alignment, proximity, ratio of text to white space, image file size, color use, font

size, type, and style; (G) demonstrate the ability to control access to the WWW site via password controls and global access/deny controls; and (H) establish a folder/directory hierarchy for storage of a web page and its related or linked files.

(10)Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to: (A) demonstrate proficiency in, appropriate use of, and navigation of LANs, WANs, the Internet, and intranet for research and for sharing of resources; (B) extend teaching and learning in the local environment to the worldwide community through the creation and sharing of WWW documents; (C) synthesize and generate new information from data gathered from electronic and telecommunications resources; (D) create and format WWW documents containing bookmarks of on-line resources and share them electronically; (E) demonstrate the use of WWW pages, collaborative software, and productivity tools to create products; (F) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor; and (G) participate in relevant, meaningful activities in the larger community and society to create electronic projects.

(11)Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to: (A) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product; (B) seek and respond to advice from peers and professionals in delineating technological tasks; (C) create technology specifications for tasks and evaluation rubrics; and (D) resolve information conflicts and validate information through accessing, researching, and comparing data.

(12)Communication. The student formats digital information for appropriate and effective communication. The student is expected to: (A) use hypertext linking appropriately when creating WWW pages; (B) develop interactivity for the web server via scripting additions such as Common Gateway Interface (CGI), Java Script, or JAVA; and (C) demonstrate the ability to conduct secure transactions from the web server to the client.

(13)Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to: (A) synthesize and publish information in a variety of ways including, but not limited to, printed copy, monitor display, Internet documents, and video; and (B) identify and use LANs, WANs, and remote resources to exchange and publish information.

(14) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to: (A) create technology specifications for tasks and evaluation rubrics; and (B) seek and respond to input from peers and professionals in evaluating the product.

Source: The provisions of this §126.28 adopted to be effective September 1, 1998, 22 SWReg 5203.§126.29.

Independent Study in Technology Applications (One Credit).

(a) *General requirements.* The prerequisite for this course is completion of a high school technology applications course as identified in this subchapter and permission of the instructor/mentor for Independent Study in Technology Applications. This course may be taken at Grades 10-12.

(b) *Introduction.*

(1) The technology applications curriculum has four strands: foundations, information acquisition, work in solving problems, and communication.

(2) Through the study of technology applications foundations, including technology-related terms, concepts, and data input strategies, students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

(c) *Knowledge and skills.*

(1) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to: (A) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components; (B) make decisions regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency; (C) delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity; and (D) use appropriate technology terminology in the independent study course.

(2) Foundations. The student uses data input skills appropriate to the task. The student is expected to: (A) demonstrate proficiency in the use of a variety of electronic input devices including the mouse, keyboard, scanner, voice/sound recorder, disk/disc, video, and digital camera as appropriate; and (B) use digital keyboarding standards for data input such as one space after punctuation, the use of em/en dashes, and smart quotation marks.

(3) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to: (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods; (B) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; and (C) model respect of intellectual property when manipulating, morphing, or editing graphics, video, text, and sound.

(4) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to: (A) use local area networks (LANs) and wide area networks (WANs), including the Internet and intranet, in research and resource sharing; (B) apply appropriate search strategies in the acquisition of information from the Internet including keyword and Boolean search strategies; and (C) pose hypotheses/questions related to a selected problem.

(5) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to: (A) acquire information using appropriate research strategies and a variety of electronic formats, including text, audio, video, and graphics, citing the source; and (B) identify, create, and use available file formats including text, image, video (analog and digital), and audio files.

(6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to: (A) identify and employ a method to evaluate the design, functionality, and accuracy of the accessed information; and (B) analyze information for validity and relevance in the confirmation, testing, and solution of the hypotheses and questions.

(7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to: (A) develop and apply advanced technology applications skills; (B) identify and solve problems, individually and with input from peers and professionals, utilizing research methods and advanced technology applications skills used in a selected profession or discipline; (C) select and integrate appropriate productivity tools including, but not limited to, word processor, database, spreadsheet, telecommunication, draw, paint, and utility programs into the creation of products; (D) use foundation and enrichment curricular content in the creation of products; (E) synthesize and generate new information from data gathered from electronic and telecommunications resources; and (F) read and use technical documentation.

(8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to: (A) work with a mentor to determine problem to be solved, hypotheses, and strategies to accomplish task; (B) develop products that meet standards identified by the selected profession or discipline; (C) produce original work to solve the identified problem and publish the product in electronic media and print; (D) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor; and (E) participate in relevant, meaningful activities in the larger community and society to create electronic projects.

(9) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to: (A) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product; (B) produce documentation to illustrate the progress of the project including, but not limited to journals, logs, videos, pictorial documentation, multimedia products, and printed books; and (C) seek and respond to input from peers and professionals in delineating technological tasks and problem solving.

(10) Communication. The student formats digital information for appropriate and effective communication. The student is expected to: (A) format the developed projects according to defined output specifications including target audience and viewing environment; and (B) present findings to a panel for comment and professional response.

(11) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to: (A) determine and implement the best method of presenting or publishing findings; (B) synthesize and publish information in a variety of ways including, but not limited to, printed copy, monitor display, Internet documents, and video; and (C) use LANs, WANs, and remote resources to exchange and publish information.

(12) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to: (A) design and implement procedures to track trends, set timelines, and review and evaluate the product using technology tools such as database managers, daily/monthly planners, and project management tools; (B) determine and employ technology specifications to evaluate projects for design, content delivery, purpose, and audience, demonstrating that process and product can be evaluated using established criteria or rubrics; (C) seek and respond to input from peers and professionals in evaluating the product; and (D) make necessary revisions and/or proceed to the next stage of study.

Source: The provisions of this §126.29 adopted to be effective September 1, 1998, 22 SWReg 5203.

Appendix II - The State Guidelines for Art Education

§117.51. Implementation of A Southwestern State Essential Knowledge and Skills for Fine Arts, High School.

The provisions of this subchapter shall supersede §75.67 of this title (relating to Fine Arts) beginning September 1, 1998.

Source: The provisions of this §117.51 adopted to be effective September 1, 1998, 22 SWReg 4943.

§117.52. Art, Level I.

(a) *General requirements*. Students may fulfill fine arts and elective requirements for graduation by successfully completing the following art course: Art I (one credit).

(b) *Introduction*.

(1) Four basic strands--perception, creative expression/performance, historical and cultural heritage, and critical evaluation--provide broad, unifying structures for organizing the knowledge and skills students are expected to acquire. Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks. They express their thoughts and ideas creatively, while challenging their imagination, fostering reflective thinking, and developing disciplined effort and problem-solving skills.

(2) By analyzing artistic styles and historical periods students develop respect for the traditions and contributions of diverse cultures. Students respond to and analyze artworks, thus contributing to the development of lifelong skills of making informed judgments and evaluations.

(c) *Knowledge and skills.*

(1)Perception. The student develops and organizes ideas from the environment. The student is expected to: (A)illustrate ideas for artworks from direct observation, experiences, and imagination; and (B) compare and contrast the use of art elements (color, texture, form, line, space, value) and art principles (emphasis, pattern, rhythm, balance, proportion, unity) in personal artworks and those of others, using vocabulary accurately.

(2) Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill. The student is expected to: (A) create visual solutions by elaborating on direct observation, experiences, and imagination; (B) create designs for practical applications; and (C) demonstrate effective use of art media and tools in design, drawing, painting, printmaking, and sculpture.

(3) Historical/cultural heritage. The student demonstrates an understanding of art history and culture as records of human achievement. The student is expected to: (A) compare and contrast historical and contemporary styles, identifying general themes and trends; (B) describe general characteristics in artworks from a variety of cultures; and (C) compare and contrast career and avocational opportunities in art.

(4) Response/evaluation. The student makes informed judgments about personal artworks and the artworks of others. The student is expected to: (A) interpret, evaluate, and justify artistic decisions in personal artworks; and (B) select and analyze original artworks, portfolios, and exhibitions by peers and others to form precise conclusions about formal qualities, historical and cultural contexts, intents, and meanings.

Source: The provisions of this §117.52 adopted to be effective September 1, 1998, 22 SWReg 4943.

§117.53. Art, Level II.

(a) *General requirements*. Students may fulfill fine arts and elective requirements for graduation by successfully completing one or more of the following art courses: Drawing II, Painting II, Printmaking II, Fibers II, Ceramics II, Sculpture II, Jewelry II, Photography II, Electronic Media II (one credit per course). The prerequisite for each Level II art course is one credit of Art I.

(b) *Introduction*.

(1) Four basic strands--perception, creative expression/performance, historical and cultural heritage, and critical evaluation--provide broad, unifying structures for organizing the knowledge and skills students are expected to acquire. Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks. They express their thoughts and ideas creatively, while challenging their imagination, fostering reflective thinking, and developing disciplined effort and problem-solving skills.

(2) By analyzing artistic styles and historical periods students develop respect for the traditions and contributions of diverse cultures. Students respond to and analyze artworks, thus contributing to the development of lifelong skills of making informed judgments and evaluations.

(c) *Knowledge and skills.*

(1) Perception. The student develops and organizes ideas from the environment. The student is expected to: (A) interpret visual parallels between the structures of natural and human-made environments; and (B) compare suitability of art materials and processes to express specific ideas relating to visual themes, using precise art vocabulary.

(2) Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill. The student is expected to: (A) formulate multiple solutions to expand personal themes that demonstrate intent; (B) apply design skills in creating practical applications, clarifying presentations, and defining choices made by consumers; and (C) select from a variety of art media and tools to communicate specific ideas in drawing, painting, printmaking, sculpture, ceramics, fiberart, jewelry, photography/filmmaking, and electronic media-generated art.

(3) Historical/cultural heritage. The student demonstrates an understanding of art history and culture as records of human achievement. The student is expected to:(A) study a selected historical period or style of art; (B) analyze specific characteristics of artworks in various cultures; and (C) select and research career and avocational choices in art.

(4) Response/evaluation. The student makes informed judgments about personal artworks and the artworks of others. The student is expected to: (A) select and critique artworks in progress, making decisions about future directions in personal work; and (B) select and critique original artworks, portfolios, and exhibitions by peers or others.Source: The provisions of this §117.53 adopted to be effective September 1, 1998, 22 SWReg 4943.

§117.54. Art, Level III.

(a) *General requirements*. Students may fulfill fine arts and elective requirements for graduation by successfully completing one or more of the following art courses: Drawing III, Painting III, Printmaking III, Fibers III, Ceramics III, Sculpture III, Jewelry III, Photography III, Art History III, Graphic Design III, Electronic Media III, the College Board Advanced Placement (AP) Drawing, AP General Art Portfolio, AP History of Art, International Baccalaureate (IB) Art/Design SL Option A, IB Art/Design SL Option B, IB Art/Design HL (one credit per course). The prerequisite for Art History III, Graphic Design III, AP General Art Portfolio, AP History of Art, IB Art/Design SL Option A, IB Art/Design SL Option B, and IB Art/Design HL is one credit of any Art II course. The prerequisite for all other Level III art courses is one credit of Art II in the corresponding discipline.

(b) *Introduction*.

(1) Four basic strands--perception, creative expression/performance, historical and cultural heritage, and critical evaluation--provide broad, unifying structures for organizing the knowledge and skills students are expected to acquire. Students rely on their perceptions of the environment,

developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks. They express their thoughts and ideas creatively, while challenging their imagination, fostering reflective thinking, and developing disciplined effort and problem-solving skills.

(2) By analyzing artistic styles and historical periods students develop respect for the traditions and contributions of diverse cultures. Students respond to and analyze artworks, thus contributing to the development of lifelong skills of making informed judgments and evaluations.

(c) *Knowledge and skills*.

(3) Perception. The student develops and organizes ideas from the environment. The student is expected to: (A) analyze visual characteristics of natural and illustrating flexibility in solving problems, creating multiple solutions, and thinking imaginatively; and (B) analyze visual qualities to express the meaning of images and symbols, using precise art vocabulary.

(2) Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill. The student is expected to:(A) solve visual problems by planning and attempting a variety of solutions; (B) solve visual problems and develop multiple solutions for designing ideas, clarifying presentations, and evaluating consumer choices, using design skills; and (C) select from a variety of art media and tools to express intent in drawing, painting, printmaking, sculpture, ceramics, fiberart, jewelry, photography/filmmaking, and electronic media-generated art.

(3) Historical/cultural heritage. The student demonstrates an understanding of art history and culture as records of human achievement. The student is expected to: (A) study a selected period, style, or movement in art; (B) trace influences of various cultures on contemporary artworks; and (C) analyze a selected career opportunity in art, identifying the training, skills, and plan of action necessary for realizing such a goal.

(4) Response/evaluation. The student makes informed judgments about personal artworks and the artworks of others. The student is expected to: (A) select artworks for a personal portfolio based on evaluation of developmental progress, competency in problem-solving, and a variety of visual ideas; and (B) analyze original artworks, portfolios, and exhibitions to form conclusions about formal qualities, historical and cultural contexts, intents, and meanings and to show innovation and provide examples of in-depth exploration of one or more themes.

Source: The provisions of this §117.54 adopted to be effective September 1, 1998, 22 SWReg 4943.

§117.55. Art, Level IV.

(a) *General requirements*. Students may fulfill fine arts and elective requirements for graduation by successfully completing one or more of the following art courses: Drawing IV, Painting IV, Printmaking IV, Fibers IV, Ceramics IV, Sculpture IV, Jewelry IV, Photography IV, Graphic Design IV, Electronic Media IV, the College Board Advanced Placement (AP) Drawing, AP General Art Portfolio, AP History of Art, International Baccalaureate (IB) Art/Design SL Option A, IB Art/Design SL Option B, and IB Art/Design HL (one credit per course). The prerequisite for

AP General Art Portfolio, AP History of Art, IB Art/Design SL Option A, IB Art/Design SL Option B, and IB Art/Design HL is one credit of any Art II course. The prerequisite for all other Level IV art courses is one credit of Art III in the corresponding discipline.

(b) *Introduction*.

(1) Four basic strands--perception, creative expression/performance, historical and cultural heritage, and critical evaluation--provide broad, unifying structures for organizing the knowledge and skills students are expected to acquire. Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks. They express their thoughts and ideas creatively, while challenging their imagination, fostering reflective thinking, and developing disciplined effort and problem-solving skills.

(2) By analyzing artistic styles and historical periods students develop respect for the traditions and contributions of diverse cultures. Students respond to and analyze artworks, thus contributing to the development of lifelong skills of making informed judgments and evaluations.

(c*) Knowledge and skills*.

(3) Perception. The student develops and organizes ideas from the environment. The student is expected to: (A) create themes for personal artworks that integrate a broad range of visual observations, experiences, and imagination; and (B) make subtle discriminations in analyzing complex visual relationships and content, using precise art vocabulary.

(4) Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill. The student is expected to: (A) produce an original body of artwork that integrates information from a variety of sources and demonstrates sustained, self-directed investigations into specific themes; (B) evaluate and justify design ideas and concepts for use in personal artworks; and (C) create artworks, singularly and in series, by selecting from a variety of art materials and tools appropriate to course work in drawing, painting, printmaking, sculpture, ceramics, fiberart, jewelry, photography/filmmaking, and electronic media-generated art.

(3) Historical/cultural heritage. The student demonstrates an understanding of art history and culture as records of human achievement. The student is expected to:(A) identify and illustrate art history as a major source of interpretation; (B) analyze and evaluate the influence of contemporary cultures on artworks; and (C) evaluate a selected career in art, justifying the choice.

(4) Response/evaluation. The student makes informed judgments about personal artworks and the artworks of others. The student is expected to: (A) develop evaluative criteria for selecting artworks to include in a portfolio and senior exhibition that demonstrate a high level of creativity and expertise (B) analyze a wide range of artworks to form conclusions about formal qualities, historical and cultural contexts, intents, and meanings.Source: The provisions of this §117.55 adopted to be effective September 1, 1998, 22 SWReg 4943.

Appendix III – Letter from Researcher to the Campus Leadership Committee

Dear CLT,

I am a professional artist in the sense that I do art for art's sake and have had my modicum of success and continue to put artistic problematics, challenges and artifact-making at the center of my life and heart. Because I have never been interested in making art in exchange for commercial success, I have instead relied on teaching for my economic sustenance. I began my teaching career as a math tutor and have taught many diverse subjects since. Slowly, but surely, my disparate pursuits appear to be merging. (Resume attached and available at: http://www.2cyberwhelm.org/temirose/resume.html)

I don't honestly know why [the Fine Arts Coordinator's] original email to K. touched me, but it did and I very much wanted to meet her. I had, and still have, no idea in particular of how best to organize our partnership. As I said at the CLT meeting, I prefer to work *within* any given environment's mores. It is far more interesting to me as an artist and as a socially committed citizen, to try and be of real help rather than work from a set of ideas that, regardless of their beauty, might nonetheless be utterly irrelevant to the people I wish to work *with*.

Most of the art forms I have trained in are collaborative art forms. Periodically it is necessary for me to work in isolation and I do it but it isn't what I like best. My very best work (I feel) is done with large groups when I act as producer/director as well as coach and participant. These are my favorite projects because they seem to me to increase people's faith in each other and in life itself. The joy that is crated when people find that they can build cathedrals is lasting, both within those who build and for those who wish to visit these uplifting artifacts.

Coming down a bit from lofty metaphors ☺… It seemed from Lanier and my initial conversations, that the best way for me to serve your community is to help coordinate a group responsible for creating and maintaining your web site. I would also assume responsibility for coordinating the design so that the site can

expand over the next few years in a sensible manner and be of greatest use to as many teachers, students and internal groups as possible.

Going to the student council for structural coordination and to a committee formed by the CLT for guiding vision sounds like a strong beginning to a seemingly daunting task. Perhaps next we would decide on a time frame and folks who feel comfortable being my contacts/partners in the school.

Sincerely, Temi Rose (2/6/01)

Appendix III – From the Fine Arts Academy Coordinator: e-mail initiating contact with research community

Thursday, November 2, 2000

Dear K., Thanks for calling me back from H. I'm the director of the Fine Arts Academy for this School District. Students may audition in the areas of music, dance, visual arts and theater arts to attend this school of the arts. We are a grass roots effort that has come a long way in the last five years. [Two other major cities in the state] have the support of their school districts behind their magnet schools of fine arts. Here, there are district support magnet schools for science and liberal arts, but this Fine Arts Academy is not supported by the district in the same way the schools for science and liberal arts are supported.

Some of the most significant support of the Fine Arts Academy comes in a significant partnership between the college of Fine Arts at your university and our Fine Arts Academy.

We are not researchers, but want to know if researchers who are attending the conference would be interested in a grass roots effort like the Captain Dewey Fine Arts Academy. We have set goals and have accomplished goals and certainly have overcome obstacles to have achieved what we have achieved to date.

If we could be involved in some way (informally, since we found out about the conference too late to send in a proposal), I think there would be conference participants who might like to visit our campus and learn more about our school.

What do you think? Will you send me the web address, too, Thanks, K.

Fine Arts Academy Coordinator

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