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Integrating Art and Technology: An Action Research Case Study in a High School in the United States of America, 2001

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Integrating Art and Technology: An Action Research Case Study in a High School in the United States of America, 2001

by

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Dedication

For Diane Schallert, without whose constant care, I cannot imagine myself here, thank you.

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For the subtlety, purity of heart, and vision they shared

For the sheer magnanimity of their repeated acts of kindness and care

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This study was inspired by James Tarrant's (1989) extension of John Dewey's (1916) understanding of democracy and education. Democracy as we dream it has yet to be invented and can only be realized as a process, as the experience of being an equal among equals. It is a moral imperative, in a Kantian sense, for educators to assert their conversational mutuality with students as participants in re-creating democratic process.

The purpose of the study was to explore a much-cited barrier to technology innovation in schools: teacher resistance to technology. Focal participants were teachers, staff, artists, and parents of art students who worked or volunteered in a Fine Arts Academy within a public high school. I found that teacher resistance to technology was a phenomenon amenable to influence through conversation, care, collaboration, and connectivity.

Two new concepts emerged as a result of this study: polarity thinking and emotional scaffolding. Polarity thinking is a perceptual schematization in which concepts are understood to be antagonistic. Certain effects of polarity thinking can delay self-actualization, collaboration, innovation, and change. Emotional scaffolding extends the horizon of Lev Vygotsky's (1934) concept of the Zone of Proximal Development (ZPD) to include Nel Noddings' (1981) concept of the ethic of care in education. Emotional scaffolding supports learners creatively as well as critically.

I recommed that change agents adopt a definition of cognition that values the role emotional intelligence plays in learning, and be willing to participate emotionally as well as cognitively, ethically as well as rationally. I suggest that curriculum theorists interested in technology integration in the schools recognize the importance of celebration and identify joyful, caring ways to share information, skills, and resources with specific schools and individual teachers; to influence the social ecology of education towards connectivities that support group and individual self-actualization.

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Chapter One
The Problem Statement

The specific educational issues that concerned me during this research emerged from my long-term commitment to facilitating community organization for creative projects involving experiences of social equality and peaceful collaboration.

PERSPECTIVES

Cognizant of the proliferation of weapons of mass destruction and stunned by the slayings at Columbine High School in 1999, my question was how might educators be influencing the creation of knowledge towards or away from violence in interpersonal relations?

My perspective was that human beings were not capable of being neutral; emotions guarantee that we have feelings about everything. If we must have feelings about everything then how can educational researchers contribute to an evolution of the feelings contributing to violence in our schools?

Just a few decades ago, emotionlessness was considered the highest aim of intellectual life and the sine qua non of academic professionalism. Today emotionalism is still, perhaps rightly, distrusted. However, currently we have begun to seriously consider, because of the significant work of clinical psychologists, artists, philosophers, and practitioners, that intelligent behavior may very well require emotional resonance; and that rationalism unchecked by appropriate emotional responsiveness has contributed to crimes against humanity.

Howard Gardner (1983) proposed a theory of multiple intelligences. I imagine Gardner's intelligences as tonal qualities of mind, as potentials generating from human experience that can each be developed, and then coordinated into what Gardner called *general intelligence*. This general intelligence includes (among other factors) emotional intelligence.

Expanding our comprehension and appreciation of human potential has long been the project of humanist theorists. If we choose to educate ourselves through the use of force, threats, monetary rewards, and behavior modifications, we are using external motivators to generate fear of loss in order to produce desired outcomes. If we choose to engage in the creation of emotionally resonant interpersonal relationships within which we share the problems and challenges inherent in living, we must rely on self-discipline and internal motivation to generate positive outcomes. The humanist position generally favors the latter choice, minimizing the use of interpersonal tactics (like force) that tend to delay participant ability to self-actualize.

Socio-Constructivism

I am embedded in a socio-constructivist landscape, an ecology of meanings, in which my thoughts and feelings are co-active with those of others. Socio-constructivism is a democratic awareness of others, a respect for the contribution of others. This socio-constructivist research study does not make ultimate truth claims but incorporates deductive and inductive reasoning, self-reflection, and a sensitivity to psychological perspectives in a qualitative narrative describing the events and conversations that took place during an action research

initiative in a high school. The initial purpose of the action research was to integrate technology into the fine arts curriculum.

National Research Perspective

The *Goals 2000: Educate America Act* (1994) made educational technology a funded educational priority. The same act recommended that art have a place in the core academic curriculum. Several Department of Education studies in technology integration have focused attention on the lack of teacher education in technology (MacPherson, 1994; White House 2000). Some studies have asserted that teachers are resistant to technology innovation in their classrooms (Hodas, 1993; Saba, 1999; Solmon, 2000; Slowinski, 2000). Other studies concerning technology integration into the curriculum emphasized the value of technology for math and science (Boser, 1998; Cajas, 2000; Pannabeker, 1995; 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).

Teaching and Technology

Technology is more often integrated into schools as a tool before being introduced as a discipline in its own right. For the purposes of this study I was not concerned with technology as a discipline, a fascinating subject but one with very different parameters than the integration of technology as a tool to support and enable the evolution of existing curricula. In the state in which this study took place, the curriculum and the procedures for student evaluation were determined

district-wide and teachers could make only minimal alterations. Teachers participating in this study were familiar with computers but not expert in any particular functionality.

I merged Dewey's assertion that experiential learning was fundamental to democratic education (1916, 1938) and Maxine Greene's (1978, 2001) concept of the creative potential of meaningful relationships in educational settings with Noddings' (1981, 1984), Goldstein's (1997), and Gilligan's (1987, 1988) assertions that caring relationships were just, meaningful, and educative. I wanted to explore the potentials of conversational and collaborative equality as a democratic principle in an educational setting. I thought that educational technologists were obliged, no less than any other educational professional, to promote democratic principles by engaging in democratic conversations and relationships.

Qualitative Research

The writing of a qualitative case study in education was itself an experiment. Methodologies evolve. Qualitative educational research is no exception. Methodologies represent the researcher’s concept of best practice with regard to the nature of the inquiry. At this writing, a qualitative researcher has many choices and creative possibilities open to her. My main challenge was to further the social science conversation while participating in the evolution of the ground upon which this conversation rests.

One 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 must be considered a relational act; taking into account the interpersonal, symbolic, and communicative nature of instructional praxis will enlarge the scope and alter the impact of education. The increase in scope and the alteration of the impact that qualitative research implies and promotes, make it crucial for us to consider social responsibility a necessary element in the procedures of interactional (the life, natural, and social) sciences.

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 (Maimonides, 1200/1946; Spinoza, 1677/1883) and the power of relationships to manifest inter- and intra-personal change (Macmurray, 1936; Rogers, 1962). As an artist, I have not limited myself to any particular medium. I have used computers, publishing, television, theater, poetry, 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 the formal qualities of relationships and social structures. As a researcher, these same interests came into play.

I am fascinated with how groups manage (or do not manage) to make meaning together and further, how group interactions and mutual interpretations affect a 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.

I 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, is evidence of a growing human ability to bridge what used to be considered incompatible modes of thought and activity. This study aims to aid in building this conceptual bridge.

VALUING AESTHETIC COGNITION: ART IN ACADEMIA

Some educational theorists, firmly and fiercely devoted to the preservation of the centrality of art in the academic curriculum (Bruner, 1985, 1986, 1990; Eisner, 1976, 1978, 1998, 1999; Gardner, 1990), sought to justify the centrality of art education by asserting that art education contributed to the improvement of general intelligence. These writers asserted that, in order to keep art a subject in the core curriculum, evaluation methodologies corresponding to those used to

measure achievement in other core subjects had to be developed and consistently employed. While I applaud these efforts, I hope that those of us committed to art in academia not allow ourselves to be swayed by the fallacy of total pedagogical uniformity, nor allow ourselves to participate in the subjugation of teachers (and students) to the stress and humiliation of "teaching to the tests."

Another branch of educational literature, exemplified by the work of Maxine Greene (1978, 1988, 1995, 2001) and William Pinar (1975, 1981, 1992, 1998), encouraged researchers and educators to appreciate the unique power of learning moments that are mutual processes of self-discovery and the value of individual perspectives. Greene and Pinar have repeatedly asserted that teaching itself could be a creative, ethical act.

There have been two main efforts in the struggle to promote art in the schools. First, the attempt to consider art from a generalized perspective, developing forms of classification and evaluation to secure art a central place in the curriculum, and second, the attempt to justify art education on the grounds that its communicative and creative power assures art's universality and its centrality in society. 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 efficacy of this perspective in the context of an action research initiative that would integrate art and technology in a high school curriculum.

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 (Barber,1994). My assertion is that art and technology are mutually receptive: developments in either discipline have caused profound alterations and developments in the other. In the following, I will discuss some theories relevant to the perspective of an inherent and mutual receptivity between art and technology.

Ellen Dissanayake (1988, 1992) theorized that art was a behavioral, ethnobiological necessity. Dissanayake proposed that “making special” was a core drive, intrinsic to human nature. The act of transforming objects and persons satisfies an innate need to celebrate and signify. The repetition of creative acts of transformation caused their evolution into ritual while the artistic act itself, Dissanayake asserted, remains tied to 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’s contention was that intelligence derived from an instinctual need to handle fear and pain. Her example was a mother, wishing to distract her child from the pain of a hurt finger, asks her

daughter to identify objects outside the window. Engaging with the world causes the child to be distracted from her pain. Harrison stated that early societies created gods of thunder and lightning from painted, danced, and sung representations of these feared powers. Over time, these representations became secularized into what we understand as art forms.

Although there is a notable similarity between Harrison's theories and Dissanayake's, Dissanayake did not include Harrison in her bibliographies. I assumed that Dissanayake came to her conclusions regarding the social embededness of art, following a different path than Harrison's. Similar conclusions arrived at by dissimilar methods has often been considered a sign of a resilient possibility.

Harrison (1913, 1962, 1973) insisted that action preceded understanding. Harrison showed that religion developed from rituals rather than the other way around. Using early Greek art as evidence, Harrison convincingly described the evolution of religion from ritualized acts and then the gradual independence of art forms from religious practice. Later, scientific questioning grew out of artistic exploration and then gradually became a discipline in its own right. Harrison's assertion was that new cultural influences and discoveries must be integrated first into familiar forms. Harrison called this "new wine into old bottles" and insisted that this was 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 my view, art is a

foundational cultural experience: Art does not surpass in importance later cultural and cognitive developments such as astronomy, math, science, or technology, but neither can art be entirely subsumed into these other symbolic systems (Cassirer, 1955d; Harrison, 1962).

Stages are often used in educational literature as a convenient and cogent way to characterize learning moments, cognitive development, and progressive mastery (Piaget, 1950, 1952, 1970, 1977; Mezirow, 1991). But, contrary to common interpretations of stage theories of development, I assert that traces of prior stages and experiences can be perceived in later stages. Early stages and experiences tend to influence any process, throughout its development. Art, language, science, and understanding all evolve. Often, it is in the realms of art and poetry that new concepts, relationships, visions, and values have been developed and articulated. Art has often inspired scientists. And scientific advancements, both technical and theoretical, have influenced art subjects, methodologies, and, of course, the lifeworld of artists.

It is my assertion that the mutual influence of science and art can and should be formally acknowledged by educators searching for methodologies suitable for new pedagogical practice suitable for the digital information age. Grounding in scientific principles can provide learners with the critical, intellectual tools they need to question facile or manipulative artistic assumptions and techniques. And, exactly the same is true in reverse: A grounding in artistic principles makes it possible to challenge the assumption of neutrality often taken by scientists and technologists who are anything but neutral politically,

educationally, socially, or emotionally. Art and science are different enough in their methodologies and praxis to enable vital, mutual critique and support.

A complex democratic society, dependent upon a variety of technologies, including information technology, will require its members to be sufficiently dexterous in both scientific rationalism and creative imagination to participate autonomously as citizens (Apple 1982; Arendt, 1977, 1978; Bennett, 1996; Freire, 1998; Tarrant, 1989, 2001). One of the myriad challenges facing educators today is how to integrate these disparate domains while maintaining the integrity of their epistemological diversity.

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 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. Social change is inevitable but thankfully, change is slow to take root in human minds and hearts.

TECHNOLOGY IN EDUCATION: ETHICAL CONSIDERATIONS

Distinct from the crises of legitimization daunting the art curriculum, 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). In the educational technology literature, technology in education is usually described as

progressive and benign, while those who "resist" technology integration are described as unwilling or incapable of adapting to change.

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). Dewey's argument for progressive education was not the mainstream curriculum position of his time. However, by the later part of the same century, curriculum specialists were promoting constructivist principles (Kleibard 1986, 1992) as legitimate *because* they were progressive. Today, majority values in the United States are distinctly in favor of educational goals oriented towards scientific, technological progress. Dewey, it would seem, is at last victorious. (See Appendix A for state guidelines for technology education, 2001.) But Dewey's argument was not that science needed to be included in the curriculum because science, in its essence, was progressive, but rather that scientific knowledge was going to be necessary for the evolution of a newly industrialized, engineering-dependent, United States. Dewey's position was that a democratic education whose aims must benefit citizens can only accomplish this by taking into consideration the social situation, the actual lives of citizens, and looking to the future as well as to the past.

RATIONALE FOR THIS STUDY

There was little research literature on the integration of art and technology in the curriculum when I began this study. A qualitative methodology suited my aims because the methodology supports subtlety and interpersonal meaning-making. Because the literature on technology integration suggested that there was

teacher resistance to the integration of technology into the curriculum, action research methodology suited my purposes because, without sacrificing the central goals of the change process, the methodology is flexible and can be modified according to the needs of participants

I decided to attempt the integration of technology into the curriculum of the Fine Arts Academy in which I had been invited to do research. When I embarked upon the project, the technological purposes were multifaceted but the specific action focus was the improvement of the fine arts section of the school web site. This activity focus provided an opportunity to explore my central question, whether technology integration could be effected primarily by means of conversational reality (Shotter, 1993a) and the ethic of care (Noddings, 1981). Action research methodology developed out of a concern with issues of justice (Atweh, Kemmis, & Weeks, 1998; Kemmis, 1993), non-violence, and social organization but so far as I could find, there have been no articulations of the ethic of care as a moral perspective within an action research approach. And, although conversational reality theory embodies many perspectives similar to action research theory, I did not find specific studies that encouraged the combining of these theoretical stances in educational fieldwork.

I approach technology as an artist: I explore the communicative possibilities that tools afford for socially ethical, creative action. The vast opportunity that computers afford for artistic and ethical purposes is not well explored in the educational research literature. I felt that a study that explored an artistic (essentially communicative) alternative for integrating technology could

contribute to both the literature on technology use in schools and to the literature concerning art in education.

It was particularly tempting to use the World Wide Web (WWW) as the medium for a technology change initiative because the WWW embodies in its design the principles of collaborative meaning-making fundamental to artistic and democratic practices. This study was an exploration of democracy in education as manifested in socially responsible, conversational interactions during a technology change initiative in a public high school.

The action initiative sought to co-create a viable environment for continuous technological integration into the curriculum through a shared experience of one particular technology initiative. If the action initiative was successful, participants would be encouraged and feel confident to continue the process of technology innovation on their own, once the researcher had left the site.

Further, I hoped that this study would contribute to conversations concerning conversation itself used as a tool for change in educational environments. In the field of clinical psychology, conversation has been acknowledged to be a useful tool for interpersonal meaning-making but conversation has been less well studied in the fields of art and technology education. This study will use face-to-face conversations and mediated conversations to analyze some of the interpersonal interactions that affected a technology change initiative.

Another fundamental purpose of this study was to apply the ethic of care during a change initiative and to describe what occurred. I wondered whether a care perspective on the part of the change agent (myself) would ameliorate the anxiety surrounding the integration of art and technology thereby affecting teacher resistance to technology innovation. Perhaps a care orientation will turn out to be a necessary element of the collaborative, co-equal practice that Dewey and others have described as essential to democratic practice and education.

Before moving on to the literature review, 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 become a custom widely held, evolving to support ongoing negotiated, meaning-making. Then, by articulating an experience of art and technology integration in a specific high school, I hoped to join my efforts with those of other artists, technologists, and educational theorists who wish to diminish the destructiveness of educational mythologies that polarize as they divide.

Chapter II
Literature Review: Weaving a Web

John Dewey understood that the education of individuals affected the structure and capabilities of society. He encouraged educators to create learning environments that would support the development of personal responsibility in students. The essence of democratic education, from a conversational, interpersonal perspective, is the promotion of egalitarian relationships while facing social and intellectual challenges. As an instructional technologist, I have every reason to use the same democratic processes to educate teachers that I expect teachers to use to educate their students.

Everything we are as a civilization is people in relationship. This seems to me to be Dewey's great contribution to educational theory, his contention that education is the living moment in which learners meet with teachers to create not only knowledge *of* civilization but civilization itself.

From my point of view, the primary benefit of using technology in education is the greater connectivity we can offer students and teachers - both through real-time connections and by making available high quality knowledge systems and learning packages. My main objection to the way technology is generally presented to educators is that the emphasis is on the manipulation of hardware and software but rarely on the potential for connectivity that technology affords. Except to discuss with dismay the need to protect systems from people and people from dangerous information, instructional technology research

literature rarely examines the philosophical or cultural implications of information technology products or procedures.

This study will examine some cultural patterns during an action research initiative whose primary goal was the integration of technology into the curriculum. The literature review for this study covers the following, each in its own section: 1) action research; 2) technology in schools; 3) art in schools: theory; 4) art in schools: practice; 5) adult education: self-determination; 6) conversational reality; and, 7) justice, responsibility, and care.

ACTION RESEARCH: HISTORICAL ANTECEDENTS, PRINCIPLES, AND METHODOLOGY

Action research and the ethical system underlying participatory democracy developed from theories of social justice described and promoted by enlightenment scholars as early as the 17th century. Benedict Spinoza can be considered the first enlightenment scholar although, in the realm of educational discourse and historical analysis, Immanuel Kant is generally credited with originating the philosophy of the ethical society.

Spinoza (1677/1883) wrote and lived for his vision of religious freedom. Seventeenth century Europe was immersed in religious warfare. Spinoza asserted that God and nature were one and that religions can and should co-exist. Spinoza was the first European philosopher to assert a schema for a peaceful, diverse, and pluralist society.

Kant is credited with the origin of an intellectual, empirical, logical, and epistemologically oriented argument for the fundamental validity of ethical

behavior in society. The task Kant set himself was to explain how some people could feel a moral imperative to ethical, interpersonal relations when logic led to the unmistakable conclusion that acting exclusively in one's self-interest was the way to the good life. Kant's critique of reason (1781/1965) was that it could lead us only to the conclusion that selfishness was the greatest good. And yet many of us feel the drive to work cooperatively and for the good of the group. Kant asserted that this desire to work for the good of others was an intelligence that used a different sort of logic than the reasoning used in support of utilitarianism.

In the 20th century, Europe was once again immersed in what might have seemed to be an interminable state of warfare. The two world wars inspired many intellectuals to challenge cherished rationalist perspectives in the hopes of, if not ending war entirely then at least examining the precursors and effects of war in order to prevent humanity from descending into a hell of mutually-inflicted violence, pain and misery.

Hannah Arendt (1963, 1977, 1978), Ernst Cassirer (1955a, 1955c, 1956), Kurt Lewin (1936, 1939, 1948, 1951) and Lev Vygotsky (1934/1962, 1925/1971) posed particular challenges that are relevant to this study. Arendt, Cassirer, and Lewin (all profound thinkers) were concerned with explaining the origins and the effects of the social and psychological damage perpetrated on society through the use of such technologies as gas chambers and atomic bombs. Lewin, Cassirer, Arendt, and Vygotsky wrote about the potentials and perils of manipulating social groups and individuals through language. Each made significant contributions to

our understanding of the symbolic power of inter- and intra-personal meaning-making.

Arendt and Vygotsky: Thinking, Action, and Relationship

The ideas of Hannah Arendt (1954, 1964) made an indelible impression on me as a young adult. The application of her theories has been fundamental to my work as an educator and community organizer. I adopted the concept from *On Revolution* (1963) that lasting social change emerges out of practical applications not solely 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 description of thinking (1978) was similar to Vygotsky's (1934/1962) assertion that higher levels of thinking took place only once thought was capable of handling *both* the analysis *and* the synthesis of concepts. Other activities often thought of as thinking. for instance generalization and classification, belonged to earlier stages of cognition and were pre-requisites to conceptual thought but were not as flexible, nor as capable of leading to creative, social action.

Arendt asserted that thought was the mind following its own pursuits, free from the necessity of solving practical problems. According to Arendt, once the mind has had time to think thereafter, when called upon to solve particular problems, the mind quickly extrapolates relevant concepts and applies them to the problem at hand. Arendt stated that this type of free thinking (thinking free from utilititarian application) was inherently ethical and stood in contrast to thinking

that was simply a form of rule-following. In *Life of the Mind: Thinking* (1978), Arendt asserted that free thinking itself could be a safeguard against unethical acts.

Arendt coined the term “the banality of evil” in her book *Eichmann in Jerusalem* (1977) to describe the supremely ordinary logic Eichmann used to justify his duties as a Nazi. He had been told what to do and he did it, that was his job. Perfectly simple: Follow orders. Arendt’s contention was that thinking created complexity, what we might call relativity, and this complexity made it impossible to take part in the simplistic banalities of evil.

Cassirer: Symbol Systems

Cassirer (1955a, 1955b, 1955c, 1955d) is considered, as is Arendt, a neo-Kantian. Beginning his intellectual pursuits examining the history of science, he soon found his perspective that symbol systems underlay all historical understanding. He is credited with originating the philosophy of symbolic forms. Developed from Kant’s description of the formal organization of mental constructs, Cassirer’s assertion was that meaning rests on a foundation of symbols. Cassirer's description of the active role symbolic systems play in cognition and in the historical development of epistemologies is salient to this study. Symbol systems provide the elements from which the mind constructs operant schemata upon which conversations rely in order to structure, communicate, and re-structure meaning.

Often the symbolic basis of someone’s orientation is related to, or even determined by, the pedagogy and epistemology that they have been taught and in

turn, teach. Often there is an affinity between how people like to organize their minds and the subject area that they choose for their concentration.

In the midst of the sturm und drang of social communication for organizational change, sorting out where people are coming from can be aided not only by understanding their operant schemata but by interpreting the symbolic bases of their mental representations. In order to analyze specific conversations with a view to organizational change, my attempt in this study was to decipher some elements of the symbol systems used by the participants.

When participants hold personal narratives that are thwarting their full participation in a change effort, these narratives are often revealed to a change agent in conversations. When a participant's schemata derive from symbolic representations inimical to the proposed change, it will be more challenging for a change agent to effect change solely through conversation. Symbols are more fundamental, less likely to be available to the conscious mind and therefore more difficult to affect than schemata or narratives (Gersie & King, 1990; Gersie, 1997; Gilligan, 1982, 1990). Nevertheless, in making decisions as to the probable effectiveness of initiatives and activities, an awareness of participants' general experience, narrative style, and favored symbolic referents can be helpful.

Lewin: Social Organization

Kurt Lewin is known 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. And, along with Arendt and Cassirer, he is considered a neo-Kantian.

Lewin introduced the idea that researchers have the potential to influence the events that they are studying and that they have a moral obligation to attempt to effect beneficial change by sharing knowledge that could contribute to an improvement in the lives or circumstances of participants (Argyris, 1952). Lewin's perspective was that individuals experienced their lifeworld 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 involved in the change effort. Lewin did not use the terms social ecology (Shotter, 1993b) or systems thinking (Mink, 1979, 1998), but his methodology requires a similar examination of intersecting, overlapping, and inter-relating systems.

With Lewin as its philosophical father, action research has maintained a socio-political agenda of increasing social harmony and disabusing authoritarianism (Dadds, 1995; McNiff, 1993). However, action research does not necessarily share critical pedagogy's purposes of empowerment through the illumination of economic and political oppression. The critical pedagogists' perspective was that radical intellectual conversation could free the minds of oppressed people so that they might come to view their situation as oppression and then take action to ameliorate the situation. Lewin's action research perspective was that careful listening to participants' reports regarding their situation could lead a researcher, through careful analysis of the forces acting in the environment on individuals and groups, to recommend or initiate structural changes in the organization of the social system.

Although there are aspects to the theoretical stance of critical pedagogy, particularly evident in the work of Freire (1973, 1989, 1993, 1994, 1998) and Apple (1979, 1982) that have been illuminating and inspirational for me, because of its essentially polarized and politicized methodology, critical pedagogy was not a suitable philosophical framework for the kind of action research I wished to pursue (Ellsworth, 1989). I do not interpret action research as revolutionary in an aggressive sense. I interpret action research as a call to participate as an engaged individual with the supra-personal agenda of contributing to inclusive, peaceful, democratic processes.

Action research involves a cyclical process of active participation and self-reflection. When an action researcher works in 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, attempts to clarify and ameliorate social inequities through participation in, and analysis of, the social/professional praxis taking place in a specific environment.

Recent Developments: Group Interaction and Knowledge Creation

Oscar Mink's work (1970, 1979, 1993a, 1993b, 1993c, 1994, 1998, 2000) provided inspiration and guidance for this action research study. Mink’s theory of open systems, his work in organizational change, the learning organization and knowledge management reinforced for me my experience that personal development works synergistically in groups.

Mink has written that change in organizations relied upon a change agent’s ability to identify and support individuals in that organization. The

support must manifest in the form of an attitude of acceptance towards individuals as people and simultaneously, in concrete, pragmatic efforts to accomplish group-identified goals. Group synergy emerges, according to Mink, when people 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, completely removing the barriers thwarting individual and group emergence is an impossibility. Nevertheless, in my experience, acceptance of and respect for people can remove many barriers to change.

Gordon Lippitt (1978, 1982) has collaborated with both Mink and Lewin. One of Lippitt's most original contributions was the T-group model. T-groups were training groups, small groups in an organization who, working with the change agents, went through a change process and then facilitated change throughout the organization. T-groups actively participated in creating the change model. Through conversation and shared experiences, T-groups co-created solutions with the change agent. According to Lippitt, once T-group members have understood the change process and made significant meaning together, the rest of the organization will inevitably be changed.

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 aim 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 all support the idea that people have within themselves the ability to co-create new patterns and options. The historical thrust of the philosophy and practice of action research has been towards individual autonomy in a context of social responsibility (Carson & Sumara, 1997).

TECHNOLOGY IN SCHOOLS

This section on technology in schools will first review the organization and educative potential of the World Wide Web, and then discuss several recent research studies in the area of technology in schools. This section ends with a reiteration of the inherent connection between art and technology.

Connectivity and Collaboration

The World Wide Web (WWW) was invented by Tim Berners-Lee (1999) who then relinquished his right to patent the software engineering. Berners-Lee gave the WWW to the world so that no one could ever own it, so that everyone would have the right to work with it. Perhaps the reader will enjoy thinking of the WWW as an international park, preserved in order to be accessible to everyone equally, as a citizen of the world. Berners-Lee wrote that he hoped that the WWW user would do more than passively receive information, or merely advertise and sell merchandise (utilitarian usage). Berners-Lee intended the WWW to be held in

common, a medium for boundaryless collaboration, knowledge building, and lifelong learning (humnitarian usage).

Berners-Lee received his doctorate from Oxford in classification systems. Berners-Lee 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 to CERN 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). Berners-Lee's challenge was to enable scientists working at CERN to share knowledge when each scientist's computer was likely to use a different operating system (i.e. different ontologies). Berners-Lee's solution was the development of HTML, hypertext markup language. The development of hypertext and the WWW is a fascinating story but not particularly relevant to this study. However, Berners-Lee's original concept, to facilitate collaboration, his beneficence in insisting that the web remain free and available to anyone and his concept of a world-wide, open and shared mind was an inspiration that delighted my hopes and led me to attempt a technology integration initiative focused on improving the school's web site. (See Appendix B for my letter to the Campus Leadership Team.)

In his book, *Weaving the Web* (1999) 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" (p. 1). Clearly, the web offers an opportunity to

explore collaborative and heterarchal organizations of material, information, and relationships.

Recent Research in Technology Education

This section includes a brief discussion of five articles on technology education. The articles concern technology refusal, technology literacy, conceptual change, creative thinking, and conditions for learning.

Technology refusal. Steven Hodas' oft-cited article, *Technology Refusal and the Organizational Culture of Schools* (1993), was critical to the conceptualization of this study. I will examine some of Hodas' points in depth.

Although Hodas challenged a general assumption in instructional technology when he asserted that technology was "never neutral," he did not question whether or not technology (as a system) was pedagogically benign. He pointed out that the integration of technology carried with it a set of practices that would either be in alignment with or contrary to the organization of the school.

Hodas reported that technologists were continuously disappointed in their dream of technology changing the way schools work because they would not take into consideration the fundamental stability of schools' organizational patterns. However, Hodas did not reverse his lens to question whether or not schools were disappointed in their dream of technology helping them with their curricular challenges. Hodas did not unpack, deconstruct or analyze what precisely a technologist's ideal school might be (Leonard, 1968). Hodas did assert that technicians considered efficiency to be a feature of enlightenment and hoped to make schools enlightened by making them more efficient. Technicians also,

according to Hodas, made the assumption that schools were themselves technologies that could be engineered.

Hodas characterized school cultures and organizations as being self-protective, extremely hierarchical, and profoundly conservative. However, my previous experiences introducing television technology into the schools as an artist-in-the-schools had not been that school cultures were self-protective, rather they were centers of intense gossip and constant social, emotional and political manipulation and upheaval. In my experience, school cultures were not homogeneous nor did they function for self-protective interests. In fact, I had often hoped that schools might act more consistently in their own interest; schools so often have taken the brunt of every critical breeze that blows across the political landscape. And, once again, Hodas did not question whether or not technology itself and the cultural organization of technology might be considered self-protective, extremely hierarchical, and profoundly conservative from a curricular perspective.

Schools themselves did not seem to me to be extremely hierarchical. However, I had often noticed that the central bureaucracies that run schools, that handle the funding for schools, had many levels to their hierarchies, resulting in teachers being virtually cut-off from decision-making processes. Workers being far removed from the decision-making affecting their work has been a socio-political factor endemic to western civilization. I had little doubt that hierarchy was a factor in teacher resistance to technology. However, I was not convinced by Hodas' argument that teachers had thoroughly internalized hierarchical methods

and principles. Nor was I convinced that teachers were resisting technology because of technology's inherent progressivism.

Hodas' assertion that schools were essentially conservative was also problematic: Although I have found that the curriculum is often controlled by socio-political conservatives, I have experienced, both as a student and as a teacher, periods of time when teachers and even entire schools have taken the lead in progressive social and political action and discussion.

Hodas 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 seriously doubt that we possess a reliable statistic on teacher reading habits. Hodas also asserted that teachers were: a) comfortable with the premises of conservative educational bureaucracy; b) without other career options; and c) those who felt a "call" to be teachers, soon lost that idealistic stance and gave into a reluctant drudgery lasting until their retirement. The teachers I have known have not necessarily been thrilled with their roles nor entirely content with their situations, but most of them have been dedicated, intelligent, caring, hard working, self-sacrificing, and progressive in the sense of believing that the future is worth working towards. Many of my teachers, from as early as the first grade, have changed my life profoundly and for the better. Many teachers I have worked with have taught me to see deeper into the world and into people. Many of my teachers challenged me to open my mind and my heart by modeling an openness of mind and heart.

Hodas' view of the "culture of technology" and the "culture of refusal" was illuminating and did correspond to my experiences with corporate and academic instructional technology. Hodas reported that computers were developed from a factory model of industry. Further, he asserted that the basic purpose of educational technology has been to facilitate the transfer of skills and information.

"The culture of refusal," in Hodas' view, was a "struggle over the soul of the school…[a struggle between] self interest and self definition." Was the primary symbolic dichotomy determining the course of technology innovation a struggle between two forms of selfishness? Had our educational Atlas finally shrugged altruism in favor of materialism and labeling? Perhaps. Perhaps not entirely. I thought, by engaging altruistically, I could facilitate a technology integration initiative that would *support* the soul of a school – a soul that I perceived as altruistically struggling to actualize its potential to make complex, democratic, educative meaning.

Technology literacy. Cajas (2000) called for a clear definition of technology literacy in order that technology advocates could more easily argue for technology's place in the curriculum as a unique 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 that of technology as a tool (the definition most commonly held at present).

Cajas called for research that would "help clarify" technology literacy. I did not agree with Cajas that technology deserves a unique place in an already overcrowded curriculum. And I did not feel that a definition was the critical element in technology's evolution into an academic discipline. My view is that technologists must address the value systems and social purposes that have contributed and could conceivably contribute to the development of the field (i.e. theoretically cogent analyses of the history of techne and the variety of philosophies incorporated into technological forms) before technology can be considered an epistemology or deserve a place alongside other academic disciplines. In the meantime, I agreed with Cajas that more research was needed to define technology literacy and I hoped that my study would contribute to the ongoing conversation concerning this definition.

Conceptual change. Georghiades' study (2000) was in conceptual change learning (CCL). CCL focused on the cognitive step science and math students must take in order to comprehend concepts that do not easily or immediately correspond to a common view of a phenomenon. In the CCL field, the challenge was to facilitate comprehension of non-intuitive conceptualizations.

As far as I know, CCL has never been allied with art education. This is astonishing to me since traditionally one of art's primary purposes and cultural values has been to alter standard conceptualizations. Surely CCL is an area ripe for a merging of science and art, goals and pedagogies. I hoped that this study would support this kind of merger.

Creative thinking. Pithers and Sodden (2000) observed that definitions of critical thinking often left out and even purposely excluded creative and imaginative thinking. These researchers contended that education ought to concern itself with the development of wisdom. Wisdom, in their view, would be a merging of critical and creative thinking. I note that there was no mention in their article of Project Zero (Nelson Goddman's Project Zero, a Harvard-based initiative designed specifically to study the relationship between creative and critical thinking, is discussed in Art in Schools: Theory, later in this chapter). Technology curricula usually do not cover developments in art education. This was more incentive for me to research technology from an arts perspective. Readers exposed to literature concerning both art and technology education might discover an interest in pursuing an effective, affective, ethical integration of modes of critical and creative thinking.

Conditions for learning. Hansen's study (2000) focused on action research and technology. Hansen's main point was that action research was the ideal methodology for technology educators because technology education was already based on situated, constructivist, experiential learning.

Hansen asserted that technology teachers had a bias towards using Kurt Lewin's technique of creating environments conducive to learning rather than transferring information in a procedural manner. Hansen quoted Einstein as having said, "I never teach my pupils; I only attempt to provide the conditions in which they can learn" (p. 24). One final point of interest in Hansen's study was his understanding of technology education as providing a balance between "the

discursive and the manual" (p. 30). He stated that the fields of art, medicine, and agriculture had traditionally provided a balance between "the discursive and the manual." This was the only study I found in technology education in which there was a statement describing a pedagogical similarity between technology and art.

The educational theorist Jerome Bruner has been extremely influential in the field of educational technology, both in the area of conditions for learning and cognitive theory. Unfortunately, technology designers seem to have been more aware of Bruner's extension of Piaget's learning stages (1959) and less aware, and much less interested in Bruner's later work on the co-construction of meaning and negotiation (Bruner, 1985, 1986, 1990).

An Aesthetic Critique of Technology

I initially chose to read Choe's book *Toward an Aesthetic Criticism of Technology* (1989) as an aid in designing CD-ROM-based learning materials for a software division of a large computer company. I was looking for an analysis of why so many instructional technology designs seemed to be so conceptually/aesthetically limited. Delving in, I found that Choe's book was not a critique of technology's lack of aesthetic appeal but a careful delineation of the intrinsic similarity between aesthetics and technology. Choe's book was so vital to my thinking regarding this study that I go into his analysis in 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). Choe brought together the constructivist paradigm and critical pedagogy's agentic, engagement in social co-construction.

Choe's statement that "the notion of formal choice in technology [must be brought] to the fore" (p. 3), referred to the notion that aesthetics' disciplined examination of formal choice in the making of objects, events, and experiences should be extended from the realm of aesthetics to study the choices made in the field of technology. He went on to say that "artistic and technological discoveries are *both* [italics mine] grounded in system building" (p. 10).

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). Cajas' (2000) research agenda (to define technology literacy) might benefit from this line of questioning. When examining the place that technology should have in education, the issue of form-construction is apt. What form-construction processes are taught in school today? A discourse has evolved concerning the various cognitive abilities developed through the different types of form-production (Gersie & King, 1990; Goodman, 1978; Langer, 1963; Ruddick, 1989; Schank, 1986; Turing, 1948/1968). This discourse has created a common ground in the divide between *knowledge how* and *knowledge that* (Degenhart, 1982; Hyland, 1993), a divide that has crippled both academic and vocational education with an insistent denial of the basic human need to integrate knowledge with action.

Often those people taught to work with forms (vocational training and some versions of scientific, engineering, and artistic curricula) are not given an

education in values and reasoning sufficient to question the roles that they play, the activities that they engage in, and the products that they produce (Apple, 1982; Dewey, 1916; Efland, 1990; Lindeman, 1926; Tarrant, 1989). In contrast, those trained to work with concepts (traditional academic training) are rarely given an opportunity to experience how our concepts influence practical reality, persons, or relationships (Rose, 2000).

Choe contended that it was the “non-utilitarian structures [that] have stretched the limits" (1989, p. 129) of our understanding of natural processes. In other words, Choe agreed with Harrison (1913, 1962) and Dewey (1934) that it has been art that has provided the inspiration for scientific and technological progress. Choe’s argument also corresponded to Arendt’s conception of the ethical role that non-utilitarian, free thinking plays in the life of the mind.

I will end the discussion of Choe’s book with two quotes that I found particularly inspiring. 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, but a *producer of experiences* [italics mine] that contribute to building a creatively habitable world” (1989, p.11). And, the final words in this section on technology in the schools, “technology, like poetry, creates form and material for further activity of the mind” (p. 111).

ART IN SCHOOLS: THEORY

Democracy and Education (1916), *Art as Experience* (1934), and *Experience and Education* (1938): It always seemed to me that there were two

books missing, logical continuations of Dewey's astounding trilogy, books that would bring together Dewey's vivid descriptions of living democratic action with his equally vivid depiction of thinkers as creative actors. 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 explored concerned the interrelationship of art, experience, education and democracy. I was interested in supporting the co-operative evolution of these four titanic concepts in the life of a school through an experience of technology integration, created and shared in moments of co-agentic conversation.

This section on art education theory provides an overview of the work of some theorists who have made significant contributions to the present understanding of art in the curriculum: John Dewey, Eliot Eisner, Jerome Bruner, Arthur Efland, Nelson Goodman, Howard Gardner, and Maxine Greene.

Art in the Curriculum

Dewey pointed out that knowledge was embedded in, and also derived from, experience. For democracy to continue to exist, democratic experiences must play a significant role in education. For Dewey, art's cultural significance lay in the nature of its practice. Dewey understood artistic praxis as a process involving engagement with the tangible and, simultaneously, with the intangible.

Art brought together, in the experience of the artist, body and soul, mind and matter, and finally, self and other. Dewey's thrilling assertion that people were the means *and* the ends of education, art, experience, and democracy has been the focus of many humanitarian educational efforts.

Eliot Eisner (1976, 1978, 1985a, 1985b, 1994, 1998, 1999) argued eloquently that art belongs in the core curriculum. Eisner's argument focused on the necessity of creating standards and evaluation systems that would guarantee art a standing equal to any other academic subject. Eisner's conceptions were influenced by his background in art criticism. Eisner is credited as the progenitor of the *discipline-based arts* curricula presently funded by the J. Paul Getty Foundation. Discipline-based arts is a cognitive and organizational structure for art education that eases assessment and evaluation by incorporating the ethos and structure of pragmatic efficiency. On one level in particular Eisner's argumnent has been successful: the justification for the centrality of art in the curriculum has been incorporated into our national standards (Goals 2000: Educate America Act, 1994). (See Appendix C for state guidelines for art education, 2001.)

Jerome Bruner (1985, 1986, 1990, 1996) has contributed a great deal of theoretical and practical support for creative thinking as a necessary element of cognition embedded in his descriptions of 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 actively participate: Learning activities are designed to lead students to realizing the truth of extant theoretical models.

Jerome Bruner, later an educational advisor to Presidents Kennedy and Johnson, helped organize the Woods Hole Conference in 1959 that has been credited with inspiring the "new science" curriculum. As a grateful high school participant in a science curriculum inspired by this early work of Bruner's, I can vouch for the excitement in the moment and the permanent cognitive benefits of studying physics from a textbook designed according to Bruner's participatory, discovery model of scientific proofs. Art and science are equally well suited to constructivism's hands-on, participatory approach to education; a melding of theory and practice is crucial for the skilled practice of either discipline.

Arthur Efland (1990, 1996) made an impact on art education theory through his perspective on the history of art and art education. Efland illuminated cultural assumptions underlying the purposes and values of art education. He suggested that educational objectives forced educators to treat knowledge as a commodity rather than as a process. Efland's view was that knowledge emerged from syntheses made within the context of living moments of experienced reality. Efland's insistence on the value of synthesis is reminiscent of Vygotsky's (1934/1962) definition of conceptual thinking. Based on available information and skill, through the co-creation of meaning and relationship, knowledge is continuously forming and reforming. Efland disputed the utilitarian view that knowledge was "made" and available for distribution. He asserted that this static view of knowledge as a commodity contributed to the perpetuation of illegitimate (i.e. non-democratic) social control.

Efland used Polanyi's (1966) definition of tacit knowledge to argue that understanding that is present but not yet articulated will always be greater than articulated knowledge. What there is to know will always exceed what is known and what is known will always extend beyond articulated knowledge. If art educators were allowed to recognize and value tacit understanding, Efland argued, there would be an appreciable difference in their curricular assessments and evaluations. Efland's position was purposely posed as a challenge to discipline-based arts praxis and theory.

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 debate. Perhaps there is room for a few, new approaches to art education. This study seeks to share relational descriptions from the point of view of a change agent exercising the ethic of care during a change initiative involving art and technology. My hope is to complicate and extend the conversation concerning what is appropriate for serious curriculum debate in the field of art education.

Creative and Critical Thinking

Two major educational theorists who have had profound effects on art education have been involved in Project Zero, Nelson Goodman and Howard Gardner. Based at Harvard, founded in 1967 by Nelson Goodman, Project Zero is a research group 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 Goodman gave for naming the project “zero” was that there were zero studies on art education at the time. Gardner was co-director of Project Zero from 1972 until 2000. This section will review a few elements of Goodman's and Gardner's writing on art and education salient to this study.

Goodman was an art collector and ran an art gallery in Boston for several decades. In his book, *Ways of Worldmaking* (1978), Goodman contended that art was a way to make the world or of making worlds. According to Goodman, the pluralist notion of the existence of many different worlds (structures of consciousness) did not stand in an antagonistic relationship to the notion of a unified world of shared, ontological perceptions. From the particularist point of view of an individual experience, there are many created, unique worlds. From the point of view of shared reality, we functionally occupy an agreed upon world together. Goodman’s work sparked interest in whether and how a cooperative (i.e. non-antagonistic) cognitive relationship between a pluralist view and a unified, ontological perspective could lead to serious discussions concerning personal and public responsibility for the creation of individual and shared worlds.

Goodman's description of our many, unique worlds was similar to Habermas’ concept of the lifeworld (1973, 1984). Goodman’s idea of worldmaking included the idea that art was the means through which we explored possible worlds before we commit to living them. Possible worlds were the possible futures from which people could extract elements to use in creating their lived realities.

Goodman stated that he would have us rid ourselves of the onus of trying to solve the famous conundrum, "What is art?" (Sesonske, 1965; Tolstoy, 1898) and ask instead, "*When is art?*" When is art was meant to throw the focus of analytic attention away from production, from product and object, and onto the lived moments, the processes involved in the making and interpreting 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 able at synthesizing critical and creative thinking.

Developed under the aegis of Project Zero, Gardner's (1983) theory of multiple intelligences proposed a complex and influential view of educational possibility. Gardner at first proposed 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 to develop multiple intelligences and how we might assess and evaluate learning and teaching in a multiplicity of modes. Gardner's work increased awareness of the value of diverse types of intelligence. Note that all Gardner's types of intelligence are practiced in the arts; and that Gardner placed no theoretical limits on the possible combinations of types of intelligence.

Gardner's theory is compatible with that of Hirst (1974) who claimed that there were fundamental knowledge domains that embodied, in their epistemological structure, different types of reasoning. Hirst's suggestion was that each knowledge domain was cognitively unique, therefore, to ensure the development of a fully rounded cognition, every domain should be included in the

curriculum. 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.

Technology has been reported to be effective in supporting a variety of learning styles. A significant amount of research has developed around computer supported collaborative learning (Baecker, Grudin, Buxton & Greenbert 1995; Bostrom, Watson, & Kinnet, 1992; Chan & Chou, 1997). However, an issue that can be considered more fundamental to learning than learning styles - how to coordinate and synthesize critical and creative thinking - has been less well explored in academia, and is as yet only rarely facilitated by instructional technology programs, procedures, or pedagogy.

Becoming Who We Are

Maxine Greene (1978, 1988, 1995, 2001) was dedicated to elucidating the kinship between educational and artistic process. Greene taught that art had the power to educate. Greene made it respectable for teachers and administrators to use art for inspiration and illumination. Greene was a founder of the Lincoln Center Institute for the Arts in Education. This organization provides workshops, lectures, and programs for schools, practitioners, and pre-service teachers. An interdisciplinary program, dedicated to the integration of the arts and artistic process into the curriculum, the Lincoln Center Institute has had a significant impact on education praxis.

Greene's educational philosophy was eclectic. She combined sensitivity to women's issues with a sense of the teacher as artist and a respect for the teacher

as a professional. She was an advocate for democratic practice in every aspect of education. Education, according to Greene, was about people, about *becoming*. Greene furthered the educational conversation by helping teachers imagine a place for art and artistic process. Greene often repeated the phrase, "I am not yet" (Pinar, 1998). We are always not yet fully who we might be. We are all in a process of becoming who we are and art is the quintessential medium for exploring becoming.

Just as a natural scientist observes nature, attempting to find meaning in natural phenomena, Greene, Harrison, and Dissanayake observed art in an attempt to find patterns and meaning in the artifacts of 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 wrote often of the liberating effects of making art in a classroom. Greene encouraged teachers to honor their own learning process in their teaching experiences.

The books that I wish Dewey had written, *Democracy as Art* and *Art and Education*, would have built on Dewey's perception that art leads us into the future by engaging human beings in disciplined conversations with their own and others' ontological conceptions. Dewey's perception of democracy as a practical, rational attempt to live in ethical relationship with others, combined with his appreciation of art praxis, re-emerged, transformed, in the writing of Maxine Greene.

ART IN SCHOOLS: PRACTICE

At this time there is little research specifically on technology and art in schools. I have chosen several articles on art education issues that seem to me to be relevant to this study. Most of them are philosophically based on Eliot Eisner's influential work. Eisner, unwavering in his support for the arts in education, has written elegant responses to criticisms and has supplied practical solutions to seemingly intractable problems. Eisner (1998) wrote that participation in the arts improved student academic achievement. Even though Eisner's work has had a profound effect on national educational priorities, in many schools in the United States, art's position is precarious and remains dependent upon community support for its continued existence.

Art and Academic Performance

Joyce Riha Linik, in *Picasso in the Wilderness* (1999), reported that participation in art not only raised student test scores but participation in art caused a rise in self-esteem. In *Gaining the Arts Literacy Advantage* (1999), Laura Longley built on Eisner's concept of assessable skills in the arts and the beneficial effects of arts practice on academic achievement. Longley asserted that art literacy consisted of a group of abilities that, in the aggregate, improved student learning, cognition, and educational achievement. She stated that all public schools should give students what she called "the arts literacy advantage".

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 their case study of a multi-year, after-school

program whose effectiveness was undermined in part due to technical challenges and in part due to unaddressed conflicts regarding values. This study reported that the current national emphasis on standards and standardized testing has forced the elimination of the arts in many urban schools. Quinn and Kahne asserted that more policies and practices were needed that acknowledge the importance of art in education. Their report stated that nearly half the schools in the United States did not have full time art teachers.

In *The Passionate Teacher and the Curriculum Police: Perspectives on Modes of Subjectivity and the Curriculum as Art* (1999), Yaroslav Senyshyn reported 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 this as a struggle between educational authoritarianism and creative freedom and suggested that the curriculum itself could be viewed as art and handled more creatively.

Many urban schools have been pressured by national testing regulations to improve their math and English curricula. When basic skills must be improved, time spent in art class can be seen as a waste of time. In these cases, the research reporting the beneficial effect of art education on general academic proficiency is unknown, disbelieved, or ignored.

Community Support

In *Imagineering Future Learning Designs* (2000), Don Glines reported that community attitudes had an influence on what was taught in schools. He suggested that the development of new person-centered social and educational

paradigms were needed. Glines went on to state that what was needed, even more than new paradigms, were innovative leaders using imagineering. He described imagineering as a technique for co-imagining desirable futures and then working to create those futures.

Glines found that communities had to be supportive of the arts before schools accommodated the arts in their curriculum. His position was 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 four states, found that community and district support were the most critical factors in the success of an arts curriculum.

My readings in art education research indicated that communities were the primary source of support for art programs and many studies revealed a beneficial relationship between participation in art and academic achievement. In every study I found reiterated the finding that, despite national support for art education, art's position in the academic curriculum is not secure.

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 used language and the way that men and women understood justice, responsibility, and care. Gilligan's articulation inspired me to value care as historical exigencies spurred me to search for social justice.

Moral Orientations

Gilligan's premise was that men tended to prefer using generalized principles while women preferred to respond to particular circumstances when evaluating moral and ethical choices. Many objections have been raised against Gilligan's assertion that gender is the primary reason for differences in moral perspectives. Rarely, however, have I read any objection to Gilligan's assertions first, that people use two types of moral reasoning, or, second, that moral reasoning has two legitimate orientations. It has been argued that generalized perspectives are practiced in the public sphere while a focus on the particular is more applicable in the realm of the personal. Feminists have responded to that argument with considerable vehemence, claiming that the private sphere itself is an artifice of patriarchy (Benhabib, 1987) and, of course, it was feminists who made the argument that the personal *is* political (WMST, 1998).

Meeting at the Crossroads (Brown & Gilligan, 1992) described a group of female researchers in the process of studying girls' transition into adolescence, whp learned to communicate more personally (which was interpreted by participants as more respectfully) with their research participants. In order to get the data they desired, the researchers had to abandon their original conversational approach to the young women (that of the objective expert observing dispassionately) and adopt a far more interactive and responsive conversational style. The researchers found that speaking respectfully and intimately to participants elicited the type of self-revealing anecdotes that the researchers had

hoped to use for data; whereas an objective conversational stance produced stilted formality and resistance on the part of the youngsters.

The lessons I learned from this book have affected all my teaching activities and much of my personal and creative life. The assertion made in *Meeting at the Crossroads* was that professional language could mask and hinder, as well as reveal and facilitate. People asking questions could chase away the very knowledge they were seeking if they spoke in a manner that participants associated with power and authority. What is it about the assertion of power and authority in a conversation that silences the other? How can we speak intelligently without alienating those with whom we wish to speak?

Meeting at the Crossroads also examined the way young girls made choices to silence themselves; how girls took on specific cultural roles and along with those roles, a manner of speaking and relating. The researchers found that all the choices the girls made involved to one extent or another, the loss of their pre-adolescent honesty and clarity of speech. In particular, the researchers found that adolescent girls sacrificed their personal points of view in order to facilitate non-antagonistic, interpersonal relatedness.

In a Different Voice (1993) described Gilligan's theory of dichotomous moral orientations. This book helped me understand the importance of speaking as close to my personal truth as I possibly could, regardless of the bewildered looks or angry rebuttals this occasionally provokes. Gilligan's books made it clear that speaking honestly was a socio-linguistic challenge whose outcome had significant philosophical, political, and personal impact.

Care in Particular

Women's sensitivity to particulars, whether socially conditioned or biologically determined, affects how we handle social reality, and political and moral choice. Nel Noddings was 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, did not require educators to love students in the same way that they loved their own children. However, the ethic of care did require educators to accept co-responsibility for feeling states that were generated in educational situations.

Noddings' concept of interpersonal responsibility was further illuminated by Lisa Goldstein in her book, *Teaching with Love* (1997). Goldstein's narrative revealed the ethic of care, as practiced in a specific early education classroom, to consist of complex, non-trivial, and anything-but-stereotypical encounters and attitudes. One of Goldstein's points was that, because care was, by definition, something that occurred between real people in real time, it would always be unique. Each participant, each researcher, each reader, must take the responsibility to reflect on her own values - and represent those values with consideration and respect for others. Theoretically, because the ethic of care is embedded in a relational architecture of experience, every genuine example of this ethic ought to involve a unique challenge to some of the researcher's plans and preconceptions.

The Ethic of Care and Social Justice

In her book *Maternal Thinking* (1989), Sarah Ruddick shared her philosophical extension of the ethic of care. Ruddick interpreted care as a form of justice *and* moral responsibility that came about through the practice of mothering. In Ruddick's view, mothering was not a gendered activity and could be done by men or by women. Mothering was caretaking, a labor, a praxis. Mothering generated, as all praxis will, its own language and value system particular to the necessities of its practical application.

Ruddick extended the theory of moral responsibility and the ethic of care by showing how the practice of mothering could be generalized to the principles fundamental to Gandhi's philosophy of peace action. Ruddick extended the concept of mothering and the ethic of care by joining these with the formulations of rule-based, public, international, political, peace activism.

The ethic of care does not have to be understood as in opposition to a principle-based ethic. To dichotomize the specific and the general and to separate the personal (private) experience from shared (political, social) experience is unjustified because in lived experience these experiences are part of a continuum. Gilligan’s assertion that there were two moral orders is a perception that can be traced back to Kant. Gilligan's justice orientation is what Kant described as pure reason. Gilligan's care orientation was the first internally consistent articulation of what Kant called “the moral imperative.”

I view 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.

ADULT EDUCATION

Realistically, entering a high school as a technology consultant and a university-based researcher put me in the role of an adult educator. This section will address some of the research on adult education that was applicable to this study.

Autonomous learning and independent thinking have been the hallmarks of the epistemology of adult education. Often, experts in the adult education field have been practitioners and the literature is filled with practical advice on the best ways to teach adults (Brookfield 1987a, 1987b, 1995; Brosio, 2000; Daloz, 1986; Freire, 1970a, 1993; Lindeman, 1926; Mezirow, 1991; Race, 1993). Brookfield (1987a) identified four main elements to adult education: experiential learning, learning to learn, self-directed learning, and critical reflection. (See Appendix D for an overview of Eduard Lindeman's contribution to theories of adult education.)

Many adult learning theorists have agreed that discussion is a key factor in the success of adult education programs. The sort of discussion that adult educators described as beneficial was a co-equal engagement in a process of self-discovery. Many adult educators and educational theorists have written that

citizenship in a participatory democracy included the right and the responsibility to share ideas and skills in a public arena. These same theorists have asserted that a facility for critical thinking and an ability to engage creatively in discussions are both necessary skills for citizens to participate fully in a democracy (Apple, 1979; Brookfield, 1995; Brosio, 2000; Freire & Faundez, 1989; Freire, 1998; McLaughlin & Tierney, 1993; Tarrant, 1989, 2000, 2001).

Self-Actualization and Self-Determination

Discussion and conversation, as tools for intrapersonal growth, have been investigated from many angles in the field of psychology. This section explores Third Force psychology, and the applicability of two of its main theorists' ideas and experiences, Abraham Maslow and Carl Rogers, to the field of adult (teacher) education.

Maslow (1968) coined the phrase, "Third Force psychology," and defined the interpersonal and relational as the arena of its investigations. According to Maslow, Freudian psychology investigated internal states, Behavioral psychology studied observable behavior, and Third Force psychology explored interpersonal dynamics. The elements of Third Force psychology discussed here will be self-determination and the existence of an intrinsic motivation towards self-actualization and self-organization.

Maslow (1955, 1968, 1971) developed a theory of becoming based on what he called self-actualization theory. According to Maslow, psychology research had focused attention primarily on the pathological, leaving the definition of psychological health as simply the lack of pathology. In order to

provide practitioners and individuals with a way to guide themselves and others, Maslow conceptualized a model of psychological health. According to Maslow's theory, everyone has an intrinsic need to develop, to self-actualize. The core schema in Maslow's conceptualization of psychological health and self-actualization was a hierarchy of needs. In this hierarchy, needs are divided into two major categories, B-needs and D-needs. Satisfaction of basic, D-needs comes before the satisfaction of being, B-needs. The *D* in D-needs, stands for *deficiency*. D-needs are motivated by insufficiency.

D-needs, in hierarchical order, are the needs for: 1) physiological maintenance; 2) safety; 3) belongingness; and 4) esteem. D-needs increase when they were thwarted, while B-needs increase when they were satisfied. The *B* in B-needs, stand for *being*. The B-needs, in hierarchical order, are the need for: 1) knowledge; 2) aesthetic awareness/pleasure; and 3) transcendence from ego-based rationality towards the realization (actualization) of interpersonal potentials in the personality.

There is no stasis point in Maslow's model. A self-actualizing person is engaged in a process of becoming, bringing to mind, Maxine Greene's signature phrase, "I am, not yet" (Pinar, 1998). Note that Maslow defined needs, not as pathological but as the basis for the development of psychological health.

Maslow and Rogers were both adult educators. Maslow taught at Brooklyn College and then at Brandeis University. Rogers taught at Ohio State, the University of Chicago, and the University of Wisconsin. Although Maslow wrote his theory of self-actualization from the point of view of a clinical

psychologist, his early training was in experimental, physiologically-based psychology. Rogers came to clinical psychology from theology. Maslow's theoretical emphasis was on the individual's intrinsic motivation to grow. Rogers' focus was on interpersonal relationships' influences on individual amd group self-realization.

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 (whose doctoral dissertation was in psychology). Rogerian therapy is client-centered and non-directive. Rogers stated that it is crucial to perceive clients with positive regard. Rogers' idea was that interpersonal positive regard would become internalized as positive self-regard. Note the similarity between Rogers' concept and the interpersonal dynamics of Vygotsky's theory of language acquisition, whereby interpersonal discourse becomes internalized as intrapersonal thought.

Rogers' later work (1980) emphasized the mutuality of development between clients and professionals. His assertion was that he had to avoid playing a distanciated role of expert and acknowledge his true self if he was to be fully present as a human being in interaction with someone else. And, reminiscent of Martin Buber's (1958, 1977) I and Thou theory and Freire's groundbreaking work (1970b), Rogers reported that clients are more likely to actualize themselves when the relationship with their therapist (counselor, teacher) was egalitarian and open.

Rogers insisted that people were capable of finding their own solutions. Rogers saw his role as continuing in a conversational relationship with people

without telling them what to do. In his experiments with groups, he was able to show that human beings are capable of organizing themselves into functional and healthy systems. Situation-based, constructivist, and discovery learning models are based on similar principles. These schools of thought have all proposed that knowledge gained in autonomous activity, especially if the activity is relevant to participants and includes conversation that stimulates higher-order thinking, is more resilient than learning methods based on efficiency models of information transfer.

Conversants generally define their roles in a given conversation in alignment with the role that they play not only in the specific conversation but also in the social organization in which, or about which, the conversation takes place. According to systems theory, social organizations are living systems in which individuals interacting, influence the system as a whole (Bertalanffy, 1975; Bateson, 1972; Miller, 1995; Mink, 1993c, 1994, 1998, 2000). Theoretically, a change agent can use conversation as a tool to initiate and maintain a change process.

CONVERSATION

This section will continue to explore the literature on conversation and change, emphasizing the vital role that conversation can play in cognitive development and social change. The theorists whose work I will be considering are John Shotter, Lev Vygotsky, Ilya Prigogine, Kurt Lewin, and Paul Ricoeur.

Conversational Reality

John Shotter's explication (1984, 1989, 1993a, 1993b) of the dynamics of conversational reality and social ecology created a new practical-theoretic for research in the social sciences. Shotter proposed that conversations are the principle means through which people re-create, reinforce, reinvent, and reinvest in their reality. Shotter's writing opened up the possibility of researching second order change, brought about by conversations in learning and work environments.

Shotter's contribution to my theoretical understanding of the value of conversation was immense. Shotter reported that both Vygotsky and Prigogine were influential to his thinking. I will briefly discuss the aspects of these theorists' work that inspired Shotter's conversational reality theory and his social ecology theory.

Shotter was influenced by Vygotsky's (1934/1962, 1925/1971, 1993) assertion that language was the tool culture used to create itself. In *Thought and Language* (1934/1962), Vygotsky delineated the process he considered to be the origination of thought. In Vygotsky's view, internalized thought emerges as a result of dialogic interactions. Shotter built on this fundamental idea. Specifically, Shotter showed that the *way* people speak to one another in select educational and work environments reveals their underlying social assumptions, and also, even more relevant to my study, the way that people speak to one another, affects how people think and act in relation to themselves, each other, and their work.

Shotter's social ecology concept was influenced by Prigogine's (1979, 1984, 1985, 1988, 1996) work on chaos and complexity. Shotter (1993b) defined

a diverse and complex dynamic he called “social ecology” as an inter-relationship of a plethora of intersecting conversations. Shotter asserted that Prigogine's chemistry theories could be applied to the analysis of social systems because the objects of analysis in both chemistry and society are organic systems. In order to more fully appreciate Shotter's concept of social ecology, I 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 was referring to and continued to elucidate was that theoretical positions had been taken in the interests of objectivity that had led to fallacious mathematical and philosophical stances. In particular, the unidirectionality of time that defines a parameter of life experience was ignored by mathematical equations in favor of "reversible time." Reversible time made cleaner, more efficient math but Prigogine showed that only time during which organic life grew and changed, that is, unidirectional time, is useful in the analysis and prediction of living behavior.

According to Prigogine, in living systems every moment is qualitatively and quantitatively different after each interaction that takes place in the system. Process equations must take into consideration that the foundation, the context of any process, changes during the course of the event. 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 essentially unpredictable.

Shotter's social ecology theory acknowledged that individuals always act contextually. The dynamic life of social context can be characterized as an ecology. Social forms take shape through discourse and the actions of individuals (conversational reality) and discourse is shaped by the intricate balance of group process within the containing social structures (social ecology).

Shotter's concept of social ecology is not unlike 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 are embedded in fields where forces act on them and within them. According to Lewin, a social change agent's responsibility is to analyze the forces acting on individuals and, if possible, ameliorate the effects of forces acting negatively (or, even better, remove the source of the negative forces) and support those forces cooperating with the individual needs, goals, and the change process.

According to Prigogine, 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 for growth. According to Shotter, social systems are aggregates of individual lives interacting, creating larger, living systems.

Interpreting, We Meet on the Horizon

Ricoeur (1986, 1991, 1992) evolved his way of reasoning from his ecclesiastical training in hermeneutics. Hermeneutics has evolved from an ancient form of textual analysis, biblical exegesis. The premise of biblical exegesis was that holy texts required reinterpretation. Ongoing interpretation was necessary because human conditions change, and although holy words remain holy, their application to changing human circumstances must be reinterpreted to suit new circumstances. Ricoeur has developed hermeneutics beyond the exegetical, reinterpreting the discipline as a postmodern creation of text and textual exploration.

Ricoeurian hermeneutics is an interpretive analysis that is also a synthesis. Ricoeur's books illustrate a methodology for bringing concepts that appear to be inimical, or polarized, together into a dynamic realization of their holistic synergy. With an intricate, recursive style of reasoning, Ricoeur has interpreted seemingly discordant conceptualizations as working towards a greater harmony. Ricoeur has employed a standard hermeneutic technique, the hermeneutic circle, in his own unique fashion. Usually, his analysis began with a particular stance, an understanding, a statement, or a concept. As he communicated this originating idea, he took on the role of reader, of questionner, and thus, of interpreter. The idea then evolves ever so slightly.

The giddiness I had reading books by Ricoeur came each time from the gradual realization that there were several layers of hermeneutic circles going on at once. There was Ricoeur's own traversal of a hermeneutic circle (that of reader

and interpreter). There was also myself as reader, interpreting the work of Ricoeur. There were often several detours describing other theorists' interpretations of (writings on) the theme. The most exciting part of Ricoeur's method for me was that the ideas in his text were themselves in an interpretive evolution with each other. This relationship of the seemingly disparate ideas became apparent towards the close of each book, as Ricoeur brought his intricate weaves of reasoning to a close with a broad view of the entire tapestry in which all the previous ideas, opinions, and arguably, contrary assumptions were exhibited as part of an ecology of meaning.

Where the reaching called “expression” meets the reaching called “comprehension,” Ricoeur has called “the horizon.” Interpretation happens on the horizon. We meet each other on the horizon. Ricoeur's metaphor of the horizon of mutual creation and interpretation is not unlike Shotter's view that we create our reality through our ongoing participation in conversations.

The Postmodern Conversation

Action research, the ethic of care, Ricoeur's hermeneutics, even Prigogine's chaos theory have antecedents that go back hundreds of years. This literature review has been concerned with the inter-relatedness of the roots of all these theories. This section attempts to convey how these theories with their roots in a humanist past extend into contemporary postmodernism. And, by bringing us to the present, this section serves also as the conclusion to this literature review.

Postmodernism means many things to many people today. Interestingly, the most famous elements of postmodernism seem diametrically opposed:

deconstruction and ethical inclusionism. Generally, postmodern is a label that is applied to any work that in any way questions the values, ideologies, premises or assumptions of modernism.

Modernism was the action-cum-philosophy that had a major impact on, or described the nature of, western civilization as it was in the late 19th and for most of 20th century. Postmodernism emerged once modernism's premises were clear enough for an articulation of a coherent, alternative position. Critiques of modernism began, of course, with its inception. However, the development of articulated historical critiques takes time and the work of generations of thinkers. Modernism's stated goals were: cultural progress, industrial efficiency, clarity (or simplicity) and scientific truth (i.e. empirical validity).

The critique of modernism exposed some of its underlying mechanisms such as cultural hegemony, manipulations of ideology (from my point of view, a particularly heinous example of manipulated ideology was fascism; while a particularly useful example of manipulated ideology was labor unionism), money used in place of force (economic imperialism), capitalism, and later commercialism. This last ideology has only been occasionally pointed out as an ideology adversely affecting education, notably by James Tarrant (2000, 2001).

The realization that knowledge is embedded in and derives from experience is essential to the deconstructionist vision. Deconstructionists elucidate ways that ideologies arise out of praxis and then are manipulated to alter society for the benefit of elites. Conversational reality and the ethic of care owe a great deal to this type of deconstructionist thought. Conversational reality theory

is part of a broader, multi-cultural deconstruction of the hegemonic concept of a given, unchanging reality. The ethic of care is an articulation of a broad, multi-cultural deconstruction of the hegemonic concept of a perfect, immutable justice.

I find it helpful to distinguish between the deconstruction of an ideology and its destruction. Deconstruction does not destroy an ideology. Deconstruction is an analysis, an interpretation of an ideology in order to empower ourselves to alter our conceptions of its schemata to better suit our actual needs. The building metaphor inherent in the word *deconstruction* is apt because the mentality underlying the activity is quite a bit like drawing up engineering plans of an existing building in order to decide whether to rebuild, redesign, or renovate.

Inclusionism and the concurrent movement towards diversity are only occasionally acknowledged as essential to a postmodern ethics (Bauman, 1993, 1995). However, neither inclusion nor diversity were part of the modernist agenda and both arose from significant modernist failures to cope with issues of equity and democratic representation therefore I assert that inclusion and diversity are intrinsic elements of a postmodern sensibility.

The themes of this literature review - the ethical imperative to create egalitarian relationships to fulfill the responsibility of democratic education, the challenge of integrating technology and art (creative and critical thinking) in a curriculum, and the unique role conversation plays in social change - are all postmodern themes.

What this study sought to examine was a postmodern, relational, democratic, conversational, process of social change in an educational

environment. This literature review was an attempt to locate my study in a thick, historically rich, complex world of postmodern, qualitative research.

The literature in this review indicated that the inherent fallacy of a polarization of art and science could be handled with a combination of deconstruction and inclusion; that is, art and science could be brought together (inclusion, one with the other) if the ideological structures of their epistemologies could be deconstructed and rearchitected. However, the literature also suggested that, for any deconstruction or rearchitecting to be long-lasting and effective, it would have to be accomplished collaboratively, democratically, through co-agentic conversation immersed in unconditional positive regard for all participants.

The democratic principle that people are the means *and* the ends of education, art, experience, and democracy was a tenet of Dewey's revered work in the field of education. Dewey, ever the poet, was ahead of his time in his ability to perceive the breadth of possibility in democracy, the breadth of possibility of education to buttress and even create democracy, the breadth of art to have inspired all human activity and finally, the depth of experience to be the one fundamental element in all human endeavor.

The literature revealed that conversations are hard work, co-creations wherein participants stretch themselves towards one another and towards a shared future. By concentrating on conversations, I support an interactive view of reality. In my view, a variety of personal perspectives are not inimical to a healthy human environment but conducive to a vital social ecology. The literature implied that

conversation could affect minds and hearts, creating new initial conditions conducive to change. I sought to explore a concrete educational situation, the integration of technology into a curriculum, sensitive to the role conversation plays in social change.

Chapter III
Method

This study required a mixed methods approach to data gathering and analysis. The methods I used were qualitative and action research.

By bringing a narrative, discursive, personal view into forms of knowing originally developed to support scientific rationalism, qualitative research has initiated a new era in intellectual history. Because my study focused on interpersonal, conversational dynamics that occurred during a change process, qualitative methods were eminently suitable for the analysis.

The type of research that I used for my field methodology was action research because I needed a method what would allow me to speak spontaneously. A methodology like ethnography would not have been suitable because an ethnographic study would have required me to keep a distance between my own worldmaking propensities and those of the participants. Action research permits researcher involvement and requires the reorganization of activities and premises during the course of the research (Kemmis & McTaggart, 1988; McLean, 1995; Usher, Bryant, & Johnston, 1997).

A constant reorganization of premises is in alignment with Prigogine's (1996) dictum that a description of organic forms must take into consideration change over time. In her study, *Teaching with Love* (1997), Goldstein reported adjusting her activities in response to her participants and then closely examining her own response to the change as well as the responses of her participants.

Another reason that I chose to use action research was that many of the theorists who developed action research were heroes of mine and I anticipated learning a great deal from attempting to walk in their footsteps (Argyris, 1982; Goldstein, 1997; Freire, 1993; Lewin, 1948; Mink, 1998).

This chapter briefly describes the research site, the participants, the data sources, the procedure I chose to follow, my role as a researcher, and the methods I used for data analysis. Pseudonyms are used throughout this study. The only participant whose real name is used is Ilya Prigogine's.

THE SITE

According to their 2002 fact sheet, Captain Dewey High School was:

> …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 [Captain 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.

My research primarily involved staff and administrators who were involved with the Fine Arts Academy. The Fine Arts Academy was an additional program of work that a student could elect to pursue but otherwise there was no obvious difference between the fine arts students and the regular high school students. Even so, academy staff were perceived (and often reported perceiving themselves) differently than the staff of the general high school. The academy staff worked with students from both the regular high school and the academy. Students in the academy were required to take more classes than the rest of the student body but no art class was off limits to regular students except, as in any discipline, on the basis of satisfying pre-requisites.

The 2002 fact sheet reported that the Captain Dewey High curriculum, "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, [Captain Dewey High} received an award as an Outstanding Advanced Placement School from the region."

The college enrollment information given in the fact sheet was that,

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)

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

When I began the study, Sable (Fine Arts Academy Administrator), Tower (Head of the Art Department), and Wiser (High School English Teacher of the Year for 2000-2001) were the participants. The Fine Arts Academy Administrator (Sable) had requested a researcher at the site and s/he remained my primary connection to the school throughout the course of the study.

Over the course of the year and a half I spent at Captain Dewey High, 25 people contributed significant data and/or participated in a relevant conversation with me. These 25 participants will be briefly described in this section. The participants played the following roles at the school:

- ten teachers
- eight staff (including administrators and staff who were not primarily in the high school as teachers)
- four parents of students
- three university professors (two fine arts professors and Ilya Prigogine, Nobel Laureate chemistry professor)

With the exception of the Nobel Laureate, Ilya Prigogine, I will use pseudonyms for all the participants. The pseudonyms were invented and edited by myself, Wiser (English teacher), Genesis (Head Librarian), and Sable (Fine Arts Administrator). The pseudonyms were chosen to be as gender neutral as possible.

In the second half of Chapter Four: Data Analysis, the gender of participants and issues that seemed to have been influenced by gender will be discussed.

I delay the reader's knowledge of participant gender so that each reader will have an opportunity to reflect on her assumptions regarding gender and conversation. It is well-documented that we all make assumptions regarding gender appropriate language, conversation, and activity (Broverman, 1970; Brown & Gilligan, 1992; Coates, 1986, 1988; Gilligan 1977, 1982; Holmes, 1995; Kramarae, 1980, 1988; Rogers, 1993; Smith 1998; Spender 1982a, 1982b; Tannen, 1986, 1989, 1990, 1993a, 1993b, 1994a, 1994b, 1996, 1998, 2001). Perhaps, in the course of reading the data, the reader will find herself surprised at the gender of the participants, perhaps just the opposite. In any case, I wish the reader to engage in the story creatively as well as critically. Another reason I withhold the knowledge of gender is to emphasize the perspective of participants' roles and diminish the tendency to make assumptions regarding personality. My hope is to focus on how teachers, in their role *as* teachers, perceived a technology initiative. Revealing participants' gender in the second half of Chapter Four will aid an analysis of whether and how gender affected conversations and activities.

I conclude this section by briefly introducing the participants. The following pronouns will be used to denote participants, regardless of their gender: *s/he*, *his/her*, *her/him,* and *her/himself.*

Captain Dewey Teachers

Head of the Art Department: Tower - Tower was the teacher with whom I worked most closely and consistently throughout the year and a half that I worked

with Captain Dewey High. Tower had been teaching fine art for five years - painting, drawing and art history. S/he was lithe, quiet, and intense. His/her conversational style was direct, personal, complimentary, supportive, and yet there was always a sense with her/him that s/he had more perceptual depth than could ever be verbally articulated. In other words, in his/her presence, I felt a heightened awareness of tacit meaning.

2000-2001 High School English Teacher of the Year: Wiser - Another teacher who worked with me throughout this study was Wiser. Tall and slender, Wiser had taught at Captain Dewey High School for 25 years. S/he had attended Captain Dewey High and was able to work with some of the teachers who had inspired her/him during his/her high school years.

In conversation, Wiser was engaging and personable. S/he laughed often. S/he stood quite near to people with whom s/he was conversing, perhaps because there was usually a line of people waiting to speak with her/him and by standing nearer, s/he could focus his/her attention more closely. However, considering his/her reputation as a trusted and influential member of the teaching community, perhaps physical closeness was an element of his/her ability to listen with a rare attentiveness, physiologically as well as emotionally and intellectually engaged.

Business Technology Teacher: Bryght - Bryght was delicate in appearance. Considerate of others and polite, Bryght's conversation almost always included stated concerns for his/her students' welfare. At the time of this study, s/he had taught at Captain Dewey High for 15 years. Bryght taught in a large room with approximately 35 computers. When I first came to Captain Dewey

High, Bryght taught word processing, spreadsheet, and overhead-presentation software.

Head Librarian: Genesis - Genesis was a published, prize-winning poet. S/he seemed to know every student's name. S/he often had time to converse with students and fellow teachers. Conversations with Genesis often included time for laughter and real delight but when it came to running the library, Genesis was focused and professional.

3D Art Teacher: Copley - Copley taught 3D arts in the room adjacent to Tower's. My early conversations with Tower usually included Copley. Copley was physically strong and had a commanding presence that seemed entirely suitable to the technically demanding arts s/he supervised. His/her art room included eight potter's wheels, a torch station with four gas torches, a kiln, and a jewelry station with a centrifuge. Conversations with Copley were usually to the point. His/her style was direct and compassionate. S/he generally spoke to the emotional state as well as to the facts of the matter and was generous with hugs.

English Teacher and Student Council Sponsor: Westwood - Westwood was an English teacher but my work with her/him was in his/her role as the student council sponsor. Westwood was feisty, witty, insightful, and gentle. S/he seemed to have no excessive love for authority, his/hers or anyone else's, but s/he exhibited a great deal of respect and support for honesty, hard work and kindness.

Computer-Based Design Teacher: Shyer - Shyer was the first teacher I met at Captain Dewey High but we had few further conversations until towards the end of my research. Shyer's conversations were direct and activity-oriented.

My year there was his/her first year teaching. S/he took his/her new role seriously, with concentration and commitment. Conversations with Shyer often included a moral component: What was right or wrong to do in particular situations was of intense importance to her/him.

Debate Teacher: Abbott - When I began my research, Abbott was the school webmaster which meant that s/he knew the access codes required to work with the school web site. S/he left the school before the end of my research, the official responsibility for the web site passing to Shyer. Abbott's conversational style was abrupt. In all my interactions with her/him, s/he made sure to let me know how busy s/he was and how very little time s/he could spare.

Business Technology Teacher: Miller - Miller asked me if s/he could fill out a research questionnaire for me because s/he wanted to convey his/her problems with technology support. After I had read his/her answers, we had a conversation about what s/he had written. Miller was a first-year teacher, having come to education from industry. S/he was polite, forthcoming and inquisitive.

Journalism Teacher: Welsh - When I began my research, Welsh's journalism classes were well integrated with technology. Although Welsh and I had many short conversations, I never had the opportunity to converse deeply with her/him. S/he is mentioned here because, even though we did very little talking, I borrowed software and equipment from her, occasionally used her room, and later was able to use some grant money to buy her some new software. Welsh was a careful, considerate speaker who was generous to students and teachers alike and perceptibly sensitive to subtleties of meaning and purpose.

Captain Dewey Staff

Fine Arts Academy Administrator: Sable - Sable was my contact in the school. S/he had sent an e-mail query to the organizer of the 2000 Arts-Based Research conference. The conference organizer had forwarded his/her e-mail onto the conference listserv. Apparently, I was the only researcher who responded. (See Appendix E for Sable's e-mail requesting a researcher.)

It is difficult for me to describe Sable because I have such a high admiration for his/her abilities and I do not wish to sound unacademic, i.e. uncritical. Sable was the conductor of a semi-professional community choir. Sable was a master of conversational engagement. S/he engaged people deeply. In our many and substantive conversations I experienced the full power of Sable's conversational abilities to share, discover, explore, consolidate, rejoice, despair, and create with others.

I often had the opportunity to observe Sable in conversation with teachers, students, and parents. The most noticeable characteristics of his/her conversations with others were intensity of focus, attentiveness to detail, and imaginative responsiveness. It was an honor to work with someone who listened thoughtfully to everything I said. Perhaps because s/he was a musician and specifically a conductor, s/he was able to transfer to her administrative responsibilities the ability to hear, and merge into harmony, many voices. In addition, s/he was not given to restricting her enjoyment to simplistic harmonies of uni-culturally-determined intervals.

Principal: Lightyear – Lightyear was always busy. S/he was more often in the halls, in the classrooms, involved in conversations with students, teachers, and parents than in his/her office. Conversations with Lightyear were genial even when the subjects were emotionally charged. Lightyear kept her/himself engaged in conversations as a learner without giving up his/her role as person-in-charge. Lightyear conveyed a warmth and a genuine concern for young people and a profound hopefulness in all his/her conversations.

Assistant Principal: Hunter - I only had one conversational interaction with Hunter and s/he was only at one meeting that I attended. However, I found out later that Hunter had had a significant influence on technology use in the high school throughout the course of my research. I did not interact with Hunter often enough to be able to characterize his/her conversational style. Our one conversational interaction consisted of Hunter telling me that the red pencil we were required to use on grant administration forms reminded her/him of the bible in the church of his/her youth. According to Hunter, births and deaths were recorded in this bible, in red ink, symbolic of the "blood of the lamb.".

Assistant Principal: Mayer - I had no extended conversations with Mayer and yet I mention her/him here because we often exchanged greetings. Mayer was almost always in the halls during breaks and at lunchtime and it was impossible to be in the school without her/him knowing who you were and what you were doing there. I cannot comment on his/her conversational style but his/her bearing was calm and aware, s/he always had a smile and a friendly word to say to me and some days this was welcome support and encouragement.

Building Supervisor: Strong - Strong was the heart of the school. S/he supervised everything to do with acquisitions, resources, and building maintenance. None of our projects or plans could move forward without his/her support and that meant that I had a great many conversations with Strong. S/he was a remarkable person whose conversational style was influenced by whether or not the school was calm or in an uproar. If Strong had the time, s/he could be a lively, insightful, and generous conversationalist. When s/he had to work twenty-hour days with no breaks in sight, Strong's conversation became curt and to-the-point.

Ninth Grade Initiative Coordinator: Quinty – The Ninth Grade Initiative was a summer tutoring program for students scheduled to enter the ninth grade who had not passed all their eighth grade courses. My conversations with Quinty took place while s/he was organizing the summer program. Because Quinty was not told how many students would be in the program or what their needs were until two weeks before the program was to start, conversations with Quinty during that time were extremely odd. Quinty was always polite, but often distracted; and the chaos of the situation made it difficult for her/him to keep track of all the conversations in which s/he participated.

Administration Secretary: Winston – Winston was Principal Lightyear's assistant and, because Lightyear was so busy and rarely in his/her office, Winston was often the person we went to for help. I conversed with Winston many times, the subject was always (school or district) procedure. With regard to explaining the bureaucracy, Winston's conversational style was patient and thorough. Even

though there was often a line of people waiting to speak with her/him, s/he did not rush people. S/he gave each one of us respect and our problems due consideration.

Captain Dewey Parents

The parents I worked with were all extraordinary. Perhaps those parents who chose to work with the school in support roles were, by definition, generous, hard working, and concerned. The parent volunteers who worked on the technology initiatives during my research at the high school were heroic in their steadfast commitment, their positive outlooks, and their contributions were significant.

Fine Arts Technology Committee Chairperson: Pierce – Pierce and I had many occasions to converse both in person, in meetings, and through e-mails. Pierce owned his/her own company and sang in a choir (not Sable's choir). S/he had two children attending Captain Dewey High. With all his/her responsibilities, Pierce found the time to take on a significant role regarding technology use at the school. Pierce's conversational style was fluid and flexible. S/he was a talented organizer, charming and intelligent and able to adjust his/her conversational style to suit a variety of people and circumstances.

Fine Arts Booster Club Parent: Oliphant - Oliphant had been the first Fine Arts Academy Technology Committee Chairperson. S/he had deftly guided the group from 1989 to 1999 with a combination of humor and solid fundraising skills. During his/her tenure as Chairperson, the Fine Arts Technology Committee fund grew from a few thousand dollars to over $30,000 in trust. Oliphant's style was a paradox, both no-nonsense and humorous. The one opportunity I had to

converse with Oliphant was in a Fine Arts Booster Club meeting. I found his/her conversation stimulating and inspiring. That particular meeting gave rise to a clarity of purpose that generated significant success for the Fine Arts Department.

Fine Arts Parent and Web Designer: Elvinor – Elvinor and I had more e-mail and online conversations than we did face-to-face interactions. In fact, we only saw each other once and never spoke in person. Our electronically supported conversations were intense, informative, and inspirational. When I began working at the school, Elvinor was the first person connected with the school who spoke to me substantively about education, technology, and the future of the high school. His/her conversational style online was polite, careful, considerate, poetic, and supportive. (See Appendix F for excerpts from my online interviews with Elvinor.)

Fine Arts Parent and Web Designer: Sandragon - Sandragon was a volunteer for the Fine Arts Academy when I began my research. As our plans for the web site evolved, s/he volunteered to coordinate the design of the fine arts web pages. By the spring of 2002, Sandragon had increased his/her commitment to supervising the entire school web site for Shyer.

Sandragon and I had many online and face-to-face conversations. S/he was the manager of a technical publications department for a research facility. S/he was very able and beyond this, s/he was unwavering and seemingly tireless in his/her support for the arts and creativity of any kind. When s/he was working on a problem or a project, s/he wrote long, detailed e-mails to other participants.

Amazingly thorough, Sandragon made it a point to create trust in those of us who worked with her/him.

School District Technology Specialists

District Technology Specialist: Carver – Carver was a great friend to me. As soon as we met, s/he wasted no time letting me know his/her view of how the school functioned with regard to its technology. Carver had worked at Captain Dewey High as technology support-person until the district hired her/him away to work for the district as a whole. Conversations with Carver were like a vacation. S/he did not waste time with anything but what s/he considered to be true. S/he took me, the new guy, under his/her wing immediately. The district provided Carver with a headset so that s/he could be available at all times. Constantly receiving emergency phone calls from around the district, s/he managed to keep the thread of our conversations going. Carver's conversational style was compassionate and competent.

District Director of Instructional Technology: Archer – Archer and I had only one face-to-face conversation but it was significant. Archer had been an English teacher at Captain Dewey High. During the time of this research, Archer was in charge of instructional technology for the school district. Personable and polite, Archer's conversational style was collaboration-in-action. S/he made it clear that s/he was learning during the conversation. S/he engaged in a high degree of give-and-take conversationally.

Captain Dewey High District Technology Leadership Team (DTLT) Chairperson: Gold – Gold was an English teacher. S/he was usually carefully

dressed and his/her voice was ringing and clear. I introduce her/him here in his/her role as DTLT Chairperson, rather than as an English teacher because my interactions with her/him had only to do with his/her role as DTLT Chairperson. Gold's conversation was energetic and s/he often used anecdotes to make his/her points.

Middle School Technology Coordinator: Framingham – Framingham met with me once - for five hours. It was his/her idea that we should take this time so that s/he could thoroughly acquaint me with technology issues affecting his/her school and Captain Dewey High. Framingham's conversational style was rhythmical and informative. Considerate, generous and highly knowledgeable, Framingham was an expert technology-support-person, and had been one of Carver's early technology teachers.

University Professors

Fine Arts Professor and Art Teacher Educator: Verrell – Verrell was forthcoming and eloquent in providing information concerning art education theory. S/he spent several hours with me in his/her studio at the university. S/he subscribed to Ellen Dissanayake's (1988, 1992) cultural-anthropological view of art. Verrell knew the art teachers at Captain Dewey High and had great respect for the work that they were doing with students. One of Verrell's peer professors at the university had been simultaneously the Head of Captain Dewey Art Department and the Fine Arts Academy Administrator prior to Tower and Sable filling those positions.

Dance and Technology Professor: Aztlan – Aztlan was an innovative choreographer whose work integrated technology with dance. Aztlan had a strong relationship to Sable and the Fine Arts Academy and had delivered a workshop in multimedia prior to, and another one during, this research project.

Professor Prigogine (his real name) became a part of this research project when he granted me a personal interview in May, 2001. Dr. Prigogine won the Nobel Prize for Chemistry in 1977 for his work in thermodynamics. Prigogine has written many books on chaos theory (1979, 1984, 1985, 1988, 1996). His work and the interview I had with him had a significant impact on my understanding of change process, particularly the interactive, interpersonal dynamics involved in this case study. Prigogine's conversational style was probing, direct, poetic, imaginative, and emotionally vibrant.

DATA SOURCES

The data sources I collected for this study were:

- e-mails between myself and participants
- online chats
- my journals (notes, narratives, poems, drawings, and photographs)
- a questionnaire and eight responses
- formal, text-based communications (official reports, letters, and memos)
- informal interviews, a record of these was kept in my journals

- a variety of artifacts: flyers, evaluations of summer technology workshops, brochures, poems written by teachers and students, student and teacher art, and photographs taken by others.

Each of these sources will be discussed briefly in what follows.

E-mails

The first e-mail regarding this study was sent to me on Friday, November 3rd, 2000. I have since collected approximately 500 e-mails that were sent between myself and the teachers, parents, Captain Dewey staff and school district staff concerned with this study.

The content and the conversational style of these e-mails varied considerably. There were business-like e-mail messages, conveying concrete information such as meeting times and resource allocations. There were my passionate pleas and those from participants for aid in achieving goals or meeting deadlines or commitments. There were introductory e-mails in which participants were introducing themselves to me or vice versa. The e-mail messages ranged from sensitive and personal to extremely formal.

As of November, 2002, I am still in e-mail contact with Sable and several other teachers and technologists who are or were involved in this study. I also receive the Fine Arts Academy e-mail-newsletter (an innovation that came about as a result of this study).

Online Chats

I recorded the two online chats I had with Elvinor (parent). (See Appendix F for excerpts from these two chats.) This was the only online chat I participated in for this study.

Journal (notes, narratives, poems, drawings, and photographs)

I kept a personal journal (two large, hard-bound drawing books) that dealt with factual occurrences as well as self-reflections, philosophical explorations, all part of my attempt to understand what was happening onsite, the choices I had made, their effects, and what to do next. The journal contained poems I wrote when my feelings were too strong or too tacit to be contained in prose. The journal also contains drawings I made when words could not capture my thoughts. I pasted photographs in the journal - of participants, the school building, and student art.

A Questionnaire and Eight Responses

I developed a questionnaire called, *Technology Use in Your School: Feelings, Thoughts, Opinions and Experiences*. The questionnaire consisted 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? 2) In your opinion, what role would technology play in your classroom to be most appropriate and effective? 3) As far as you are concerned, what limits the use of technology in the curriculum? 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 questions were given to ten of the participating teachers, five of the participating staff, and to all department heads (11) at Captain Dewey High (the Campus Leadership Team). Out of 26 questionnaires, a total of eight questionnaires were filled out and returned. (See Appendix G for the full text of the questionnaire and the responses.)

Formal, Text-Based Communications (Official reports, letters, and memos)

I have collected several official reports regarding technology. (See Appendix H for an excerpt from the district technology vision statement, for 2001- 2005; and Appendix A for the state guidelines for technology education. See also Appendix C for the state guidelines for art education.)

I was asked to write a formal introductory letter to the Campus Leadership Team. (See Appendix B for the full text of this letter.) Other formal letters collected concern a technology grant that I co-administered during the study. Fine Arts Administrator Sable's formal letters were all sent to me as e-mails. (See Appendices I and J for Sable's formal letters.)

Several memos that were sent to Captain Dewey High teachers during this study concerned technology use in the school and were included as data. (See Appendix K for one of these memos.)

Informal Interviews

I participated in many informal interviews during the course of this study. Teachers, technology staff, and school administrators were more comfortable sharing their thoughts, feelings, and opinions when I did not take notes. The few times I asked whether I could tape an interview, the participants said that they would feel more comfortable if I did not tape our discussions.

Throughout the course of my presence at Captain Dewey High, I made sure that, when I was introduced, I said that I was there as a researcher and that I intended to write about my experiences and conversations. I asked the people I spoke with to refrain from talking to me about anything that they would not want me to use in my study and explained that if they did wish something to remain confidential, to please let me know and I would be sure to keep it the information to myself. During the course of this study, no one asked me to withhold any information.

Artifacts and Documents

A variety of artifacts and documents were used as data for this study. High school curricula, school budgets and documents related to the activities we carried out are some examples of the artifacts and documents collected that fill two average-size storage boxes.

Some documents were given to me by participants, for example, Wiser gave me his/her application for High School English Teacher of the Year award. Carver gave me all his/her Captain Dewey High technology grant paperwork for 1999-2000. Genesis gave me copies of his/her poetry.

PROCEDURE

I followed the Lippitts' (1976) consultancy phases for gathering data during the action research phase of this study: 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.

I made the initial contact with Fine Arts Administrator, Sable, as a result of an e-mail s/he had sent to the coordinator for an arts-based research conference in 2000. Sable's e-mail contained a description of the school and an introduction to the Fine Arts Academy within Captain Dewey High. Sable requested that researchers interested in doing research at the academy contact her/him. (See Appendix E for the text of Sable's e-mail.)

I contacted Sable by telephone just before Thanksgiving, November, 2000. 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. The verbal contract included the Lippitts' third and fourth stages: We identified some of the problems, set goals, and planned initial actions.

Action research is a recursive process of goal setting, taking action, resetting goals, and taking more action. In this study, the initial goals were set in the original meetings with Sable. These initial meetings took place on the telephone and lasted approximately eight weeks. I was onsite at the Captain

Dewey High campus approximately 10-20 hours a week throughout the course of the study.

My entrance into the school as an active participant began with my meeting with the Campus Leadership Team in February, 2001. I began to visit the school more regularly during that month, took some actions and received some feedback (the Lippitts' fifth stage). Then, I was hired by the school as a technology coordinator in May, 2001. This shifted my role from an external consultant to an internal consultant.

I worked from May, 2001 until August, 2001 as an internal consultant, hired by the school district and Captain Dewey High to administer a technology grant and provide technology support (the job Carver had vacated to work as a district-wide technology support-person in January, 2001). The goals that Sable and I had established of improving the Fine Arts Academy's web site were then subsumed into a larger project of technology integration into the general high school curriculum. New actions were taken during this phase and participants gave and received feedback.

From September, 2001 until December, 2001, I returned to my original role as an action researcher but with my expanded goal of 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 worked at the school, mentoring, coaching, and setting up technological support systems, two to three times a week. This completion stage, the Lippitts' final stage, will be discussed in Chapter Four.

RESEARCHER'S ROLE

There were two different roles I played in the course of this study. One was as an action researcher and the other was as a qualitative researcher. These two roles were not at odds with one another but they did require a different sort of intelligence or attitude towards data. Each role will be addressed separately in what follows.

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) My full participation was mandatory: I was not to excuse myself from active participation, emotional, intellectual, or 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 came 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.

My full participation was mandatory. A researcher has the ability to escape from active participation into an intellectual perspective. In an action research study, a purely intellectual perspective can have detrimental effects on the researcher's apprehension of events. 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 was not always 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 analyze during self-reflection not during participation. The theories behind action research proposed that an engaged researcher was a 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 a familiar one. Briefly, self-reflection is an affective-cognitive technique used to increase awareness of relationships, events, and actions taken or intended. I defined thematic self-reflection as an affective-cognitive technique for increasing my understanding of how a specific set of concepts operated in the research environment. The themes I reflected on in this study were collaboration, conversation, care, and connectivity.

As a Qualitative Researcher

During data analysis, synthesis of data, theory development and in writing this dissertation, my role has been that of a qualitative researcher. The primary values I had in playing this role were patience, fairness, and accuracy.

Sometimes, it took a long time before a pattern in the data emerged; rushing that process always seemed to lead to unacceptable levels of interpretive confusion. Patience was clearly necessary. Being fair was the most challenging aspect of this process: Balancing my personal opinions with those of the group, in

order to represent what happened, meant searching continuously for the broadest possible perspective.

My reading in postmodern ethics (Aoki, 2000; Ayers, 1998; Bartolome, 1994; Bateson, 1979; Bauman, 1993, 1995; Berman, 1982; Berners-Lee, 1999; Biederman, 1999; Black, 1997; Bogen, 1999; Brookfield, 1995; Broverman, 1970; Brown & Gilligan, 1992; Buber, 1958; Cissna, 1998; Daloz, 1986; Damon, 1991; Efland, 1996; Ellsworth, 1989; Freire, 1970b, 1998; Fromm, 1941, 1947, 1956; Goodman, 1994; Greene, 1988, 1995; Grice, 1991; Kerber, 1998; Luscombe, 1979; Martusewicz, 1992, 2001; Maslow, 1968a, 1968b; Miller, 1980; Noddings, 1984; Nussbaum, 1990, 1998; Orwell, 1949; Papanek, 1992; Pinar, 1975; Polanyi, 1958; Prigogine, 1985; Ricoeur, 1991; Robertson, 2001; Rogers, 1967; Ruddick, 1989; Schumacher, 1973; Schutz, 1999; Shotter, 1984; Spender, 1980, 1982a; Spinoza, 1677/1883; Swidler, 1979; Talbot, 1991; Tarrant, 1989, 1991, 2000, 2001; Velleman, 1999; Vygotsky, 1993; Warschauer, 2000; Weill, 1992) alerted me to the problems associated with accuracy (Argyris, 1980; Hamilton, 1996, Illich, 1971; Lather, 1986; Luttrell, 2000). I decided to merge a relational (relativist) concept of accuracy with my understanding of the creative collaboration of conversational reality and worldmaking to grant myself permission to create a world of meaning from my interpretations. My goal then became to capture the heart of the meanings that the data held for me and to convey them to the reader as coherently as possible.

DATA ANALYSIS

My data analysis was hermeneutic, recursive, and self-reflective. I wrote a 150 page, narrative description of the action research. This narrative was the basis for the descriptive and analysis sections of Chapter Four. I used Schallert's (2002) method of thematic conversational flow analysis as a basis for interpreting the flow of meaning during the study. I used Mink's (1979, 1993a, 1993b, 1993c, 1994, 1998, 2000) descriptions of organizational change as the basis for interpreting the change process. I used Ricoeur's hermeneutic circle applied to conversational reality theory's description of interactive co-creativity, to conceive of unities underlying the diversity of events, educational paradigms, and personalities. I used Maslow's (1955, 1968a, 1968b) hierarchy of needs to interpret the need levels of participants in the context of Gilligan's (1987) formulations regarding the role of gender in conversation and ethical action. Other theories that were used to create and sustain the action research and to qualitatively interpret an analysis were covered in Chapter Two and some of these will be revisited in Chapter Four and Five.

My analytical goals were to describe some participant perceptions and some of the social forces at work that affected technology use at Captain Dewey High. I was interested in identifying attitudes towards technology and the availability of technological resources, both cognitive and material. I felt that it was important to notice how perceptions of the availability of resources were characterized by participants and any social forces that seemed to influence the availability of technological resources (cognitive or material). I was interested in

any patterns in interpersonal meaning-making that took place during the change process. I was interested in the way that conversations emerged from and effected particular events.

As we transition into the information age, technology is becoming more ubiquitous in our schools. This case study was done as a contribution to our shared understanding of some of the relational, interpersonal, conversational realities that can influence the integration of technology into the curriculum.

Chapter Four
Data: Description and Analysis

My research at Captain Dewey High lasted for a year and a half. To convey the events and my analysis, this chapter is divided into two major sections. The first section is a descriptive overview of relevant conversational events. The second section is an analysis of the conversational reality that emerged and developed during my involvement with the school. My analysis is based on Gilligan's theory of justice and care, Shotter's conversational reality theory, and Third Force psychology's emphasis on self-actualization through conversational interaction. The description of data briefly covers some of the organizational and interpersonal issues that affected the primary action research initiative, the integration of technology into the Fine Arts Academy, later broadened to include the school as a whole.

In both the descriptive and analytic sections of this chapter, the emphasis is on conversations that took place face-to-face, on e-mail, over the telephone, or in meetings during which concepts of justice and care were shared and moments of self-actualization took place or were stymied. As previously explained in Chapter Three, participants are referred to in gender-neutral terms in the descriptive section while in the analysis section the gender of participants is openly discussed. Throughout the dissertation, participants are referred to by their pseudonyms. An annotated list of pseudonyms can be found in Chapter Three.

DESCRIPTIVE RESULTS

Captain Dewey High opened in 1953. Its perimeter was approximately one mile. The Fine Arts Academy was established as a curricular path within Captain Dewey High in 1989. Even before 1989, Captain Dewey High had a reputation of supporting the arts, creativity, and the shared articulation of interpersonal relationships. Students from anywhere in the district could apply to the Fine Arts Academy and based on an audition (or a portfolio) and an interview, could be accepted for transfer to Captain Dewey High.

Both the Fine Arts Academy and the high school had a city-wide reputation for social liberality. Teachers at the school were known to take a personal interest in students. One teacher had adopted and raised a student and many teachers, counselors, and staff had their own children attend the school or had themselves attended the school and returned as teachers. Often school policies had been based on a belief in the power of discussion to work out difficult situations. When the school became racially integrated, there were incidents of verbal and physical violence. Interracial student support groups were formed that enabled cross-cultural communication. Although I did observe evidence of systemic sexism, I did not witness overt acts of sexual or racial stereotyping by students or staff.

The East side of the school grounds lay alongside a major two-lane thoroughfare. The North and West sides of the school bordered on neighborhoods primarily made up of two and three bedroom houses. The South side faced a mix of single-story professional buildings and undeveloped land.

Permanent installations of student artwork and topical posters graced the walls of Captain Dewey High. When I began my research there, copies of a poster "Think it. Believe it. Achieve it." were posted in every hallway. I supposed that the poster was meant to encourage individual achievement. However, I interpreted the poster as referring to my research questions: Could the interpersonal articulation of individual thinking generate belief in and the achievement of collaborative action? Could the goal of technology integration be achieved as a result of co-agentic conversation rather than through the current much-researched model of expertise-centered teacher technology training? I have divided my research chronologically according to my interpretation of consultation phases: entering, meeting, transferring, and completing.

Entering

In November 2000, I responded to an e-mail from Sable, the Fine Arts Academy Administrator at Captain Dewey High. (See Appendix E for Sable's e-mail.) Sable e-mailed a message to the coordinator of an arts-based research conference and his/her e-mail was forwarded to the conference listserv. Sable requested researchers to come and work at the Fine Arts Academy. The idea of working with art educators appealed to me. After several phone conversations and e-mails, Sable and I made arrangements to meet in person to discuss potential research projects.

I arrived to meet Sable for the first time in January 2001. Among my first impressions of Captain Dewey High School recorded in my journal were, "Schools are sites of continuous transformation," and "It [Captain Dewey High]

feels like America to me." Walking down the hall as students made their way to their classes was a heady experience. In my journal, I wrote of the joy I felt being in the midst of such a heterogeneous mix of young people. I felt privileged to be a participant in what seemed to me to be the site of a young America in its becoming.

Sable's initial e-mail characterized the Fine Arts Academy as "a grass roots effort that has come a long way in five years." Initially, the academy was the idea of the founder of a well-renowned performance arts high school in another part of the state. Sable was hired in 1995 as the academy's first full-time administrator. The academy did not have official status as a magnet school but functioned instead as a special program under the aegis (and dependent upon the good will) of the school as a whole and its current principal, Lightyear.

Sable's office was small. Most of the offices at the high school were small. None were ostentatious. Sable and I decided that the most productive avenue for our collaboration would be to upgrade the Fine Arts Academy's web site. For several weeks, we discussed our ideas with committees of teachers, parents, and students; and we interviewed teachers who might be interested in participating specifically in the web site project or in the more general goal of technology integration into the curriculum.

Creating collaboration. My understanding of what my role should be as an action researcher was heavily influenced by the work of Argyris (1982), Lewin (1948), and Mink (1993a). I felt my purpose of initiating and supporting change and innovation in order to impact the organization of human and educative

systems barred the simple dispensing of expertise. My goal was for technical knowledge to become embedded in the daily workings of the Fine Arts Academy. I felt that my role was to initiate and model long-term collaborations that would support the continuous development of the use of instructional technology.

By the end of February 2001, Sable and I had collected all the necessary permissions to proceed and had identified two teachers who were highly motivated to work with me, Tower, the Head of the Art Department, and Wiser, the High School English Teacher of the Year for 2000-2001.

In retrospect, even in initial conversations, teachers, parents, staff, and students were generous with useful and accurate information. The parents I spoke with conveyed reliable organizational analyses as well as penetrating self-reflective portrayals of the significance of parents' role in support and change. (See Appendix F for excerpts from online conversations with Elvinor.)

Teachers and students repeatedly informed me that they valued inclusion, in particular that any program taking place in the school ought to be available to every student. Some teachers let it be known to me that efforts benefitting the Fine Arts Academy would be viewed as draining needed resources away from the rest of the school. There seemed to be universal agreement that the school and the academy needed more resources of all kinds: space, equipment, training, money, teachers, and time.

My general impression was that the shared mythology of lack was supporting a D-need motivational approach to the full integration of technology into the curriculum. The challenge for me would be to collaboratively re-story this

mythology so that teachers, parents, and students could perceive themselves as supported and capable of fulfilling both basic technology goals and the “higher” goals of aesthetic and intellectual engagement with technological tools.

I began the long process of clarifying for myself my interest in implementing aesthetic principles of education and innovation as bases for the development of technology literacy, creativity, and continuous innovation.

Understanding resistance. It has bothered me that polarities are used so often for explanatory schemata. Intellectuals perpetuate irreconcilability by reifying polarities in thought and action. The research literature on teachers and technology was filled with examples of teachers responding negatively to innovation. It did not make sense to me that teachers would inherently be against change. How could the educational technology literature fail to notice that teachers have just as often been the change agents as they have been conservators and traditionalists? I wanted to go beyond Hodas' (1993) characterization of teachers as non-readers who, by the very nature of their role, were doomed to resist new forms of knowing. I thought it likely that there were qualitative differences between the techniques, policies, and innovations that teachers accept and those that they resist. I wondered what those qualitative differences might be.

I took for granted that the researchers who had found teachers to be resistant were telling the truth. Teachers as much as anyone can resist change when they deem the change to be dangerous. Was it in the way the innovation was explained to the teachers or the substance of the innovations themselves that was causing teacher resistance? I thought that if I moved very slowly and carefully

and listened closely I might be able to determine the nature of teacher resistance to technology innovation. I assumed that Hodas (1993) had been accurate in his identification of a phenomenon of resistance but that he had misrepresented its psychological and intellectual origins and purposes.

Meeting

The meeting phase dated from March 2001 through May 2001. This phase of the action research was characterized by intensive and often quite interpersonally revealing conversations. The conversations all concerned our roles and our hopes for education at Captain Dewey High. Often these conversations became heated, passionate, emotional. These conversations quite literally became the engines of change. Although the primary or core participants/collaborators remained the original three, Sable, Tower, and Wiser, a secondary group of participants including teachers, parents, school and district staff became involved in the change effort.

Elvinor was the parent of a Fine Arts Academy student musician. When Elvinor and I discussed the role parents played in school change, I was moved to re-evaluate my interpretation of the role parents could and did play in the communicative organization of school. In an online chat, Elvinor beautifully captured the spirit of our hopes, "It's way too much work for any one soul to do. That's also the beauty of the interwovenness of the web that we were talking about....the more brains at work, the better." (See Appendix E for more of Elvinor's contributions.)

Sable often discussed with me the complexities of the Fine Arts Academy's relationship to Captain Dewey High. Sable had to negotiate through Lightyear (principal) and Strong (building supervisor) for resources, teachers, money, and equipment. The academy's finances and even its organization depended on the high school's administration. Often the needs of the academy were perceived as contrary to the needs of the school as a whole and this was a great frustration for Sable. (See Appendices F and I for Sable's memos to Lightyear and parents.)

Although the academy had recruited a sufficient number of students to require the appointment of additional teachers to the art department, the district had refused to hire more teachers. Some art classes had to be cancelled, many others were overcrowded. During this series of conversations with Sable, we often discussed parents' potential to effect systemic organizational change. In Sable's experience, parents had succeeded where administrators had failed.

Conversations with district technology staff were always pleasant and informative. It seemed particularly odd to me that everyone I contacted on the district level regarding technology integration was well-informed and considerate and that the technology infrastructure was well-designed but teachers, students, and parents at the academy and the high school did not feel supported or encouraged in their technology use. Where was the disjunct between a district policy that was eminently coherent and a daily school technology praxis that could at this stage be characterized as chaotic and fraught?

For example, the district had provided a server-supported information structure, a password-protected set of folders, one for each student and each teacher in every school in the district. Each school member's folder was accessible from all networked computers on each campus. Practically speaking, all campus computers were networked. This well-designed system represented a commitment on the part of the district to support intra-campus use of information technology for instruction and collaboration. Theoretically, students and teachers could make their work accessible electronically throughout the building; collaborative work between teachers from different areas was a technically-supported possibility. And yet *no one* at Captain Dewey High was using this functionality. Except for Gold, an English teacher and the chairperson of the District Technology Leadership Team (DTLT), none of the participating teachers even knew of the system's existence. None of the high school teachers had been trained to access the system and there had been no school-wide dissemination of information concerning its educative or organizational potentials.

Classroom computers. Some places have powerful effects on our psyches. Some classrooms embody the philosophy of a teacher so well that the room itself teaches. Wiser and Tower both had classrooms of this type. Tower's art room and Wiser's English room were spaces in which it was possible to have deep and penetrating conversations. Both teachers expected self-reflection from their students and both encouraged students to use both creative and critical intelligence in their class work and in their homework assignments. Tower's and Wiser's classrooms reflected their personalities and their teaching style. Neither

room was overly tidy, each had a lived-in quality. Resources were organized and kept in order and students were allowed to make themselves comfortable while they were working. Students working in these rooms were encouraged to show a sense of pride in their work. Both teachers offered generous and timely analyses and in-depth feedback to each student.

Wiser had four Macintosh computers. They were networked together so that Wiser could access them all from a single desktop. Students could be found using the computers throughout the day. Tower, on the other hand, had only one Macintosh in his/her classroom. Students rarely used this computer because it was password-protected and required Tower to walk over and type in his/her password every time the computer was idle for more than 15 minutes. Tower's (art) computer did not have any art or design programs installed. In contrast, all of Wiser's (English) computers were equipped with a popular word processing program and did not require a password for student access.

In the first few weeks of the research both Tower and Wiser communicated to me their concern for students with special emotional or intellectual needs. Both of these teachers spent extra time and effort to appreciate the life situations and the psychology of their students.

Competency. Competency has many connotations in educational discourse and several research methodologies have arisen for studying and defining competency and methods for its acquisition (Hyland, 1993; Tarrant, 2000). I was not concerned with technological competency as an element in my research because I felt that teachers' competency as teachers (not as technologists) was

what ought to be important; and that any definition of technology competence should be altered depending on each teacher's subject area and preferred teaching style. I was surprised when both Wiser and Tower, in our respective, initial, face-to-face conversations, described in great detail their struggle with the district's computer competency test. Both teachers felt that the test was an unfair and unrealistic assessment of their ability to utilize computers in their curriculum. Both teachers had spent hours working on the tests. Tower had not yet passed but Wiser had spent a weekend struggling with it, engaging the help of family and friends (one of whom happened to be Carver, technology support-person) and had at last passed. Both Tower and Wiser asked me if there was anything I could do to change the system because in their view many teachers were discriminated against because of this test. My response was that I would like to see the test myself and then I would ask someone at the district level for the rationale for using the test. Perhaps district policy had not been conveyed correctly.

Prior to my work at Captain Dewey High, I had not heard of the existence of computer competency tests for teachers being a pre-requisite for the allocation of computers for student use. According to both Wiser and Tower, every teacher who wanted to have classroom computers was required by the district to pass this test. Teachers were given one computer for their administrative responsibilities but to receive computers for their students, they would have to pass this test.

The test required a knowledge of DOS, an operating system that had become embedded and invisible in PCs but had never been used in Macintosh computers. Wiser and Tower had Macintosh computers but both PCs and Macs

were used on campus. The test questions were not cognitively challenging. One exercise was to outline an image of scissors and place them on the left side of the screen. But understanding and using DOS commands appropriately was daunting for most non-programmers. Neither Wiser nor Tower would ever have occasion to use DOS commands on their Macs. Interestingly, the district did not supply a set of instructional materials so that teachers could study for the test. The situation seemed so odd to me, and every teacher I spoke with (not just Tower and Wiser) mentioned the test as a stumbling block, that I resolved to find out more.

Force fields. Some Lewinian force fields affecting teachers' ability to integrate technology into their curriculum were becoming apparent. The competency test was a hurdle that teachers were having difficulty surmounting before they could even acquire computers or begin to utilize technology pedagogically.

The District Technology Leadership Team (DTLT) was made up of a group of Captain Dewey High teachers and was charged with disseminating district-wide instructional technology information. The DTLT seemed to spend more of its time and energy focused on the acquisition of hardware than on educational guidance and pedagogical support. During the course of my research, as far as I know, the DTLT at Captain Dewey High did not organize any instructional technology events. And the only school-wide communications from the DTLT were memos, sent in Lightyear's name, reiterating the necessity of taking and passing the technology test. (See Appendix K for an example of one of these memos.)

Rather than working together to initiate new teaching practices utilizing the potentials of technology, teachers were pitted against each other, competing for computers. Teachers at the school who were interested in using technology had no direct access to intellectual or technical support. The emphasis on the competency test and a shared belief in the scarcity of resources meant that teacher relationships regarding technology issues were often adversarial and competitive.

Gold Crisis. Crises can result from Lewinian forces pushing in contrary directions. Lewin (1936, 1951) wrote that individual behavior can be understood as a reaction to external forces that either restrict or enable an individual to achieve her goals. Almost as soon as Sable, Tower, Wiser and I had defined our goals - a summer technology workshop for teachers, students, and parents, the development of the fine arts web site, and the improvement of the technical support for creating the school's yearly literary journal – we experienced external resistance. The most outspoken representative of the resistance to our projects was Gold, an English teacher who was also the chairperson of the DTLT.

The literary journal project (desktop publishing) was the focus of my collaboration with Wiser. Tower was committed to the web site project (web publishing). And Sable was my primary collaborator for the technology workshops (graphic arts, multimedia, research, and business software). Theoretically, none of these projects required Gold's participation or assistance.

Wiser and I had once asked Gold's advice on accessing the shared folder system. Gold gave us a printed handout with step-by-step instructions and, when

Wiser and I were unable to make the written instructions work, Gold, at Wiser's request, briefly assisted us in accessing the system so we could see how it worked.

Gold had been mentioned to me in the context of the competency tests. Gold was reported to be a fierce advocate of the tests. During my research at the high school Gold and Lightyear sent three memos, all of them on the subject of the vital importance of teachers taking the competency tests. The memos used threatening language saying that computers would be removed from the classrooms of teachers who had not passed the tests and that those teachers who did not yet have computers would not receive any unless they had passed the tests. (See Appendix K for one of these memos from Lightyear and Gold to the faculty.)

In my view, competency was not the fundamental problem but rather was masking an avoidance of the challenge of fair allocation and distribution of computer hardware and software. This more fundamental issue of computer allocation brought about a public confrontation between Gold and myself in the hallway outside the teachers' lounge.

Sable and I had been immersed in an organizational nightmare, trying to find rooms and computers we could use for summer technology workshops that would not interfere with the yearly cleaning of the school or the Ninth Grade Initiative summer school. During the course of our brainstorming of possible solutions, Sable had told me how a few years earlier s/he had organized a summer multimedia workshop taught by Aztlan, a university professor of dance and multimedia. Sable had borrowed one computer from each of several friendly

teachers and carried them one at a time to a room approved for use. Sable told me this story as a fable, the moral being, that his/her previous method was daunting and time-consuming but, worst case scenario, could be tried again.

Building supervisor Strong had suggested to me that we use Bryght's vocational technology lab. Strong further suggested that Bryght might be interested in working on the project. I had met with Bryght (Business Technology Teacher) and Genesis (Head Librarian) to discuss the possibility of using their (already computer-equipped) rooms. The library contained approximately 20 computers and the vocational technology lab held approximately 35 computers.

The day following our initial conversation, Genesis came out of the teachers' lounge and stopped to talk to me in the hall. S/he told me that Gold was in the teachers' lounge warning teachers that I was planning to remove computers from their classrooms without their permission. Genesis and I were still talking when Gold came out of the lounge. I greeted Gold and stepped forward so that s/he would stop and talk. When it became clear to Genesis and the others who were standing around us that I was not intending to create a scene, everyone drifted off and Gold and I were alone in the hall.

We spoke for about 20 minutes and though we covered a lot of ground we did not find common ground. Gold denied spreading rumors about me and I stated that I would prefer that s/he come directly to me if s/he had objections or questions regarding my plans. Gold agreed in principal. I then asked Gold about the competency tests and the memos that threatened the teachers with the confiscation of their computers if they had not yet passed the computer

competency tests. Gold said that the teachers who had not passed the tests were lazy and refused to make the commitment to learn about technology. Gold said that using threats was the only strategy that would work with Captain Dewey High teachers and when I had been there longer I would come to accept this fact.

Clarifying district policy. It took many weeks to get a meeting with Archer, the district instructional technology director. And, although we had intended to meet once more, Archer's job was extremely demanding of his/her time and after Archer cancelled three appointments because of emergencies – an area flood, an emergency district meeting, and a personal emergency – my research time had expired.

In our face-to-face meeting, Archer began by explaining to me that the district had created a "vast and robust" technical infrastructure but that there was a growing realization that more attention to human factors was needed in order to utilize and maintain those systems appropriately. S/he said that "the [district's] first line of defense" was made up of five facilitators who were responsible for providing training to district teachers. Archer admitted that the district was not yet providing adequate technical support but s/he skirted the issue of whether or not the district was providing teachers with sufficient cognitive support for technology integration into the curriculum. Throughout the duration of this study, neither myself nor any of the core participants ever met or saw any of the five district technology trainers at Captain Dewey High.

When I asked Archer about the district's position on the competency tests, s/he seemed to hesitate about agreeing that they were outdated and irrelevant but

did become animated when explaining that the district's new policy was to replace the competency-based allocation of computers with an enrollment-based assessment and allocation. The district's goal was changing from teacher competency to the availability of computers for student use.

Archer had taught English at Captain Dewey High before going to law school and joining the district as an administrator. S/he had taught in the same department as Gold and was familiar with Gold's approach to education. I asked her/him to come to a meeting at the school to discuss district policy. I explained that my hope was that Gold might be influenced by the new district policies. Archer agreed to come and said that s/he looked forward to being in the school again.

Are we in it or not? While I was collaborating with the teachers at the high school, I was working on presentations for conferences on Artificial Intelligence in Education (AIE) and Computers and Writing (CW). My presentation to the AIE conference was on the relationship between ontology and epistemology, specifically how the symbolic structures of ontologies often limit the exploratory potentials of epistemologies. My presentation to the CW conference was on the same topic but was posed as encouragement to teachers to realize their power as consumers of instructional software to influence the course of its development.

My hope in both cases was that educators would have the confidence to promote the educative value of unpredictable, interpersonal relationships. And that AIE designers would have the open-mindedness to perceive a value in open-

ended instructional designs. During my research on this topic, I became fascinated with Ilya Prigogine's conceptualization of the relationship between chaos, creativity, and the arrow of time. The ontological conception underlying educational programs invested in fixed-answer questions was similar to the reasoning underlying reversible time equations: a fixed universe. Incorporating an appreciation of the arrow of time into educational designs could mean a greater sensitivity to change, growth, and interaction in learning moments.

When I realized that Prigogine was a professor at my university, I sent an e-mail to his assistant asking if s/he would be willing to let me interview her/him about Prigogine's work. S/he wrote back with the message that Dr. Prigogine would like me to call him at his home to arrange an interview. I was surprised and thrilled. Our phone call led to his suggestion that we meet in his office a few days later to discuss further the relationship between his theoretical work and my research interests.

After our initial greetings in his small office at the University of Texas, Dr. Prigogine began our discussion by saying, "I simply wanted to know: Are we in it or not? And what is your question?" Unfortunately, at that time I did not have a coherent question, only a broad wondering. Dr. Prigogine patiently listened to my rambling, groping for perspective. When I mentioned Cassirer's work on the history of science, Cassirer's theory regarding the ubiquity of symbols and symbolic thinking and then my interest in how underlying ontological conceptualizations influence pedagogic practice, Prigogine said, "I think I know this…Cassirer…He was a Kantian?" I concurred. We smiled. He was pleased that

I had found his theories by following Kantian idea-threads. We found that we were both interested in the analytics of a humanitarian science, a humane and human science whose epistemology accepts the responsibility of biological embeddedness and social interwovenness.

I asked Prigogine how he could have written that time could be considered reversible in some cases. His response was that in cases where only two factors are involved, mathematically reversible time can predict behavior with some accuracy. But in situations involving living organisms, there are always far more than two interacting factors. For practical purposes, the arrow of time, the effects of change over time, must be taken into consideration.

Sable had asked me to take the position of on-campus technology support-person, the position that Carver had vacated when s/he took a district-wide technology support role. The situation was complicated. There is a large body of literature exploring the relative pros and cons of internal vs. external consulting. If I were to take a job with the district and work in the school, would that compromise the integrity of my study? I had reason to believe that Sable's administrative instincts and abilities were excellent and his/her reasoning seemed sound. Sable had explained to me that a local technology company had provided a grant for a technology support position, software, and equipment. $35,000 remained in the fund but the grant stipulated that the school could not use the money if the technology support position was vacant. If I took the position I would have to abandon my research design, immerse myself in the priorities and

goals of Captain Dewey High, the vagaries of district bureaucracy, and the thankless headaches of grant management.

With Prigogine's question reverberating in my mind, I decided to choose to be in it rather than not. I accepted the job. I was hoping that my new role as internal consultant would not cause me to abandon my objectivity but, even if it did, it was exciting to consider that my new position might allow me to enter into a more profound state of inter-subjectivity.

More meetings. Two technology meetings were held at Captain Dewey High before the meeting with Archer. I was unable to attend the first of these but was told by Sable and Tower who had both attended, that the meeting had become heated and there had been yelling. Tower left the meeting early rather than lose his/her temper. Sable said that the argument stemmed from Gold and Strong objecting to our summer technology workshops on the grounds that they were disruptive. Tower and Sable felt that Lightyear could have been more active in our defense.

Meanwhile, I had pursued Strong's suggestion to involve Bryght. I hired Bryght to teach some of the summer workshops and s/he allowed us to use her vocational technology lab.

The second technology meeting was a meeting of the Fine Arts Technology Committee and took place in a small room off the library. The room was crowded, nine people – Principal Lightyear, Assistant Principal Hunter, Sable, Tower, Head Librarian Genesis, a geology teacher, computer-based design teacher Shyer, parent chairperson of the Fine Arts Technology Committee Pierce,

and myself – sat around an oval table that took up most of the 8’ x 14’ room. I attributed the large turnout to the fact that there had been yelling at the previous technology meeting. At this meeting participants were attempting resolution and interestingly, Gold and Strong did not attend.

Although there was no yelling, there was noticeable tension. I used a conversational strategy of counter-interrupting when someone interrupted Sable or Tower. More than occasionally, when Sable or Tower would try to clarify their positions, someone would cut in and speak over them before they could express themselves. Then, hoping to create awareness, I would break in with my counter-interruption and suggest that Tower or Sable be allowed to finish what they were saying. On one occasion, having interrupted the interrupter, I took the liberty of speaking for Sable and Tower myself.

Essentially, Sable, Tower, and I were explaining that the $35,000 in the grant budget had to be spent within a matter of weeks. We were spending the money the only way we could, given the grant categories. The summer technology workshops were free and open to anyone. There was a tremendous amount of work involved in closing out the grant with dignity and educational honor and we would appreciate any help but at the very least we were hoping for the good will of this Fine Arts Technology Committee and anyone else committed to technology integration. After this meeting, Sable, Tower, and I ceased to experience overt negativity or resistance.

The Captain Dewey High meeting with Archer was in a large open area of the library. Gold, Shyer, Bryght, Lightyear, Pierce, Genesis and Strong were

among the 12 people who came to the meeting with Archer. Tower and Sable had previous commitments. The meeting was formal in structure but Lightyear had brought us pizza so that we would feel relaxed and comfortable. The agenda was in three parts. Lightyear opened the meeting, before Archer arrived, asking us to read excerpts from texts about technology and intellectual life. S/he asked us to consider how the faculty who were not particularly interested or well-versed in technology perceived those of us who were enamored of its potential. Lightyear identified her/himself as someone who was less than comfortable with a technology-based educational system. This part of the meeting was lively and elicited a variety of responses from participants.

The second part of the meeting (Archer had called to say that s/he would be late) was taken up with visioning what was needed at Captain Dewey High for technology to be integrated into the curriculum. Gold dominated this portion of the meeting. Lightyear repeatedly suggested to Gold that s/he refrain from interrupting others but Gold ignored Lightyear's suggestions and continued to overpower most of the speakers with his/her own opinions.

The third part of the meeting began when Archer arrived apologizing for being late, and said that s/he was glad to have brought us copies of the first draft of the district's new five-year technology vision and plan "hot-off-the-presses." S/he made a short speech explaining the district's vision. The district's official view was that technology should support learning. The long-range goal was "any time, any place learning." In five years, every student was to have their own laptop computer. In an attempt to shift the focus from hardware to education,

during the following school year, one million dollars was to be cut from the hardware budget and made available for training and education programs. (See Appendix H for a summary of the district's technology vision.)

After Archer's short speech, Gold continued to dominate the discussion. Surrounded by technology professionals, parents, the principal and the district information technology supervisor, Gold presented her/himself as the most knowledgeable educational technologist in the room. Bryght and I left the meeting early so that we could install new software in the vocational technology lab for the summer workshops.

Transferring

The meeting stage of a consulting process has always been the most difficult for me, requiring me to model and engage as deeply as possible in meaningful interpersonal conversations. The transferring stage, on the other hand, is much less affectively challenging. The transferring stage is primarily cognitive in its process, explanations are followed by examples; my focus is on participants incorporating information and practicing skills and I am free to support openly or to observe quietly. During the entering and the meeting phases I was modeling collaboration and making it as clear as I could that I would support any and all attempts at incorporating technology into the curriculum. During the transferring stage my role became that of a traditional participant-observer.

Summer workshops. We offered day and evening classes in PowerPoint, Illustrator, and PhotoShop. Approximately 40 people attended the technology-art classes. Five were parents, the rest were Captain Dewey High students. The

responses on the feedback forms we handed out at the end of the courses were generally positive. Some participants reported that they would have preferred more structure while others felt that there was an appropriate amount of creative freedom. One of the graphic arts teachers had attended Captain Dewey High in the 1980's. We offered a second series of technology-art workshops in multimedia taught by university dance and technology professor, Aztlan. S/he taught Flash, Director, and Poser to 20 students. Tower attended all the technology-art workshops as co-teacher and workshop co-organizer. S/he was paid for his/her time, allocated a computer in each class and was able to learn alongside his/her students.

We offered a web research class and a class in Microsoft Office. Both these classes were originally intended for the Ninth Grade Initiative (a summer school for eighth graders who were lacking the requisite credits to enter high school the following fall). Sable had suggested that we use part of the grant money to provide some classes for the initiative as this would benefit the school as a whole. Sable thought that this would also ameliorate accusations that we were only interested in benefitting the fine arts academy and satisfy Strong's request that we not conflict with the initiative's use of school facilities.

Unfortunately, the initiative was traditionally organized at the last minute. Quinty changed plans several times, the result being that the web research class ended up with only two students (one teacher and one high school student) and the Microsoft Office class had none. To preserve the integrity of our budget and our commitment to pay Bryght and Genesis, Sable and I asked those teachers with

few or no students to turn their lesson plans into open learning materials for the district. With design help from one of the graphic arts teachers, we created two high quality overhead-projection presentations with hard copy versions of each. We intended to distribute them to the district but found that there was no bureaucratic mechanism to make teacher-generated learning materials generally available.

Writing together. Tower and I wrote a proposal for a special issue of Theory in Practice called "Doing Curriculum Work as a Public Moral Enterprise." Our proposal was not accepted but the experience of writing together helped us to understand each other. The following was our proposal:

> "It's all about Culture really…"
> This paper examines the forces and essences we are experiencing as we work to integrate technology into a fine arts' curriculum. Currently, technology is assigned first to "core" subjects. Fine Arts is considered an elective, lacking the academic credibility necessary to command fiduciary respect from the existing bureaucracy. Equally powerful constraints are imposed by current curriculum designs: The arts curriculum is organized categorically, according to technique; efforts to teach the socio-cultural embeddedness of art are not presently supported. Articulating and developing a mutual understanding from our working collaboration, we have imagined and are implementing a co-evolution of the arts and technology curricula.

Art as vocational or academic training. Throughout the course of our collaboration, Tower had represented our ideas to the fine arts (parent-run) booster club. Before the beginning of the new school year (2001-2002), Tower requested that I come to the booster club's planning meeting. S/he indicated that

s/he was having difficulty representing his/her ideas to the group and would appreciate my help. I was glad to oblige.

The meeting took place in a local city library meeting room. The room was large. Pierce, Oliphant, Sandragon, all parents of fine arts students, Tower, and myself sat around a spacious table and talked about money. How much money did Tower need to accomplish his/her goals? Where would the money come from? I listened and observed, hoping to perceive the dynamic that had bothered Tower enough for her to ask for my support. Sandragon was quiet. The conversation was between Pierce, Tower, and Oliphant.

Oliphant and Pierce suggested that Tower apply for a grant from a program called "Career to Work." According to Oliphant and Pierce, the music department at Captain Dewey High had received $20,000 the previous year from this program. Career to Work was a vocational program. Oliphant and Pierce said that a vocational technology-art strand would generate funds and prepare students for jobs in the local technology industry. Tower tried to express an alternative vision but was overridden by Oliphant's enthusiasm. After considering how to proceed, I offered, as Tower and I had spoken often of issues relevant to this particular discussion, to share some of our concerns.

I explained to the group that although there was strong national support for art to be part of the core curriculum of public schools, local governments and parents were not always in agreement with this national priority. There were districts where art was cut from the curriculum entirely. Tower and I agreed that art at Captain Dewey High must strive to be a vital, intellectually stimulating,

core academic course. If Tower put his/her program in debt to a vocational structure s/he would risk sacrificing time and energy from the academic, the *fine* art strand in favor of a *commercial* art strand. In order for students to continue producing high quality, prize-winning art (something the academy students were noted for, in all of the art disciplines offered), Tower had to remain committed to academic rigor. However, if the district would supply the funds for a new teacher, Tower would hire a graphic arts teacher who could be supported in acquiring the certification necessary to apply for vocational funding. Note that the previous year there had been enough enrolled (some transferring from other schools) art students to require a new art teacher, the district had refused to provide the funds and classes had to be merged or cancelled.

Our conversation was lively. Tower participated fully. Oliphant shared valuable information and advice, as did Sandragon. Oliphant owned a graphic arts company and Sandragon worked for a large technology corporation. We began a round of delightful brainstorming. We came up with ideas and visions, many of which became actualities during the following school year.

I brought up an idea I had been mulling over for awhile but had not known how or with whom to share it. I wanted to involve Bryght (vocational technology teacher) in teaching the basic levels of creative software such as PhotoShop, PowerPoint, and Dreamweaver. The group was interested in this idea for several reasons. The majority of art students were white while the majority of Bryght's students were Hispanic or African-American. A collaboration between the vocational technology curriculum and the art curriculum could increase the

diversity of both departments. Bryght's vocational technology program was already certified to request funds from the Career to Work funding sources. Art students interested in technology-based art could study in the vocational strand to achieve technology literacy and vocational students might go from Bryght's class to the academy or simply explore their talent in an art class.

Though we did not realize it at the time, a partnership similar to the one we were then co-imagining between Bryght and Tower developed later between the computer-based design teacher, Shyer and 3D art teacher, Copley. Shyer became frustrated with the limitations inherent in his/her technology curriculum. Even though Shyer's students were ostensibly in a design class, they were not given any substantive creative guidelines. The lack of art theory in the computer-based design curriculum was frustrating to Shyer. 3D art teacher, Copley taught sculpture, jewelry making, and mobiles. By the end of the next school year (2001-2002), Copley, Shyer, and I were actively investigating the possibility of acquiring the same 3D design software (SolidWorks) and teaching it in both classes. At the same time, Tower, Sable, and I were investigating the feasibility of re-arranging the master schedule so that students could take computer-based design and 3D art classes as part of a unified curricular pathway.

Completing

The highlights of the completion stage of my research at Captain Dewey High were the dissemination of my questionnaires, Sable's organization of "The Dream Team," the realization of the fine arts web site, the redesigning of the

literary journal's procedures, and Bryght and I designing and delivering together the first web design course at Captain Dewey High.

The dog days. August, 2001 was a difficult month. School began in mid-August. Very few new teachers had been hired in the district and many high schools as well as elementary and middle schools were coping with the negative effects of overcrowded classrooms. Sable told me that the district justification for not hiring new teachers was that existing teachers had been given raises. Once again teachers were being put in a position of being pitted against themselves. Money was also an issue for me personally because discrepancies in bureaucratic regulations had resulted in a three-month delay in the payment for the work I had done as technology support-person and grant administrator. I remained off-campus for the few weeks remaining until my check arrived. I did not wish my negative feelings to affect my collaborations.

While off-campus, I continued to communicate with Sable, Tower, Wiser, Carver, and Genesis by phone and by e-mail. Tower and Wiser were overwhelmed with record numbers of students; they were both teaching without a free period. Sable told me that the school was in crisis, that teachers and staff were exhausted. The district had introduced a new computer-based system for taking attendance and was requiring every teacher to use the system immediately. The system was not working well, there was no on-site technical support and a call to the help line often meant a wait of more than half an hour, time teachers with no free periods, could ill afford. Sable suggested that I hand out my questionnaires while "the teachers are angry." I could not give out the

questionnaires then because the district and university permissions for the previous year had expired while I had taken the job of technical support for the high school. I had resubmitted and was waiting for the committees' approval before I could resume collecting data.

September arrived with no sense of foreboding. On September 11th 2001, everything changed. The shootings at Columbine in 1999 had elicited in me a focusing onto the field of education my commitment toward the development of peaceful coexistence. Although the scope of my concerns was enlarged by the events of September 11th, I understood that my present challenge, my contribution, my piece of the humanist puzzle, was to continue working towards the development of interpersonal negotiation and creative collaboration at Captain Dewey High. I returned to the school on September 25th to participate in the fine arts' open house. Students sang and played music in the courtyard outside the art room. Student art was exhibited throughout the school. Parents, students, teachers, staff, and community volunteers were sharing ideas and enjoying the creative work. The mood was both somber and celebratory, a soft sadness permeating the festivities added a stroke of ponderousness to the youthful creativity and hopes tentatively emerging. Lightyear gave a speech. S/he said, "We will continue to support the creative spirit of our children," and, "nothing is going to dampen our spirits."

A few weeks later, Principal Lightyear had two PCs sent to Tower's art room. Tower had still not passed the competency test. Because Tower did not want to ask, we never found out how or why Lightyear had decided to give those

computers to the art department. Regardless, within days students could be found working on the computers in the art studio. Only a few weeks later, Tower brought in a local multimedia artist who showed the art students how to make collages merging digital pictures with handcrafted ones.

The week before I left Captain Dewey High, Tower and I finished writing the criteria for creating and evaluating student web portfolios. Every art student made a web portfolio for their final art grade. It had taken us the full year and a half to acquire the digital camera and to teach everyone how to use it. However, the acquisition of the two PCs was the event that made our dream come true. Until we had more computers, it was hard for students to fulfill any computer-based assignment and almost impossible for me to train enough students in any process sufficiently to make a computer-based arts assessment feasible or fair.

This breakthrough that benefitted all the art students at Captain Dewey High must be credited to Principal Lightyear's unsolicited generosity. The two computers that Lightyear allocated to the art room provided Tower with the equipment necessary and sufficient to achieve our long-hoped-for goal of student-created web portfolios. In the Spring of 2002, Captain Dewey High art students were the first group in the district to showcase their work online. Every art student was given the opportunity to self-represent to an unimaginably large audience of family, friends and internet users worldwide.

The questionnaire. I had intended to give questionnaires only to the people I had worked with closely at the school but Bryght's colleague, vocational technology teacher, Miller requested one and then Lightyear's secretary, Winston,

suggested that I give questionnaires to the heads of the curriculum departments, the Campus Leadership Team. I handed out 20 questionnaires and received eight responses. (See Appendix G for questionnaire responses.)

All respondents reported a lack of district support for the technology already in place. Several respondents mentioned the teacher's role in relation to technology and pointed out ways that technology affected this role. Respondents did not attribute any resistance they had toward technology to any inherent difficulty in understanding or manipulating technology or software but to the awkwardness of working with technology on a daily basis without sufficient technical support.

Although in casual conversations with teachers and staff, the distance learning lab that had been built during the summer of 2001 was characterized as a pointless and expensive mistake, questionnaire respondents reported interest in the potential of distance learning to enhance their curriculum.

Sable and I were surprised that so few people filled out the questionnaires. We had thought that teachers would welcome the chance to express their views officially.

Assessing accomplishments. December marked the official end of my research at Captain Dewey High. At that point it would have been difficult for me to state exactly what we had accomplished. At the time it seemed that we had spent a year planting seeds but nothing had come to fruition. I worried that the participants and the research community would feel that I had shown that time spent nurturing relationships and collaboration was a waste of time. Our

accomplishments had not been directly credited in the report that parent and Fine Arts Technology Committee Chair Pierce wrote concerning the progress of Fine Arts Academy technology projects (Spender, 1982a). (See Appendix L for Pierce's report.) However, by comparing the report to those of previous years, I could see the influence our conversations and collaborations had had on the conceptual structure and goals of the technology committee.

The changes that we effected were: the clarification of the teacher's role with regards to technology implementation, the acknowledgement of the role that district initiatives play, and the reiteration that the primary goal of technology initiatives must be student access.

Then, in January 2002, from having too many official roles (media artist, technology expert, district technology support-person, and novice researcher), I suddenly had no official role to play. I continued to work in the school as an artist and community volunteer for several months until I left the site in April 2002.

The Dream Team. Sable's concern was always how the Fine Arts Academy could benefit students – both academy students and the entire population of Captain Dewey High. During the course of our collaboration, Sable began developing a new vision of the organization of the academy.

In parallel with my realization, but reached independently, Sable had come to appreciate that parents were a pivotal source of power in the school district. Leaning on the solid relationships s/he had created with parents of fine arts students, s/he leveraged the opportunity presented by our goal of developing the web site to create a central committee of booster club parents. This central

committee, made up of individual parent volunteers, self-selected from the variety of subject area and afterschool activity booster clubs, would be responsible for organizing cross-curricular collaborations. One of the first projects on the agenda of this central committee of booster club parents was a revitalization of the school web site. Sable expanded our goal of developing the fine arts' web site and broadened its vision to include coordinating a school-wide collaboration responsible for improving the Captain Dewey High web site.

Sable asked Bryght if s/he would lend the vocational technology lab and asked me if I would teach a once-a-week web development course for parents from the booster clubs. We agreed immediately. Sable called the group "The Dream Team" because we were using Dreamweaver as the web design software. Representatives from the theater, music, several sport booster clubs, a math teacher, fine arts' parents (including Sandragon), Sable, Bryght, and Shyer attended the classes and created pages that were put on the web site by Sandragon who emerged as the school webmaster. Sandragon had been the booster club parent responsible for coordinating Tower's fine arts web site (which had evolved from a hodge-podge of odds and ends to a focused, contemporary, elegant web design). The fine arts' parents developed a beautiful, professional web site featuring information on the academy, the fine arts curriculum, examples of prize-winning student art, and many fine arts students' web portfolio.

The literary journal. One of the most developed computer-supported creative methodologies has been in the field of desktop publishing. Wiser and I had planned for many months to upgrade the way students were putting together

their yearly literary journal. We wanted students to use technology more efficiently and for more students to understand the process of digital layout and design. In the Spring of 2001, the (student) editor of the literary journal was not particularly interested in working with others so Wiser and I did not have an opportunity to introduce the collaborative potential of desktop publishing to support group creativity. However, in the Spring of 2002, the new (student) editor had a talent for organizing others and was interested in technology's collaborative potential. The new editor (who happened to be a gifted, fine arts student) asked me to coach his/her staff. We set up processes and procedures, and reorganized the computers and files so that the team could work more efficiently. Additional roles were created so that students interested in digital design and layout could concentrate on those areas.

Bryghter days. Happily, the final initiative was the most successful, with the fewest bureaucratic muddles, the most beneficial student effects, and the most significant curricular impact.

In the spring semester of 2001, Bryght decided to offer a web design course the following year and I committed myself to helping design and deliver the lessons if and when the time came. It was spring semester of 2002 before we actually sat down to think out how we would approach teaching FrontPage (a web site design program) to students of radically differing abilities. Bryght taught the vocational business technology course five periods out of seven every day. His/her students had won the citywide competition for excellence in using business software for four consecutive years. Bryght's commitment to his/her

students was total. Taking advantage of our past collaboration and my continuing presence in the school, s/he was determined to expand the experiences available to his/her students.

We worked together on lesson plans for the first week of a three week curriculum. We delivered the first week of lessons together. We designed these first lessons to cover the most complicated of the basic techniques so that Bryght could absorb them along with his/her students. In order to minimize anxiety due to the overwhelming amount of new information and ways of knowing involved in web design, each lesson culminated in the creation of a new kind of web page so that students would have a sense of tangible accomplishment each day. We were surprised and gratified when students brought their friends in on the second day to see their projects during lunch. Our class was the talk of the school and the other vocational technology teachers were inundated with requests by students to offer the same experience.

In Conclusion

This section of the data chapter consisted of a description of my experiences as an action researcher at Captain Dewey High. My focus was the nature of interpersonal interactions conveyed through mediated and face-to-face conversations. In the next section I will describe some of the analytic structures that I used in interpreting the events and conversations that were described in this section.

ANALYSIS

I have employed five modes of analysis to organize my understanding of the experiences and events that occurred during the action research initiatives at Captain Dewey High. Two modes of analysis, conversational reality theory and Ricoeurian hermeneutics are fundamental to the way I have interpreted the other three theoretics. However, for clarity's sake, the more fundamental Ricoeurian hermeneutics and conversational reality theory will not be covered in depth until Chapter Five.

Both conversational reality theory and Ricoeur's hermeneutics are constructions based upon holistic, non-antagonistic perceptions of events. Neither theoretical discipline employs conceptual polarities as fundamental to their interpretations. In Ricoeur's hermeneutics interpretation is the ongoing relationship an individual has with text. In the Ricoeurian view, interpretation is an attempt to establish connection with meanings made by another consciousness in textual forms. Conversational reality theory emphasizes a meaning-in-process view, a way to understand face-to-face interactions, that holds all participants responsible for creating their perceptions of events, acknowledging that individual perceptions are the result of personal experience merging into the interpersonal moment of communication. Emphasizing the role that relationship plays in meaning-making, both theories subsume polarity schemata within a relational process dynamic that assumes mutuality.

In Chapter Five, I will use conversational reality theory and Ricoeurian hermeneutics to interpret three sets of polarity thinking that I observed affecting

the change process at Captain Dewey High. The three sets of polarities that are covered in depth in this chapter are Carol Gilligan's justice and care dichotomy, Third Force psychologists' interpretation of the I and Thou relationship, and Nelson Goodman's distinction between creative and critical thinking.

My purpose in this section is to discuss the possibility that a change agent can acknowledge participants' polarity thinking while simultaneously working with the unity that underlies the polarities. In Chapter Five, I will consider how conversational reality theory and Ricoeurian hermeneutics provided a means for me to perceive a dynamic unity embracing three sets of polarities that I perceived affecting the change process at Captain Dewey High.

Justice and Care: Values and Methods of Moral Reasoning

Carol Gilligan (1987) proposed that there were two types of moral reasoning; one based on abstract rules of justice and another based on the necessities and practicalities of caring for others. Gilligan proposed that women were more likely to use moral reasoning to preserve interpersonal relationships and quality of life (care) whereas men were more likely to base moral judgement on abstract, generalized rules of right and wrong (justice).

In this study, I did not find that gender was a factor in the type of moral reasoning used by participants. I did note that participants often expressed the expectation that the school system should honor rule-based moral reasoning (justice) but teachers were expected to honor both justice and care for their students. When participants were disappointed in the school system's handling of technology, their disappointment was expressed as a justice issue rather than as a

care issue. Two examples of this preference for using justice-based moral reasoning with regard to technology issues follow.

Competency tests. When I began my research activities at Captain Dewey High, teachers were required to pass a computer competency test to qualify for computers in their classrooms. Both Tower and Wiser expressed the opinion that the test was unnecessary and unfair. Principal Lightyear relied on Gold, the English teacher who was also chairperson of the DTLT, to determine who should receive computers. Gold thought that the competency test was fair and a necessary means to weed out those teachers who were "lazy" and unwilling to spend the time necessary to pass the test.

At first it was unclear to me whether Gold was representing district policy. Archer, the district's instructional technology coordinator, corroborated that the test had been required but added that district policy had recently changed to an enrollment-based model whereby teachers would receive computers for their classrooms proportionate to the number of students taught in each classroom.

The position that Gold articulated to me was that the competency test was a just method of organizing computer allocation. His reasoning was that, although the test was not an accurate test of technological ability, passing the test proved a commitment to the technology program. According to Gold, the willingness to struggle with the test and conform to regulations was proof that a teacher "deserved" to have classroom computers.

Teachers, both Tower and Wiser, who perceived the test as unfair, and Gold who perceived the test as necessary, were operating from an abstract justice

orientation. Tower and Wiser expressed the opinion that the test was unjust, that teachers were unnecessarily burdened with learning outdated information and made to conform to a peer's assessment of their commitment. Tower and Wiser did not criticize the test on the grounds that the district or the technology committee was not sufficiently caring for students or teachers. Gold criticized teachers for not having the discipline to conform to the rules set down by the district. Gold's criticism never implied that teachers did not care for education, innovation, technology, or their students.

On the other hand, Archer, expressing to me that district policy had changed, framed this alteration as a caring change, a change that would prove that the district's cared for student learning. Archer's point was that instructional technology should serve students. Archer's framing of the new district policy (that computers be allocated on the basis of student enrollment) included an element of abstract justice reasoning in that maintaining a standard ratio of students to computers throughout the district would be empirically just. However, he described the overriding purpose of the change in policy as an attempt to care for students and not simply as compliance to abstract conceptions of educational justice.

Room 128. Bryght's values were revealed to me in an early confrontation we had with one another over the use of Room 128, her computer lab. During the school year, Room 128 was used five periods out of seven by Bryght. Approximately 35 personal computers (PCs) were arranged around the perimeter of Room 128. Bryght had applied and received grants for 15 new computers but,

once the computers arrived, she had had to wait for months before Carver (district technology specialist) had the time to come and set them up according to district specifications. Bryght's new computers sat in boxes, in a small room off the library for an entire semester. Bryght argued vehemently that her students, having suffered so long with below standard computers, had the right to be the first to enjoy the benefit of the new computers.

During the course of my time teaching with Bryght, I had many occasions to observe her active commitment to a care orientation. Justice for Bryght consisted ultimately in what was best for her students and in this she was a model for the new values that the district was attempting to support. However, Bryght's expectations for herself were never that the district or other teachers would take care of her. In fact she did not expect a caring moral orientation for herself or her students who were mostly vocational and mostly non-white. Bryght was extremely flexible in relation to any unfairness in policy or procedures. If there was inequity in what was offered to her students, she would just work harder to acquire or achieve what they needed. As a role model she was exceptionally effective and I often witnessed students who were generally resistant to other teachers respond to her, seek her advice, support, and even take her criticisms seriously.

Parents. I found an exception to the polarization of justice and care value systems in the actions and attitudes of many parents who worked with Captain Dewey High and the Fine Arts Academy. Parents were fundamentally concerned with caring for their children and yet they were valiant and nearly indefatigable in

their defense of justice for the school, for teachers, and for programs that they considered could benefit their children or other children in the school. The parents that I worked with during the action initiatives often spoke of their own children proudly but in meetings and activities these parents remained focused on the needs of the group. There was a general assumption that what would benefit the school would benefit the individual student. The main reason the rumors that Sable and I were only interested in benefitting the academy were so destructive was that even the parents of children attending the academy preferred for the school as a whole to be the beneficiary of all community efforts. I found the consistency of the parents' position to be remarkable and admirable.

Justice and care: Further remarks. In general, participants, regardless of gender, did not expect the educational system as represented by the district bureaucracy to care about teachers. On the other hand, there was evidence of an almost universal belief that the educational system should care about students. My observation was that what teachers expected for themselves was justice but what they expected for their students was care. A moving example of this was when there was an increase in students fighting in the halls at lunchtime after the World Trade Center bombing on September 11th 2001, teachers met to discuss the problem and rejected a plan to bring more police onto the campus. Instead, teachers chose to volunteer to give up their free time at lunch to walk the halls. The increased teacher presence in the halls was a caring response, not a response based on abstract rules of discipline and the violence faded away almost immediately.

Many participants expressed the view that justice in the context of a school system should be concerned primarily with protection and nurturance (generally intellectual but also and just as often mentioned, emotional and social) of students. Students at Captain Dewey High were mostly minors and there was a general perception that students were children who needed adult supervision, guidance, and support. Rule-based justice was applied to students as a last resort. However, the moral valuation of teachers and staff was not generally based on care but on evidence of shared, abstract values such as principles of peer equality, commitment to students, and hard work.

I/It vs. I/Thou: Resisting Oppression vs. Experiencing Equality

In his book *I and Thou* (1958), Martin Buber described two ways of relating to another: I/Thou and I/It. Buber maintained that I/Thou relationships were the foundation of dialogue. Although Buber acknowledged that the I/It relationship (facing another as an object without relating as an equal) was necessary during some scientific and philosophical inquiries, Buber asserted that an I/It relationship between people always had a dehumanizing affect on both parties. Other theorists, those that Maslow (1968a, 1968b) categorized as Third Force psychologists, notably, Rogers (1962, 1967, 1977, 1980), Fromm (1941, 1947, 1956, 1976, 1977) and Maslow himself reported their observations that *One*'s attitude toward an *Other* influenced not only what can occur between the two in a conversational moment but also influenced how each viewed herself in general, affecting long-term behavior. These theorists proposed that a truly educative (in Dewey's sense) quality to a relationship came about through

egalitarian attitudes and behaviors that were hampered when participants assumed attitudes of superiority, inferiority, or feigned complete objectivity.

In this study, I tried to use my attitude towards participants as a means of social creativity. By maintaining an egalitarian attitude towards participants throughout the study I hoped to affect the change process positively. The beneficial effects that I was hoping for were first, to bring about an increase in the use of technology as an integral part of the curriculum and second, to decrease participants' personal anxiety, interpersonal resistance and both intrapersonal and interpersonal negative evaluations that might handicap our change effort.

I discovered that an egalitarian relationship, even as temporary a relationship as a single conversation, required the willingness of both partners in the interaction to experience equality. Every participant was not willing to engage in egalitarian conversations with me immediately. Some participants, notably Tower and Strong (both women), did not begin our conversational experiences as equals. However, we gradually evolved co-equality and then friendship. Other participants, notably Sable, Wiser, and Bryght (all women) were open to equality from the first, allowing time to deepen and broaden our conversations with earned trust. Still other participants, notably Gold, Lightyear, and Pierce (all men) had powerful personalities and difficulty maintaining equality in conversations, often tending to adopt superior or inferior attitudes and phraseologies. Lightyear and Pierce made considerable efforts to be fair and open, clearly struggling with their own propensity to use their significant leadership abilities. Gold, however, seemed content to dominate conversationally. Another group of men, Carver,

Genesis, Archer, and Prigogine, were adept at and dove immediately into egalitarian, conversational reality co-creation.

Tower and Strong. The tone of my initial conversations with Strong was the polar opposite to that of my initial conversations with Tower. Strong met me with a great deal of conversational antagonism. I had to check my natural inclination to argue with her when her first words to me were critical and curt. I decided to trust the Lewinian construct that forces acting on people in the workplace are responsible for their perceptions. I looked for signs of pressures that could be acting on Strong. I was especially interested in finding out if I could do anything conversationally that could ease the effects of any negative pressures.

Strong's initial assessment of me was negative. Her perception was that I was going to make more work for her. Her reaction was to position herself as superior to me in our conversations. Her job required her to be responsible for every aspect of the physical life of the school. Indeed, we were all dependent upon her. Her attitude of superiority was based on the fact that she controlled the money and the resources that we all needed. However, the fact that she needed to meet me with that attitude was more a reaction to the fact that her burdens were overwhelming than a reflection of a genuine assessment of me or of the potentials of our relationship.

The second time I needed to speak with Strong, Carver volunteered to come with me and vouch for my character and skill. Carver's introduction was a wonderful gift and typical of his interpersonal sensitivity and generosity. Although Strong was willing to give me the benefit of the doubt because a chain

of positive regard had been created when Carver vouched for me, it took months to prove to Strong that I could be trusted to respect the school and her role in it.

Over the course of the year and a half that I worked at Captain Dewey High, I had many opportunities to aid Strong and I did so every time. After the first few times of my showing genuine respect for her position, Strong changed her conversational attitude towards me and we began to build what became a meaningful, egalitarian, working friendship. My respect for Strong was genuine. She was dedicated, thorough, hard-working, reliable, fun-loving, responsible, csring and extremely competent. The time and effort it took to earn her trust was itself a meaningful experience for me.

Tower's initial conversational positioning was exactly opposite to that of Strong's. Tower treated me with kid gloves. I had to work hard to convince Tower that I was operating as her equal. I found that I had first to convince her of her superiority to me in some area that mattered to her. The event/conversation that cemented Tower's awareness of our equality (i.e. her superiority in some areas relevant to our collaboration) took place during the summer workshops when Tower took over my duties when I had to leave town. Stepping into my role brought the realization that she performed better than I could in similar circumstances. In my relationship with Tower, I carefully monitored and limited my competitive instincts in order to support her growing realization of her own autonomy in relation to technology innovations. Restraining myself in this way meant in practice never to allow myself to step in and do any work in the action

initiatives that Tower could do herself even when I felt had more experience or when I preferred my own style.

I did not keep my strategy secret from Tower. I shared my thinking with her by comparing my work to hers. I asked Tower if she ever gave in to the temptation to paint for her students, to solve an art problem for them. We both understood that it does very little for a creative person to have an activity done for them. It is especially important for creative people to find their own way to work: to create their own unique relationship with the medium. I explained to Tower that, although I was tempted to try and solve all her technology problems, I would not. I would give her all the room she needed, and provide support and encouragement but our collaboration would mean little to her in the long run if I did not trust her to create her own unique relationship to technology.

Proportionally, over the two years, I spent more time with Tower and her students than I did with anyone else at Captain Dewey High; and the improvement in Tower's curricular use of technology was greater than anyone else's I worked with during the same period of time. But I *did* very little other than simply be there, providing just-in-time support, information, and sharing genuine affection through meaningful conversations. When Principal Lightyear arranged to have two new computers put into Tower's room, then, at Tower's request I worked several times a week, several periods each day, tutoring students in how to use Photoshop so that they could function as peer mentors for their classmates.

Gender factors. Although in most instances the women participants in this study were more sensitive to I/Thou relationship dynamics than the men, this was not the case in every instance. Probably because the nature of the study involved my interest in how conversation would affect a change process, participants who were attracted to working with me tended to be sensitive to conversation and issues of interpersonal relating.

For instance, Genesis, Carver, Archer, Lightyear, and Pierce (all men) were self-consciously aware of their role in interpersonal relationships. These men were not only aware of an official responsibility to be fair in their treatment of others, I observed them all actively co-creating equality with a variety of conversants. It took me awhile to realize that one of the reasons that Gold was able to make so much trouble in meetings was that the other men's sensitivity to issues of inclusion made them strategically unsure as to an acceptable way to restrain Gold's overbearing conversational aggressiveness without themselves becoming equally aggressive.

In contrast, the women participants tended to support polarization in I/Thou relationships. Often, even while being sensitive to the dynamics of care in conversations, I observed women participants actively maintaining social hierarchies in conversations, especially but not exclusively, with men. Several times, my role as change agent required me to model interpersonal conversational styles that self-consciously ignored hierarchical or sexist considerations, concentrating instead on specific issues and the importance of individual's self-representation. Interestingly, most of the women participants were able to alter

their conversational role almost immediately after witnessing my behavior. I never told or even suggested to women participants how to act but I did discuss with them my feelings of hurt or outrage when I witnessed people overwhelming others in a conversational dynamic.

The participants whose conversational styles were most unique in this study were Gold and Wiser. Wiser had a unique way of conversing that utilized traditional female pliability while maintaining her authority. She was spontaneous and yet rarely lost command of conversations or their contexts. Wiser credited her conversational skill to her mentor, a (male) high school teacher at Captain Dewey High who had been her teacher and then became her mentor when she returned to Captain Dewey High as a teacher herself. Wiser attributed her phenomenal ability to use conversation to continuously teach and learn as fundamental to her role as a teacher.

Gold was an anomaly at Captain Dewey High. Participants spoke well of Gold's teaching ability and of his reliability. Gold, however, was feared. His punitive attitudes and actions pushed many teachers away from him and he did not seem to notice or mind that teachers did not come to him for help. Gold was probably the member of his staff most committed to technology innovation in the school; unfortunately Gold could not help others make that same commitment.

I and Thou: Further remarks. The effect that interpersonal attitudes had on the change process is inestimable because the attitudes that participants had towards one another and towards me as technology change/integration agent were embedded in every interaction that took place among us. The patterns that I

observed were consistent with the theories of Third Force psychologists that egalitarian conversation can inspire action consistent with its philosophical premise. And the obverse was observed as well, that hierarchical attitudes displayed in conversation inspired actions consistent with perceptions of inferiority and superiority but not equality.

In this study, I found that a consistent positioning on the part of the action researcher to practice, model, assert (and reassert if necessary) her equality with others was efficacious in several ways. First, the core participants (including myself) increased our positive self-evaluations. Second, the core participants, who were all women – Sable, Tower, Wiser, and Bryght – gained increased respect from one another and also from some of the male participants, notably Lightyear and Pierce. We gained increased respect not only because of our accomplishments but because of the egalitarian way that we came to express ourselves in meetings and in our strategic actions. We also gained each other's trust and friendship, the value of which is incalculable.

Critical and Creative Thinking

In his own life, Nelson Goodman (1978) set an example of the theory he espoused, that creative and critical thinking work in partnership at thought's higher levels of achievement, particularly when thought is understood as a precursor to action. A significant portion of my time at Captain Dewey High was spent encouraging participants to integrate creative and critical aspects of their thinking and/or to acknowledge that they had already integrated these methods of thought. A dynamic relationship between creative and critical thinking is useful in

any change effort and certainly in this case study proved valuable in co-determining ways to integrate technology into the curriculum.

Art and science. Pierce was influential at Captain Dewey High not only because he headed the Fine Arts Technology Committee but even more because he was a sensible, honest, hard-working parent who could be relied upon to do a thorough job on any project.

The first time I met Pierce I was struck by his charm. Further meetings, conversations, and e-mails revealed Pierce to be not only charming but tenacious. Occasionally I found myself "pushing back" against the force of Pierce's personality and strong opinions. Pierce never reacted emotionally or negatively when I "pushed back;" rather my standing up for my opinions and asserting my personality usually brought about a thoughtfulness and a deeper conversational considerateness on Pierce's part. I greatly admired Pierce for being strong and flexible and especially for being able to accept and enjoy strength in others. However, I never witnessed either Pierce, Lightyear, or Gold abandon strategic conversational positioning for collaborative, freewheeling brainstorming. To confuse the gender discussion even further, Genesis, Carver, and Archer (all men) were adept at collaborative, conversational brainstorming.

When Tower expressed to me that she was having difficulty gaining Pierce's trust, she described a scenario that was believable to me. Tower said that when she offered ideas in meetings, Pierce did not seem to take them seriously. Tower had a delicacy, an ethics in her approach to people and ideas that made it onerous for her to try and overpower another person. First, I tried a

straightforward strategy of simply telling Pierce whenever we were alone how much I respected Tower's ability and intelligence (essentially the same strategy that Carver had used when he introduced me to Strong). A few weeks later, I asked Tower if she noticed any difference in the way Pierce listened to her. The answer was no. I then tried another straightforward strategy: describing to Tower the sort of behavior that I had used to get Pierce's attention and respect. Unfortunately, or perhaps fortunately, people do not easily alter their style of communication.

During the fine arts' parents' booster club meeting (described in the description section of this chapter) I was able to describe some of Tower's views in a way that Pierce could understand. I do not believe that Tower and Pierce will have an easy time learning to communicate in a trusting manner or a truly collaborative manner. If they continue to work together over a period of years, they may reach an understanding. However, their training is diametrically opposed and, because they are both experts in their fields, there is little likelihood that either of them will abandon their methods of inquiry or delivery.

What was it about their areas of expertise that made it so difficult for Pierce and Tower to communicate? Pierce was a successful engineer. He owned his own company. Tower was an accomplished painter. She taught art. They each approached problems in a way suited to their profession. Pierce, primarily a critical thinker, organized his ideas and then worked on them one at a time until he had accomplished his goals. Tower, primarily a creative thinker, perceived a general situational imperative and alternately applied activity and analysis to the

situation and then intensely self-reflected on the results. Essentially, Pierce used scientific rationality and Tower used creative reasoning; and as yet there are few disciplines in our culture that bridge the gap between these two types of thought/action methodologies.

Although it would be temptingly tidy to attribute modes of reasoning to the gender of participants, I have not observed the creative/critical difference in approach to problem solving manifesting along gender lines but often because of a difference in educational background (however, gender does often influence choice of vocation). In other words, in my experience, educated people tend to reason the way they were taught to reason.

It fascinates me that the area that brought Tower and Pierce into relationship was technology. It is my view that communication technology not only demands both types of reasoning but will be a medium for the creation of a variety of bridges and bridging techniques between these as yet dichotomous patterns of thought and praxis. Tower and Pierce have achieved significant improvements in the Fine Arts Academy and there is every evidence that they will continue to do so. Their struggle to communicate is part of the school change process as well as part of a national and international cultural shift, an ongoing creation and recreation of cultural and conversational patterns now influenced by technology integration into our daily lives.

Music and literature. The arts and the humanities are not immune to fractures in the social fabric due to the schematic polarization of creative and critical thinking paradigms. The following description of a particular

conversational confrontation that took place during this study serves as an example of the polarization between creative disciplines due to each discipline's epistemological reliance on specific types of critical rationality and creative praxis.

I disagree with Bruner's position described in *Narrative and Paradigmatic Modes of Thought* (1985) that there is a scientific paradigm that can be juxtaposed to a narrative consciousness that is somehow free from paradigmatic restrictions. I agree with Cassirer (1955c) that, as all thought is based on symbols, communicable thought must be paradigmatic (i.e. reference previous forms and patterns) in order to be understood. I have observed that there are many narrative paradigms that affect interpersonal interactions and there is considerable evidence that cultural narratives (paradigms) influence scientific paradigms and bind social and conversational reality to predetermined forms (Apple, 1982; Freire, 1993; Gersie, 1997; Tannen, 1986, 1993a, 1998).

Lightyear was an English teacher before becoming the principal of Captain Dewey High. Lightyear was also a poet. Sable was a music teacher and at the time of the study was the conductor of a prestigious city choir. One might be tempted to assume that people trained in these two art disciplines - literature and music - would have an easy time communicating, but in practice the types of intelligence (Gardner, 1983), and the epistemological structures (Hirst, 1974) used in practicing these two art forms are quite different.

The most emotionally volatile conversation that occurred during the entire action research experience was a conversation between myself, Lightyear, and

Sable. The issues we were discussing had been precipitated by Gold's behind-the-scenes accusations that Sable and I were intending to undermine teacher authority by taking classroom computers without their permission. Another rumor was spread along with the story that Sable and I were intending to confiscate computers: This second rumor was that I was not qualified to be working in the school at all but had been brought in by Sable, under false pretenses, without Lightyear's knowledge or permission to benefit the academy, to the detriment of the school as a whole.

Lightyear told Sable and myself that he was "concerned" with the negativity that had come to his attention concerning our summer technology workshops. Lightyear developed a story that implied that he was a neutral actor in the events that had taken place and that Sable was responsible for any negativity that had been directed at me. I challenged Lightyear's narrative by offering an alternative narrative, based on a different set of symbolic paradigms.

My story was that Lightyear’s pose of neutrality had made it possible for Gold and others to believe that Sable was acting alone. Lightyear knew how many meetings we had attended to get permission to do the action research projects because he had required us to attend them. Lightyear also knew that he had signed and approved every aspect of the grant administration. He, himself, in a private meeting, had asked me if I would please take over Carver’s position and co-administer the grant. Instead of showing gratitude to Sable for following through on the details necessary to fulfill the terms of the grant (for which Lightyear was the sole signator), Lightyear had chosen to keep silent. My contention was that, in

his role as principal, Lightyear could have participated actively, conversationally, influencing the opinions and perceptions that Gold and other teachers had created out of fear and lack of information. Note that Lightyear's duties were immense and some of his "silence" on these issues may have been caused simply by having been too busy with more pressing crises to notice ours in the making.

Lightyear was a good listener and an excellent administrator. He did not respond to my challenge with anger or denial. He praised me for my courage in speaking up. Lightyear had then initiated a move away from a critical, rational narrative and placed us soundly on the ground of creative, mutual appreciation.

Sable had not said a word. She had not said anything in her own defense when Lightyear had earlier implied that she had not been particularly competent in her dealings with others. And, as I defended her she seemed surprised. Encouraged by Lightyear's example, I said that I had seen Sable's choir in concert before I had ever met her. I said that anyone who could work with so many people and combine so many voices and personalities into one uplifting musical experience could not possibly be less than competent in interpersonal relating. I had literally danced out of that concert, leaping and singing. My experience working with Sable was that she was capable of handling people of all kinds. She found ways of supporting people, allowing them to make their unique contribution, while, at the same time, she was able to bring our work into a unified whole. I knew, as I spoke, that Lightyear had not heard Sable described in this way before.

I never asked Sable or Lightyear if that conversation changed anything. At that time I was not thinking as a change agent and researcher, I was deeply immersed in the narrative of the school and I was swept away by the situation to make utterances deeply, personally meaningful to me. And yet this is the conversation I feel most pride in having co-created because this conversation brought about a deeper trust between us and a greater efficacy in our ability to create lasting change in the school.

An exception: Appreciation of complementarity. Wiser was a master teacher and able to appreciate, converse, and work with whatever mode of inquiry was necessary to create a learning environment that was supportive of her students. I was witness to many instances of Wiser's flexible utilization of creative and critical thinking. In one particular, informal interview, Wiser acknowledged that her goal for her students was to teach them how to think critically about their creativity. She felt that she had seen over the years that the students who succeeded in further education were able to organize their ideas. I wish my words could conjure up the gentle, firm, imaginative manner in which Wiser gradually led her students to a balance between personal expressiveness and critical awareness.

Genesis was another teacher who was able to model and encourage a synthesis of creative and critical intelligence. As Head Librarian, he was able to influence not only students but teachers. Carver, a good friend of Wiser, Strong, Genesis, and Bryght was also able to combine these two modes of intelligence,

making him popular with so many of people he worked with throughout the district.

I came to depend on Wiser, Genesis, and Carver for moral support. Even though, of the three, only Wiser was a core participant, I cannot imagine that the action initiatives would have been as successful as they were without all their considered and considerable support and their active intervention in events. These exceptional people not only personally guided me throughout the projects but they made it known to others in the school that I was working with them. These associations contributed to my personal growth *and* my professional skill.

Wiser, Genesis, Carver, and I did not use technology simply as an extension of our analytical intelligence. And, although we shared a vision of technology as supporting all school activities, however powerful technology becomes in education, none of us felt that technology should or could ever replace interpersonal involvement in education.

Polarity Thinking and Teacher Resistance to Change

Argyris (1982), in his description of double loop learning, made a distinction between "theories-in-use" and "espoused theories." According to Argyris, people often exhibit behavior that does not conform to the theories that they report to believe.

In my study, resistance to technology was an espoused theory of those responsible for the allocation of hardware and the dissemination of information pertinent to instructional technology. But, if Gold had not understood that teachers were using the computers in their classrooms, then he would not have

used the threat of the removal of computers to try and harm my reputation as change agent, nor would he have used the threat of the confiscation of computers as a punishment for failing to pass the competency test. In other words, Gold's theory-in-use was that teachers were using, not resisting, computer technology but his espoused theory was that teachers were resistant to technology.

A popular espoused theory at Captain Dewey High was that rule-based reasoning was the means through which educational value was distributed but the theory-in-use that I observed staff, teachers, and parents use most often was care-based, moral reasoning. Another espoused theory in the school was that different pedagogical areas were in competition for scarce resources but the theory-in-use that I most often observed was cooperation and a willingness to share resources if students were to benefit.

Polarity thinking exacerbated the rift between espoused theories and theories-in-use. My conversational work with the core participants (Sable, Wiser, Tower, and later, Bryght) often focused on initiating discussions that would allow us to perceive polarities as elements of working, unified systems. Humor was an invaluable tool for weakening the hold that polarity thinking had on the minds and hearts of the core participants and we used it often, finding joy in each other’s presence and the knowledge that life will always provide us with challenges is mitigated by the awareness that we are not facing them alone.

Argyris (1982) implied that there was an element of hypocrisy involved in the rift of reasoning dividing theories-in-use from espoused theories. However, I found that if participants were able to come to an awareness of the limitations

inherent in allowing one's theories-in-use to become polarized from one's espoused theories, they were quite willing to re-evaluate their thinking and bring their theories into closer correspondence. Bringing theories-in-use into alignment with espoused theories can bring more intellectual energy to bear on action and makes the resultant action more effective than if these theory sets are operationally or philosophically polarized.

The conflict between creative and critical thinking was the polarization that most restricted the technology change process at Captain Dewey High. Participants who were more comfortable thinking creatively were frustrated by the linear thinking of some technology specialists. And some more flexible technology specialists were frustrated by teachers trained in only one approach to thinking. Participants who were more comfortable thinking critically were often frustrated when participants were communicating with emotional resonance about relational complexities. And creative thinkers were often distressed by bureaucratic rationalizations that restricted teacher ability to engage with students effectively.

I found that teachers showed a natural hesitancy to engage in dialogue that might reveal a professional weakness, especially in front of students. This hesitancy could be interpreted as resistance to change but I observed this form of hesitancy or resistance at different times from everyone involved in my study and I imagine that I myself, at times, showed signs of a similar hesitancy. I did not find that teachers were resistant to change per se, rather I found that teachers were guarded, first, when they thought that they might look incompetent in the process

of acquiring new knowledge, and second, teachers resisted any change that they thought might negatively affect their students. When a participant was convinced that a technological innovation would not endanger their self-esteem or their relationship to students, the change process was encouraged, not resisted.

A final note. If I could share only one impression of my experience at Captain Dewey High with the research community it would be that teachers and school staff need more of everything. Teachers need more time, more money, more support, more training, more benefits, more time off, and most importantly, teachers need more respect, conversation, and genuine collaboration. In this study, mutuality of exchange and a genuine respect shared between technology professionals and teaching professionals mitigated teacher resistance to technology.

While researching at Captain Dewey High I wrote in my journal that "Democracy as we dream it has yet to be invented, and can only be realized as a process, [as] the experience of being equal among equals. We can never write about this enough."

Chapter Five
Conclusions

John Dewey's preface to his masterful, *Democracy and Education: An Introduction to the Philosophy of Education* (1916), opens with this sentence, "The following pages embody an endeavor to detect and state the ideas implied in a democratic society and to apply these ideas to the problems of the enterprise of education" (p. iii). My study has been an attempt to continue Dewey's endeavor by extending its purview to the integration of technology into the curriculum. In short, in this study, I have attempted "to detect and state the ideas implied in a democratic society and to apply these ideas to the problems of the enterprise" of technology integration in education.

SUMMARY: CONNECTIVITY

> For the use to which any known fact is put depends upon its connections. The knowledge of dynamite of a safecracker may be identical in verbal form with that of a chemist; in fact, it is different, for it is knit into connection with different aims and habits, and thus has a different import.
>
> (Dewey, 1916, p. 356)

Science begins with a close examination of what appears to be magical. The social science of educational technology research has yet to seriously consider the relationship-magic inherent in successful teaching/learning experiences. What Shotter referred to as the "interfittedness of things" (1971), those amazing moments that are also realizations, those events that occur between people in the course of a successful teaching/learning experience, educational

technology has not reproduced. The interpersonal in education will remain magical to us until relevant grounded theories emerge through conversations and from qualitative investigations that will allow us to examine ourselves and our interactions with less prejudice and more compassion.

Living Systems: A sensitive dependence on initial conditions

This study reinforced through experience, the knowledge I had acquired through reading, of the embeddedness of living systems within a complexity of relational, communicative interaction. I found that the inevitable process of change-over-time could be manipulated by a researcher, myself, using interpersonal trust and collaborative achievement as motivators.

Systems theory describes systems as internally consistent, in continuous interaction with other systems, self-regulatory, and self-actualizing. Bertalanffy (1975), a biologist, developed the theory of open systems and general systems theory (Davidson, 1983). Bertalanffy, and later Lorenz (1993), asserted that a small alteration in the pattern of a system's process could lead to enormous alterations in that system's pattern. This "sensitive dependence on initial conditions," was a guiding premise that justified the experimental use, throughout this study, of small, caring, relational, discursive activities to bring about significant change. And, indeed, subtle changes in interpersonal dynamics, in relation to technology use, such as an increase in mutual respect, did affect the functioning of the system as a whole.

Paulo Freire (1970a, 1970b, 1973, 1989, 1993, 1994, 1998), Maxine Greene (1978, 1988, 1995, 2001; Pinar, 1998), and Lisa Goldstein (1997) have

illustrated many levels of potential and poignancy in the relationship between teachers and students, repeatedly pointing out how interactions between people determined what kind of learning resulted. Freire also emphasized the role that teachers can play, modeling interactive transformation. Freire stated that, "In the culture of silence the masses are “mute,” that is, they are prohibited from creatively taking part in the transformations of their society and therefore prohibited from being…they do not know that their action upon the world is also transforming" (1970, p. 213).

During the course of this research study, I tried to remain aware that each communication that I participated in, whether face-to-face or text-based, on the telephone or online, was affecting the course of the action and the meaning-making process of our change effort. This study validated conversational reality theory: I found that conversation was the ground from which the co-creation of our reality emerged.

Resolving Polarities

In Chapter Four, I outlined three types of polarity thinking that affected participant-teachers’ relationships to technology innovation. I asserted that it was possible to find a unity underlying the three sets of polarities using two particular theoretical perspectives, conversational reality theory and Ricoeurian hermeneutics. Conversational reality, as previously stated, defines conversation as the ground from which ongoing social re-creation emerges. Ricoeurian hermeneutics is a specific orientation to textual analysis, a creative analytic whose

purpose is a synthesis of meaning not a polarization of conceptual frameworks nor a dichotomization of prior unities.

Mink (1993c, 1994, 1998, 2000), applying systems theory to human resource development, found that, in order to support the development of a higher level of interaction within a system, a change agent must be able to perceive the existant functioning from outside the system under examination. In other words, to mix fractal terms with human resource development terms, a change agent must introduce a *strange attractor* from another level of interaction (engendering a different pattern or dynamic interaction). Using systems theory as a means of analysis, this study found that a researcher (myself), wishing to raise the level of interaction from competition to collaboration, did so by identifying, communicating, and sharing elements of unity underlying polarity thinking.

Conversational reality theory provided a framework for perceiving individuals in specific conversations as co-creating the world as they were living in it. Each participant in a conversation brings all they have been and all they hope to be. As people reach out from their prior experience to participate in a conversation, a meaning-making moment is creating ground for a future. Note that, within this theoretical framework, the future is a collaborative creation. In this framework, a competitive conversation is a collaboration in competition, an agreement to compete. A researcher can widen her lens to view a conversational interaction not as a battle of wills, nor as a conflict of interest, nor as a clash of titans, but as an exchange between two individuated elements of a unified system

whose life is sustained through (and judged by the level of) the health of its participants (Rose, 2000).

This study confirmed for me that we are embedded in interaffecting, living systems and that the course of collaborative, democratic futures cannot be predetermined. We all have the ability, through our lived connectivity, to affect change. The way we affect change is not only through lesson plans (though I do not want to minimize the importance of lesson plans) but also through subtle alterations in the interactions taking place between persons.

Having studied computer models of weather patterns, Lorenz (1993) claimed that, when a butterfly flapped its wings on one side the earth, some time later, in another part of our earth, a storm would emerge as a result. Lorenz's famous statement-metaphor added a further poetic dimension to Bertalanffy's assertion that "a sensitive dependence on initial conditions" is a principle that applies to all living, interaffecting, systems. My study showed me that human beings are no less susceptible than other natural phenomena to subtle changes in the (interactional, relational) atmosphere.

This study confirmed that delicate actions, small alterations, even as seemingly unimportant as a tone of voice, during a conversation, could act as powerfully on a system as a flap of a butterfly's wing. I have confirmed for myself, through my own experience in this study, that an educational system made up of human participants is affected, not just superficially, but radically, at its root, on ontological, definitive levels, by every conversation that takes place within it.

In the following, I will re-examine the three polarities, I and Thou, creative and critical thinking, and justice and care, from the point of view of conversational reality and Ricoeurian hermeneutics. Although I cannot demonstrate the co-creation of conversational reality in a narrative, Appendix F provides an example of a text-based a conversation that took place online during this study. However, I can demonstrate a version of Ricoeurian textual hermeneutic in the last of the next few sections on interpretive schema: justice and care. And, I can try to capture in narrative form a type of text-based, interpretive conversational reality as I proceed to integrate perspectives from this study.

A final, preliminary note: the theories I have used to achieve a theoretical unity for myself do not exhaust the available schemata for perceiving unity in dichotomies. Further research is needed in cognitive-unifying processes that support collaborative, democratic practice.

I and Thou: Appreciating the Other

In 1931, John Dewey wrote an article for the inaugural issue of *The Harvard Teachers Record* (later, *The Harvard Educational Review*) entitled, “Appreciation and Cultivation.” In this article, Dewey defined personal participation as emotional participation. "To care," was to be "emotionally stirred," with “a sensitiveness to shades of meaning” (no pagination).

I quote at length from this article because I find Dewey's appreciation of the value of care and emotional connectedness vital and vitally apt in describing the method of interpersonal relatedness I used to engage the participants in the co-

creation of conversational reality. Appreciating the other was a fundament to Third Force psychologists and, in the following quote, we see that this appreciation for the other has had a very respectable history in educational theory as well.

> I think one could go through the defects and mistakes of teaching and learning generally and find that they are associated with failure to secure emotional participation…
>
> Appreciation, in short, is more than immediate and transient emotional stir and turmoil. It shapes things that come home to us, that we deeply realize have possibilities, entail consequences. To appreciate is to trace mentally these outleadings, to place the possibilities before the mind so that they have felt significance and value.
>
> There is no fact and no idea or principle that is not pregnant, that does not lead out into other things. The greatest and commonest defect in teaching lies in presenting material in such a fashion that it does not arouse a sense of these leadings and a desire to follow them. There is then no appreciation, no personally experienced value, because what is presented is presented as if it had its meaning complete in itself, as if it were closed and shut.
>
> Think over the teachers who made you aware of possibilities in the things which they taught and who bred in you a desire to realize those possibilities for yourself. I can give no better exemplification of the true nature of appreciation nor of its capacity to attend all subjects of instruction.
>
> (Dewey, 1931, no pagination)

When I read Dewey's description of the power of appreciation, I felt that I understood the resistance that instructional technologists encountered when they tried to introduce technological innovation in schools (Hodas, 1993; MacPherson, 2000; Saba, 1999; Slowinski, 2000; Solmon, 2000). In none of these studies was

there a sense of teacher appreciation. How can we expect teachers to appreciate what technologists have to offer if we do not respect and appreciate what teachers have to offer technology?

This study found that making it clear to participants/teachers that their input and their very being was respected, appreciated, and necessary to the change effort, transformed resistance into mutual appreciation and collaborative effort, focused on the goal of improving the educational environment.

Buber (1958, 1977), Maslow (1968a, 1971), and Rogers (1962, 1967, 1977, 1980) all expressed an awareness of the importance of interpersonal appreciation, similar to that expressed by Dewey in 1931. According to these theorists and clinicians, appreciating others was the challenge from which a specific process-dynamic, *the magic of interpersonal growth and change*, emerged.

Conversational reality theory (Shotter, 1993a) stood the materialist position on its head by privileging people, and especially people engaged in process. over objects. And Buber (1958) had made the same distinction years before when he claimed that the I/Thou relationship was the basis for a humane civility, whereas the I/It relationship was the basis for interpersonal antagonism.

Freedom in the United States is guaranteed by the constitution but laws alone cannot guarantee freedom because laws cannot make people free. We give freedom to one another by appreciating each other. Mutual appreciation, as a mode of relating, is fundamental to democratic process. Dewey understood that teachers have an extraordinary opportunity to offer experiences of freedom to

their students. Certainly, in the fields of adult education, teacher education, and human resource development, democratic educators owe themselves and their students appreciation and freedom.

Bruner has always supported intellectual freedom in education, defined as a situational, constructivist, guiding that is respectful of an individual's need to prove for themselves the truth of epistemological assertions. In his article, *Learning and Thinkin*g (1959), he stated, "Let us not judge our students simply on what they know. That is the philosophy of the quiz program. Rather, let them be judged on what they can generate from what they know – how well they can leap the barrier from learning to thinking" (p. 192). Bruner's implication here is that thinking generates action.

The necessity of proving for oneself, thinking for oneself, is a fundamental praxis of both scientific rationalism and artistic creativity. Also, more generally, thinking for oneself is a fundamental requirement for democratic (participatory and interpersonally negotiated) citizenship and therefore must be valued and included in learning experiences paid for by citizens of a democracy.

Changing our minds. Most of us have experienced speaking from a point of view that we can feel is changing even as we speak. We often continue explicating from our original point of view because otherwise the conversation loses its shape. Kuhn (1992) and the structure of our higher education system, have asserted, the first in content, the second in formal, curricular organization, that *argument* is the highest form of thinking. Deborah Tanner (1998) asserted that our culture thrives on argument. Often, even though we know we will change

our minds later, we continue “to play the devil’s advocate,” not because we are being devilish but, quite the contrary, because we are being socially acceptable, keeping the conversation going, or attempting to clarify the other person's point of view, or simply re-creating an antagonistic conversational reality that has become what Dewey might have called *a habit*. In any case, argument often brings forth information quicly (though whether or not it is the information we are seeking was discussed previously in Chapter Two in the section on Carol Gilligan’s work).

The presence of conflicting opinions is not necessarily a sign of difficulty. Conflicting opinions do not necessarily have to generate antagonistic conversational realities. An environment that supports different opinions is beneficial for creative activity. In this study, I found that I did not need to agree with participants in order to show interest and care. I found that I was most effective when I gave equal credence to all points of view, including my own. The interpersonal energy source for meaning-making is challenge. More research is needed on what sorts of conversational (cognitive and emotional) challenges are most conducive to democratic meaning-making: At what point does creative conflict become antagonistic polarization?

At any given moment, a researcher cannot know for certain whether or not a conversational partner is changing her point of view. During the conversation itself, the partners may appear to retain their original points of view when, in actuality, a great deal of adaptation is occurring. Practicing conversational reality theory or Ricoeurian hermeneutics, requires perceiving beyond expressed

polarities to underlying, dynamic unities. In the context of democratic education, the most important underlying dynamic in a conversation is, quite simply, the participants' commitment to participating in the conversation. In other words, both conversational reality theory and Ricoeurian hermeneutics have proposed that participants who are communicating are making an effort, are enmeshed in a process of mutuality. In this study, I found that, if a participant, in active communication with a researcher (myself) expressed an opinion that seemed contrary, nevertheless, that participant was taking part in the unity of collaborative worldmaking and, over the course of time, exhibited signs of having been affected by our conversation/collaboration.

During the group technology meeting with Archer - weeks after Gold had expressed to me intensely negative feelings and opinions regarding teachers and technology integration - Gold used exact words and phrases that I had used during our conversation in the hall to describe his own position on technology integration. I am aware of the research on men and women's conversational patterns and the propensity men have of taking official credit for ideas that women have introduced (Alic, 1986; Barber, 1994; Coates, 1986, 1988; Holmes, 1995; Kramarae, 1980; Spender, 1980, 1982a, 1982b; Tanner, 1986, 1990, 1994b, 2001; Waithe, 1987, 1989, 1991, 1995). However, for the purposes of this study, the most important conversational reality that was taking place at that moment was not a type of intellectual theft but rather the momentous collaborative achievement of interpersonal exchange: Gold had adopted my theory-in-use as his espoused theory.

If I had insisted on taking credit for the views that Gold was publicly espousing in Archer's presence (my views), very little systemic change would have been accomplished. I would have only succeeded in embarrassing both Gold and myself. Instead, allowing Gold to adopt my theories as his own, my espoused theories created an impression in the participants that a more teacher-friendly technology policy was more likely (than previously) to occur. This created hope, a a generally beneficial addition to a change effort. My goal as an action researcher was not the same as a feminist's or a critical pedagogist's. My goal was to initiate change in such a way that it could sustain itself after I had left the system. If my goals had been feminist or critical, I would have felt obliged to challenge Gold's taking credit for my ideas.

More research is needed comparing the effects of various conversational approaches on systemic change. Ideally, I would be able to spend more time in the environment and find ways to express many interpretive levels, complicating and deepening the conversation; but more often than not, the change agent has only a limited time in the environment and more research would help us make decisions as to which type of analytic is best to express under which circumstances.

My choice, as an action researcher, to openly share information with someone who was openly in conflict with me, had the result of bringing that information into the system from more than one source. Then, because my opinion (that the goal of information technology initiatives should be student use, not teacher competency) was offered by two participants known to be at odds and then echoed by Archer, the information became widely accepted. I consider this

the most surprising achievement of the action research and it was brought about through practicing conversational reality during a single, very challenging conversation between Gold and myself.

Creative and Critical Intelligence

My favorite educative conversations are a combination of creative and critical thinking. My favorite teachers have captured my imagination and influenced my methods of ratiocination by engaging me in conversations that are rich in this powerful combination. For me, critical thought is like the spine of a creature, every bone has to be connected in a certain way, or the creature cannot move. Creative thinking is best likened to the coordination of the organs, the rhythm of the body's myriad activities, purposeful, continuously adjusting to circumstances by means of combinations of communicative and generative activities.

Sable's invitation to practice research with a group of art teachers was particularly enticing to me because I anticipated an opportunity to bring two parts of my life and thought into closer alignment in an educational experience that would unite artistic praxis (creative methods and products) with critical thought (analysis, synthesis, and thematic self-reflection). I was not disappointed. This section describes some intricacies of the weave of creative and critical thinking/action.

Vygotsky on the psychology of art. Vygotsky graduated from Moscow University in 1917, the year that marks the success of the Russian revolution. He was in Moscow studying during the years that led up to this momentous alteration

of Russian society. While Vygotsky was studying psychology at the official Moscow University, he was also studying art and philosophy at the Moscow free university (Wertsch, 1984).

Vygotsky's theories regarding the origins of thought were influenced by his understanding of the artistic process. In his earliest book, *The Psychology of Art* (1925/1971), Vygotsky stated that, "Thus, the psyche of social man is viewed as the general substratum common to all the ideologies of a given era, including art. And we also recognize that art is determined and conditioned by the psyche of social man." (Vygotsky quotes in this section lack pagination, as they were taken from: http://www.marxists.org/archive/vygotsky/works/1925/art1.htm)

Later, Vygotsky would theorize the social foundation of psychology. Vygotsky's view that art reflected and affected the social psyche prefigured the later work of art therapists such as Alida Gersie (1997), an expert in guiding people as they re-story their personal narratives.

According to Harrison (1911, 1962, 1973), art was originally used to extend religious ontological explorations, making the world a less terrifying and more habitable place, psychologically. According to Vygotsky, seemingly in agreement with both Harrison's perception and Dewey's (1934) and Dissanayake's (1988) that art praxis is fundamental to the functioning of social realities, "art arises originally as a powerful tool in the struggle for existence; the idea of reducing its role to a communication of feeling with no power or control over that feeling, is inadmissible" (http://www.marxists.org/archive/vygotsky/works/1925/art1.htm).

And further:

> If the only purpose of a tragic poem were to infect us with the author's sorrow, this would be a very sad situation indeed for art. The miracle of art reminds us much more of another miracle in the Gospel, the transformation of water into wine. Indeed, art's true nature is that of transubstantiation, something that transcends ordinary feelings; for the fear, pain, or excitement caused by art includes something above and beyond its normal, conventional content.
>
> This "something" overcomes feelings of fear and pain, changes water into wine, and thus fulfills the most important purpose of art. One of the great thinkers said once that art relates to life as wine relates to the grape. With this he meant to say that art takes its material from life, but gives in return something which its material did not contain.
>
> (http://www.marxists.org/archive/vygotsky/works/1925/art1.htm)

It is my view, from long experience, that art is transcendant to the degree that its praxis is collaborative (interpersonally and/or kinesthetic-materially). Even the cliché image of the lonely painter or poet in the garret includes the paints and canvas in the case of the painter or the pen, paper, and candle in the case of the poet. In alignment with the biblical maxim that when two or more individuals come together, the substantiality of spirituality is increased, is the Vygotskian view that when two or more individuals come together, opportunities for socio-constructivism increase.

Negotiated meaning-making. I heartily approve of teacher resistance to any simplistic representation of an archetypal human relationship such as the relationship between teacher and student. In this study, I found that teacher resistance to simplistic representations of the magic (as yet lacking substantive, critical description and analysis) of teaching/learning moments was a sign of the

health of a beleaguered educational system owing to the courage of individuals working steadfastly within its not-so-temperate zone.

Failing a Pinarian reconceptualization (1975) of the process of education, the least instructional technologists ought to be able to acknowledge is the superior complexity of any teacher's mind (and heart) to the capabilities of any machine or pre-designed instructional system. Unfortunately, affording teachers respect on the basis of the complexity of their humanity, rather than reifying computer efficiency and Gagne-influenced (1977) educational designs, is rare in the present educational atmosphere (Papanek, 1992). Conversational reality theory holds that negotiated meaning-making is the central (shared) activity that takes place during a conversation and further, that negotiated meaning-making emphasizes relationship, shared activity, and the ongoing process of co-worldmaking over winning and losing objects, status, or power.

It pains me to see or read about living, breathing, participating teachers made subservient to machine logic and any kind of systemized thought. In this study we found that, within a humanitarian approach that values all kinds of knowledge, we could integrate technology and art into the curriculum. The core participants had no desire to privilege themselves or anyone nor did they follow any ideology. The teachers and administrators who worked with me during the course of this study were hardworking and able. They accepted any knowledge of computers and technology that would help them in their work with students and peers.

The participants in my study were often at the mercy of intra- and interpersonal crises resulting from an inability to integrate creative and critical thinking well enough to envision an educational purpose broader than efficiency, for technology into the curriculum. Art/articulation made it possible for some of us to state our problems while simultaneously participating in their resolution.

Unless as change agents we wish to restrict ourselves to using extrinsic, aggressive motivators such as various forms of economic force and material or social threats, we must learn more about the interpersonal, meaning-making dynamics that take place in conversations so that we can participate more fully, with increased awareness and sensitivity to the (shades of) meaning the other person is trying to convey.

A critical/creative articulation. What follows is a prose-poem, an example of a creative/critical response to the challenge of integrating art and technology in an educational environment.

A cRiTicAlcReaTive ARTiculation

You **and** me**: I** and **Thou**; and we are all together.	Who is art? *Who are you?*	Arendt, 1954, 1977; Berman, 1982; Berners-Lee, 1999; Buber, 1958; Gersie, 1997; Gibson, 1975; Gilligan, 1990; Habermas, 1984; Koestler, 1964; Maslow, 1971; Nussbaum, 1990, 1998; Rogers, 1980…
What we **need** it to be.	What is art? *What are you?*	Sesonske, 1965; Tolstoy, 1898…
Whenever/**Now**: Is, was and always will be: *Working skillfully*.	When is art? *When are you?*	Dissanayake, 1988; Eisner, 1999; Fairhurst, 1996; Francastel, 2000; Guggenheim, 1960; Haskell, 1993; Goodman, 1978…
Here, t**her**e and e**very**where but *especially* in the Briar Patch with the other refugees from the war of wor(l)ds	Where is art? *Where are you?*	Blandy, 1987; Efland, 1990; Eisner, 1994; Greene, 1978; Ott, 1984; Randall, 1995…
It makes us **feel** better (or worse) it makes us *feel more-***human**.	Why is art? *Why are you?*	Carey, 1988; Efland, 1996; Eisner, 1998; Gardner, 1990; Gersie, 1997; Harrison, 1962, 1973; Trend, 1992…
Ecstatic/ExtremelyFine/ **SuperFine/**VeryFine/ **Fine/**Less-than-fine/ **Not-so-fine/** Far-too-far-away-from-fine …and ***you***? How **ARE** you?	How is art?	Dissanayake, 1992; Eisner, 1985a; Gersie & King, 1990; Goodman, 1978; Greene, 1995; Koestler, 1964; Langer, 1963; Robinson, 2001; Vygotsky, 1925/1971…

Any interaction can be thought of as an initial condition. A researcher can move as delicately as a butterfly and, if Bertalanffy (1975), Prigogine (1984), and Lorenz (1993) were correct, the data will be affected. It is not necessary to control a system in order to affect it; it is only necessary to participate. And therefore follows a corollary salient to social science research - that the *way* we participate affects the dynamics of the system.

More research is needed in how researchers' relational stances affect social science research projects. Of particular interest to me would be research describing the intricate weave of critical and creative thought during conversations in educational environments with careful attention given to any correspondence in the patterns/weaves (of critical and creative thought) to relational stances between individuals.

Justice and Care

A Ricoeurian hermeneutic (Ricoeur, 1986, 1991, 1992, 1997) is a particular type of creative textual analytic whose purpose is synthesis. Before this study I had never used a Ricoeurian hermeneutic to synthesize my analyses of experience. Ricoeur's technique can be described as pursuing the examination, the critique of an idea until an underlying symbolism (Cassirer, 1955a, 1955b, 1955c, 1955d) reveals itself. When an interpreter is able to identify a symbolic basis of a text, generally, that symbol system will be a response or a link corresponding to a shared human experience or need. Following Ricoeur’s examples, I found that a researcher (myself) can perceive the common humanity underlying all the symbol

systems used by participants. Perceiving a human unity of need or experience, a researcher (myself) can create a cognitive synthesis (a reconceptualization) that includes/values more than one perspective. This section on justice and care is a *very* abbreviated example of a Ricoeurian hermeneutic (interpretation) on the cultural conversation on justice and care as poles of moral orientation.

Ricoeurian hermeneutic technique involves stating the text under analysis, in this case, Gilligan's work on moral orientations, and then conveying analyses of other texts perceived as relevant to the first text's perspective. The purpose of the hermeneutic is to create an analytic movement, a circle, that begins with the text in question, goes as far as the analyst is capable of going and returns to the original text but with, hopefully, a more resonant (thicker, richer) appreciation of the derivation, meaning, and the potentials for action in the original text.

The originating text in historical perspective. Gilligan's dichotomization of justice and care as poles of moral orientation (1987, 1988) brought an ancient theological debate into the social psychology conversation.

The Old Testament had defined justice as a kind of balance that could be achieved through forms of retribution, “an eye for an eye.” This definition of justice was modified significantly in the New Testament where justice was understood to include actions of mercy and forgiveness. Skillfully, Gilligan has brought an ancient theological conversation concerning the tension between Old Testament justice and New Testament mercy into a postmodern, interpersonal, relational, psychological framework.

The conflict between justice and mercy has often been bound up with questions of equality: Can equality between persons be established and judged according to external circumstances alone or do questions involving intangible qualities, such as love, respect, and care, have a place in the evaluation of equality?

A relevant legal text. Chief Justice Earl Warren wrote the Supreme Court decision (1954) for Brown vs. The Board of Education. Thurgood Marshall's argument had been that "separate but equal" could never lead to true equality; that separation makes equality impossible. Equality connotes interaction, and interaction can only be achieved through inclusion. I quote at length from this classic decision because it is a perfect example of the exercise of the – justice of the - ethic of care in education. Marshall convinced the Warren court that the only way to make people equal was to recognize their needs, and make it possible for those needs to come together with those of others, to share in the opportunities afforded by democratic education to better ourselves.

The following quote is taken from the Warren Court's decision in that case:

> Compulsory school attendance laws and the great expenditures for education both demonstrate our recognition of the importance of education to our democratic society. It is required in the performance of our most basic public responsibilities, even service in the armed forces. It is the very foundation of good citizenship... In these days, it is doubtful that any child may reasonably be expected to succeed in life if he is denied the opportunity of an education. Such an opportunity, where the state has undertaken to provide it, is a right which must be made available to all on equal terms.

> We come then to the question presented: Does segregation of children in public schools solely on the basis of race, even though the physical facilities and other "tangible" factors may be equal, deprive the children of the minority group of equal educational opportunities? We believe that it does.
>
> (Chief Justice of the Supreme Court of the United States, Earl Warren, 1954)

Marshall's argument for inclusion/diversity in educational environments was based partly on the fact that school is compulsory in the United States. Education is a necessary part of a democratic society and thus cannot be avoided. Because school cannot be avoided, the Warren court found that laws regarding education must exercise both types of moral reasoning - the type of moral reasoning that deals with a tangible, objectively verifiable justice and the type of moral reasoning that deals with an intangible, emotionally dynamic care. Ethical justice assures a reasonable (e)quality of tangible resources while ethical care assures a reasonable (e)quality of intangible essences of experience.

Technology is bound to become ubiquitous and compulsory in schools in the United States in the 21st century. Teachers will have to use technology. Because technology will be a necessity and cannot be avoided, methodologies regarding the educational use of technology must include both types of moral reasoning. Justice-reasoning will ensure a reasonable equality of tangible, technological resources while care-reasoning will provide an emotional/cognitive environment conducive to democratic equality.

A relevant conversational reality text. In my face-to-face meeting with Archer, he assured me that the problem of teachers not utilizing technology in

their classrooms would be alleviated the following school year, 2001-2002. Archer said that the school district was introducing a mandatory computer-based reporting system that teachers would be required to use. All records, attendance and grades, would have to be submitted on the networked computer in each classroom. Hands-on teacher training in the use of this system was not part of the change management of this new requirement. However, according to Archer, requiring teachers to use computers for administrative purposes would accomplish the instructional technology goal of teachers using technology.

I questionned this approach, asking Archer if this was not yet another example of force being used to motivate teachers. I did not understand why the head of instructional technology for the district was willing to introduce computer technology to teachers through administrative necessities rather than through pedagogic rationalities. And I was seriously concerned that the head of instructional technology for the district was more concerned with the efficiency of this approach than with its interpersonal or pedagogical effects.

These questions were the only ones that Archer avoided during our conversation. He countered my query with an enthusiastic description of the new national curriculum that was being introduced district-wide. This new curriculum emphasized "accountability in speech." I acknowledged to Archer that I understood that this was the district’s goodwill gesture towards creating an educative environment. However, while I applaud accountability, I suspect that accountability used as an ultimate value will leave issues of care without a linguistically supported administrative basis.

I was working in the school in the Fall of 2001 when the teachers at Captain Dewey High were having to use the new computer-based reporting system. The system had not been thoroughly tested before being implemented district-wide and there were hundreds of problems on that one campus. Records, lost in cyber space, were resubmitted many times. Records were unaccountably altered: students were reported missing when they were present; failing grades were given to students who were doing well. I often witnessed teachers asking other teachers, in desperation, whether they had been able to access one or another system functionality. Hours were spent in sorting the mistakes made by the technology. The technology help desk was overburdened and unable to answer all the distress calls. Many report cards went out with the wrong information, causing all sorts of distress in the community.

However, lest I leave the reader with the impression that the experience was damaging or worthless, let me express another impression I had as I witnessed teacher frustration, confusion, and anger: teachers were talking about technology more than ever before. Teachers were seeking out experts in technology who were known to be kind, understanding, and fair as well as knowledgeable; teachers like Bryght, Genesis, and Wiser. Teachers were collaborating on problem solving. Technology lost some of its aura of perfection, and teachers gained much in the way of confidence. Some teachers found that they knew more than the computers ever could, and that intelligent human beings (teachers) were needed to function as intermediaries between students and computerized administrations. In other words, the justice of forcing all teachers

into the same exact situation with regard to technology had brought forth the ethic of care in teachers and led to increased instances of collaboration and peer support. However, many teachers were exhausted, many students were frustrated, and many parents were worried unnecessarily.

Coming full circle. In the Old Testament, instances can be found (cf. Abraham and Isaac) of justice and care working in tandem rather than at odds. In Brown vs. Board of Education and in my own experiences during this study, we can note an increasing awareness of the importance of the interrelationship of these two qualities of moral reasoning. Justice provides a means for rationalizing an equal distribution of tangible resources (no mean feat) while care provides a means for nurturing an ecology of democratic relationships (no less an achievement). Further research is needed on patterns and levels of integration between these two reasoning domains.

I end this discussion with a long quote, another excerpt from *Democracy and Education* (1916) in which Dewey outlined for the reader the unity of the "natural sciences." Although I would prefer to call these sciences, the "life sciences," I heartily concur with Dewey's assertion that beneath the educational division between science and the humanities lies the unity of the more fundamental "natural [life] sciences." I have broken up a single one of Dewey's paragraphs to make his (to today's standards) rather dense language more easily interpretable:

> At the outset, the rise of modern science prophesied a restoration of the intimate connection of nature and humanity, for it viewed knowledge of nature as the means of securing human progress and well-being.

> But the more immediate applications of science were in the interests of a class rather than of men in common; and the received philosophic formulations of scientific doctrine tended either to mark it off as merely material from man as spiritual and immaterial[,] or else to reduce mind to a subjective illusion.
>
> In education, accordingly the tendency was to treat the sciences as a separate body of studies, consisting of technical information regarding… physical [phenomena], and to reserve the older literary studies as distinctively humanistic.
>
> [My] account…of the evolution of knowledge, and of the educational scheme of studies based upon it, are designed to overcome the separation, and to secure recognition of the place occupied by the subject matter of the natural sciences in human affairs. (p. 290).

DISCUSSION: DEMOCRATIC PROCESS

In my study, I found that teacher resistance to technology was partly due to the way technology was managed. Decisions regarding technology were made at the highest levels of the educational bureaucracy. Technology methodology was handed down to teachers as a form of educational engineering rather than as a medium for communication.

Technology is a hybrid of rhetorical logics merged with forms of data organization. Computers were originally designed to handle mechanical and computational processes for industrial and military purposes, have evolved to benefit artistic and communicative social purposes.

Critical pedagogists (Apple, 1979, 1982; Giroux, 1981) have carefully delineated how certain ideologies systematically disempower teachers and students. When computer technology is introduced into educational environments

as representative of machine logic, teachers who are already concerned with the place of humanism in the curriculum might rightfully be suspect that technology will further alienate and disempower students. Empowerment in education is usually defined as an increase in individual self-esteem and autonomous, spontaneous, group harmony. Although technology is capable of supporting individual self-actualization and group effectiveness, its potential for connectivity is not as often offered to educators as its efficient enablement of standardization.

It is my opinion that the very predictability of computer technology that was useful for military and industrial purposes is anathema to some teachers. It was my experience in this study that teachers (especially art teachers and those who had strong spiritual commitments) were adept at the subtle inferences and gradual alterations in relationships that constitute meaning-making. In the technology in education research articles mentioned earlier (Hodas, 1993; Saba, 1999; Solmon, 2000; Slowinski, 2000)), the representatives of technology innovation appeared to be unaware of the delicate, relational balance that teachers maintain in their classrooms. Therefore, the technologists' actions could have been perceived as disrespectful to teachers. Teacher resistance to technology then might not have been resistance to the potential connectivity that technology could provide, not a resistance to technology's liberating, humanitarian Zone of Proximal Development (ZPD) but a resistance to being bullied by technocrats who seemed ignorant of the relational, communicative, imperatives of a progressive, Deweyan, educative classroom.

In the following section, I will discuss Gordon Lippitt and Kurt Lewin's (1939) study that suggested that the relationship between teachers and students is reflected in the dynamics of classroom conversations and the meaning-making that can occur therein.

Lewin and Lippitt's Social Experiment

In 1939, in an article in *The Harvard Educational Review*, Kurt Lewin reported an experiment he designed with Gordon Lippitt. Lewin stated that he was attempting to take "the mysticism out of the group conception and [bring] the problem down to a thoroughly empirical and testable basis" (p. 23). Lewin and Lippitt found that, "the atmosphere a teacher creates as well as her skill" (p. 24), affected the learning that took place under her aegis. Specifically, Lewin, a refugee from Nazi Germany, was interested in the difference between autocratic and democratic educational environments. In this dramatic study, an autocratic classroom was structured so that the teacher did all the talking, and a democratic classroom was structured so that students were active participants in meaning-making activities. "The democratic group chose its activities, whatever they chose, the autocratic group had to do" (pp. 24-5).

Lewin reported that, in the autocratic classroom, procedures were defined and dictated by the authority figure who also determined the work groups; and that, "polic[ies were] determined by [the] strongest person," while, in the democratic classroom, "all policies [were] a matter of group determination." In the democratic group, the teacher freely discussed concepts and procedures with the group whereas in the autocratic group, the teacher never gave reasons for

either criticism or praise. Lewin reported that the “style of living and thinking” (p. 27) of the leader was adopted by the group; and there was 30 times as much hostile behavior among the students in the autocratic group than in the democratic classroom where students, instead of exhibiting antagonism, often deferred to one another.

I cannot help but notice that although we expect classroom teachers today to use at least some democratic procedures as outlined by Lewin (1939), we almost always introduce new material to teachers in an autocratic manner. Generally, teachers are not free to choose with whom they work, nor are they free to discuss with authorities the new curricular designs and regulations that they are expected to realize year after year.

Defining Democratic Process in Education Today

In James Tarrant’s *Democracy and Education* (1989), Tarrant argued that the commitment to educate citizens was a moral obligation of a democratic polity. Tarrant defined a citizen as someone capable of making choices based on reason. Tarrant later expanded his argument (1991, 2000, 2001) to criticize modern utilitarianism and postmodern commercialism for abandoning commitment to individual's right to self-determination and the concomitant exercise of civic responsibility. Tarrant’s critique of utilitarianism made the point that the utilitarian assertions that people act for their own good and that happiness is the ultimate good have been used to justify training people for work without teaching them how to question the nature and value of work itself. Tarrant's critique of postmodernism was that it had absorbed commercially manipulated values

without question (2000). Essentially, Tarrant's assertion was that educators have a moral-democratic obligation to teach their students how to question intelligently and effectively.

According to Dewey (1916) and Arendt (1963), the democratic process does not consist simply in voting for the candidate most likely to get us what we want. These great thinkers understood the democratic process as a relational stance in which people engaging in dialogue transform themselves and their society. Democratic dialogue rejects the premise that the strongest force wins by overpowering the opposition. Democratic dialogue is an enlightenment concept based on new world experiences valuing (appreciating) the astounding abilities of individuals working together, creating and maintaining a precarious existence through collaborative work.

Democracy has never been an easy process, it requires a continuous redefinition of mutual rights and responsibilities, of self and other. Enlightenment scholars did not assert that democracy was a natural state. Quite the contrary, democracy is a human achievement, an ongoing attempt to actualize in a body politic a spiritual understanding of the inherent, intrinsic equality of persons. Mass education in the United States, the commitment to universal literacy, was a result of the realization that democracy requires educated citizens who are able to choose autonomously, and to work collaboratively. This is the realization that Tarrant (1989) defined as a moral-democratic, curricular imperative.

In *On Revolution* (1963), Hannah Arendt described the American revolution as the only successful democratic revolution, the only revolution that

brought about a genuinely sustainable political democracy. According to Arendt, the long-term political success of the American Revolution was due to the fact that democratic process had developed indigenously, prior to the revolt against English rule. And therefore, the constitution of the United States was not a vision statement but a description of an existing political reality, a social and conversational praxis. Our constitution was not a dream, nor a set of rules handed down to a mass of people from the decisions of a political elite. Our constitution was a description and a furtherance of how our body politic was then constituted. We practiced democracy before democracy was politically institutionalized. Our legal constitution reflected and set out to guarantee that future Americans would be able to continue to extend this democatic art, this democratic experiment. According to Arendt and Dewey, the experience of democratic process is the basis, an ever-evolving basis, of democracy.

The life sciences. The life sciences are those sciences that explore organic life, define, delineate, and manipulate life processes. In *Human Anatomy and Physiology* (Hole, 1993), life is defined as characterized by ten processes: movement, responsiveness, growth, reproduction, respiration, digestion, absorption, circulation, assimilation, and excretion (p. 7). James Miller, in his astounding book, *Living Systems* (1995), showed how myriads of life patterns and processes throughout the multiplicity of animate life correspond to one another. According to Miller, human beings are living systems whose life processes are similar to, and sometimes precisely the same as, those of other living systems. Miller proposed that social organizations were also living systems and could be

analyzed on the basis of their life processes, that which sustained the life of the organism. Accordingly, biology is a life science - and so is education.

Learning is undoubtedly a process and one upon which not only adaptation (sufficiency) but also survival (necessity) depends. Learning, in its natural state (if the reader will forgive that fanciful metaphor) is a process that promotes life. For me, learning has been the most essential life process. 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. Rather, learning is a process in which a living being enters into a relationship with some other in such a way as to integrate information and inevitably then or later, slightly or greatly, both organisms change. Learning cannot be a one-way process. Learning must involve another organism that is also somehow affected by the interaction.

This research began as my effort to join others who work to diminish the destructiveness of educational mythologies that divide people from themselves and from each other. My work has been embedded in a socio-constructivism that takes as an assumption that we all participate in the co-creation of society through each and every interaction, *I and Thou,* you (the reader) and me (the writer). In order to create change in a school environment, a technology innovation, I used action and qualitative research methodologies to encourage and participate in a moral-democratic learning process.

IMPLICATIONS: EDUCATIONAL PRAXIS AS DEMOCRATIC PROCESS

"In my own reading, dreaming, creating, intuiting, and thinking," (Mink, 1998, p. 1), I have found that I am deeply devoted and addicted (shamelessly) to

learning. For me, learning is life. Democracy is the only socio-political system I know of that incorporates within its ideology the right and responsibility of citizens to learn, develop, and grow.

My definition of democracy is that system of socio-political organization whose fundamental, interpersonal interaction process is negotiation and whose product is a progressively wider scope of human inclusion in decision making/sharing and in worldmaking/sharing. Democracy is a complex system that requires an educational system to support its drive to include and produce.

Historically, in the United States the mass education system has been analyzed and judged, argued and altered, most comprehensively in the arena of curriculum studies. Curriculum studies examines educational systems to determine what elements are more or less conducive to and supportive of learning. My study has been an inquiry into the potential efficacy of conversation, used as a tool to further democratic processes during a change initiative in a high school. The change effort was directed by a group of fine arts teachers and focused on the goal of improving a school web site. Collaboration, conversation, care and connectivity were the underlying themes, purposes, goals, and meanings of my actions, my thinking, reading, dreaming, intuiting, and creating.

Implications for Future Research

Farhad Saba, in *New Academic Year Starts with Controversy over the Use of Technology* (1999), reported that teacher resistance to technology was due to faculty anxiety and lack of technology support staff. Teacher resistance was attributed to individuals feeling insufficiently trained and insufficiently supported

by technicians. Saba indicated that cognitive paradigms, operative in the environment, held back teacher participation. My study also found that teacher resistance to technology was related to the lack of technical support. I did not find, however, that cognitive paradigms held back teachers but rather, that conflicting paradigms often made it difficult for teachers to collaborate on solutions to technical problems.

Saba freely reported that the teachers felt anxiety and a lack of institutional support but Saba did not report that he felt any anxiety or lack of institutional support even though he was surely outnumbered in the field. My impression of Saba's report was that the technologist failed to perceive his own thinking as paradigmatic or influenced by emotional needs. In a competitive research community, it can be personally and professionally debilitating to share publicly, feelings of vulnerability.

One implication that my study has for future research is in the reiteration of the value of social science researchers' commitment to self-reflective, qualitative research and the ethic of care. This commitment can mitigate against the tendency to blame teachers for systemic problems and open our eyes to the unity of the learning process in which we are taking part. I hold to the qualitative methodology premise that there are no neutral observers or researchers, that the act of studying an event, an environment, an educational situation, inevitably affects what is being studied.

Argyris (1971) wrote, "Is it possible to develop research procedures which … challenge, confront, re-design, and manage the environment in which [we

work] in such a way that the job gets done and [we actualize] more aspects of [ourselves]…? I believe it is, especially where the social scientist joins with the subjects, together to study and re-design their environment" (p. 566). If we are bound to affect our experiments and our experiences then, as knowledge workers, we need to understand more about how we are affecting systems by participating in them.

This study used the systems theory premise of sensitivity to initial conditions in a collaboration with a core group of participants; changing either the core group or the initial conditions (the conversations), theoretically, will change the outcomes. An interesting twist on the design of this study would be to have two researchers working as I did, each using unique conversational strategies with different core-group participants; and then to compare the types of curricular integration that occurs, looking for patterns related to subject area and meaning-making styles. Further improvement on this study would be to revisit the campus over a period of years to study the effects of different initial conditions and core group characteristics on long-term change.

Implications for Practice

Present democratic structure requires that mass education policy be controlled by the government. However, there is no reason for mass education policies to be controlled by special interests, whether business, military, or religious. A mass education system in a democracy must have its own values, separate from those of all other major institutions. Education must have learning

as its highest value or else deteriorate to the dissemination of propaganda and the perpetration of permanent apprenticeships, serving elite purposes.

In the large body of literature reporting the resistance of teachers to technology in schools, I found little examination of the nature of that resistance and, at least in the instructional technology literature, no serious questioning, examination, or criticism of the values that are intrinsic in the design and ontologies of our present educational technology. My hope is that this study will open a path to examining teacher resistance to technology less prejudicially. If students are meant to be the primary beneficiaries of the availability of computers in education, how do the teachers, administrators, and parents fit into this vision? What are the students meant to do with electronic information? What sort of experiences and interactions are modeled, shared, and communicated as those towards which students are expected to strive?

I found too often for my intellectual comfort, technology being spoken of as a *thing* that must be acquired with no mention of its educational meanings or purposes. Complex forms of mechanization (such as information technology) are said to be "efficient" and yet, educational technologies have been problematic in every environment in which they have been introduced. We do not need to shy away from the challenge of integrating efficiency with more expansive learning values. Surely, the challenge is similar to that inherent in the integration of justice and care, or creative and critical thinking.

Dewey understood that it was interpersonal interactions that made the difference between the exercise of routine habits and moments of genuine

learning. Dewey wrote that, "Efficiency ... is reduced to a mechanical routine unless workers see the technical, intellectual, and social relationships involved in what they do, and engage in their work because of the motivation furnished by such perceptions" (1916, p. 85). It is a disservice to those who question the forms, and purposes of instructional technology to label them resistant. And it is inhumane to then concentrate instructional technology change efforts on breaking, or transforming that resistance without a serious attempt to interpret our own labeling practices and purposes.

My efforts were to speak of and relate to technology as a means of facilitating educative process. My efforts were to attempt to relate to participants as equals, as democratic citizens, co-workers in the field of education. The teachers I worked with closely were more than willing to integrate technology into their curricula, on their own terms. They asked me to provide advice and guidance. Teachers rarely asked me for instructions but, once we had established trust, they did not hesitate to ask me to instruct their students. Most teachers in this study preferred to learn while watching me teach, rather than by participating in a teacher-student relationship with me. The few times that teachers adopted a student role with me, there were no students anywhere nearby. I interpreted this, not as a resistance to instruction but as hesitancy to create insecurity in students by even temporarily abandoning the role of teacher in their presence (mothers often exhibit this same inclination in relation to their children).

Culture is a shared ritual. School, an element of our culture, is a shared ritual. What do we celebrate in this ritual? What is reinforced, valued? Modern

culture valued progress, urbanization, and mechanization. Postmodern culture tends towards a re-evaluation of progress in the context of community, ecology, and the ethic of care. I suggest that curriculum theorists interested in technology integration in the schools recognize the importance of celebration and identify joyful, caring ways to share information, skills, and resources with specific schools and individual teachers; to influence the social ecology of education towards connectivities that support group and individual self-actualization.

Who among us can afford to cease questioning our underlying values and purposes, our motives and motivations? In the interest of technological progress, we cannot afford to circumvent traditional debate and justify ourselves when we forgo democratic conversation in our haste to create change. The means are the set (or series) of initial conditions that brings into being a particular change. The ends, the result of the change process, develop from, and cannot be separated from, the means that brought them into being.

Implications for Theory

We are all frightened of change to one degree or another. Change connotes the unknown, the unknown connotes that we will not know how to behave, what to say; we might find ourselves abandoned, incapable, bereft. A change agent is not without fears of his own (Hirschhorn, 1988; Mink, 1998). Harrison pointed out that learning can mitigate fear. If a change agent engages in an interchange with a participant as a learner as well as a teacher, aware of the potential mutuality in the meeting with another, the participant is subliminally freed from

assuming a subservient position and co-agentic conversation and action are more likely to occur.

In my view, a change agent/consultant's primary roles are listener and responder and her primary focus is the response-ability to provide just-in-time learning. The change agent's role is to manifest sensitivity, to respond to the subtle hints people share when they are ready to engage in discussion. The fear that conversation is not enough is ever-present. However, this study found that educators can trust conversation. We can align ourselves with Vygotsky's view that language is the preeminent tool for socio-cultural development. We can exercise the generosity of spirit, advised by Maimonides (1200/1946) as essential to the development of the whole/holistic intelligence. We can practice generosity in conversation in such a way that we scaffold, in Bruner's sense (1990), the learner/participant emotionally as well as cognitively. Scaffolding a learner emotionally requires the more experienced partner to provide reassurance when necessary, to model consistently an emotionally engaged intellectualism, and to refrain from abandoning close-knit, respectful participation during a change process.

I have coined the term, *emotional scaffolding* to mean a particularization of the ethic of care in education. Emotional scaffolding is an active, participatory openness to the needs of learners consisting of: 1) an awareness that emotion is the ground from which intelligence arises. (Damasio's (1999) neurological research has extended William James' (1890) conception of cognition as emerging from emotion.); and, 2) because emotion is implicated in every facet of learning

(via relationships), and because those persons in the role of learners are risking change, a change agent in the role of educator must provide emotional as well as intellectual guidance. Emotional scaffolding includes reassurance, respect, and unconditional positive regard for self and other. Emotional scaffolding is a relational dynamic that consists of a sensitivity to the potential in the learner (similar to what Vygotsky (1934/1962) described as the Zone of Proximal Development), and the ability to provide just-in-time learning in the form of encouragement and support i.e. teaching by example, modeling the approach the change agent wishes to introduce into the system, and feeling free to be influenced emotionally by people, events, and circumstances.

My conceptualization of educational, emotional scaffolding includes the premise that, since learning takes place in the context of relationship and conversation, emotional scaffolding must be mutual in order to be truly democratic. In practice, this means that the person in the role of educator must be openly risking change along with those in the role of learner.

Although I have brought the term *emotional scaffolding* into the conversation, the act itself and the efficacy of this approach to inspire learning relationships with others has been well documented (Buber, 1958; Fromm, 1956; Maslow, 1968a; Rogers, 1980; Bateson, 1979; Belenky 1997; Bovard, 2000; Bradshaw, 1996; Brown & Gilligan, 1992; Ellsworth, 1989; Gersie, 1997; Gilligan, 1990; Goldstein, 1997; Goleman, 1995; Gunzburg, 1997; Hirschhorn, 1988; Leonard, 1968; Miller, 1980; Mink, 1998; Noddings, 1981; Nussbaum, 1990; Oyler, 1996; and Velleman; 1999). Further research on emotional

scaffolding could support a humanist approach to technology integration in schools and to change initiatives in general.

IN CONCLUSION: PARTICIPATION

> To oscillate between drill exercises that strive to attain efficiency in outward doing without the use of intelligence, and an accumulation of knowledge that is supposed to be an ultimate end in itself, means that education accepts the present social conditions as final, and thereby takes upon itself the responsibility for perpetuating them.
>
> (Dewey 1916, p. 137)

I end my study as I began, seeking an articulation of the possibilities for collaboration, conversation, care, and connectivity that technology affords to educators. Technology has the potential to support teachers. Teachers have so much to offer instructional technologists and designers. And yet, in the field of educational technology, as in so many other educational arenas, the research focus remains on closed systems and could be characterized as obsessively concerned with efficiency, standardization, control, and correct answers.

Although the classroom drills, memorization exercises, and timed tests of my school years were onerous and deadening, they were thrilling, passionate, and interactive compared to some of the blindingly boring, computer-based, education packages designed with the same principles of interpersonal interaction as the digitized telephone operator recordings that make us wait while all the choices are listed, none of which suit our particular need or question. During the drills, memorization exercises, and timed tests of my school days, anything could happen; in every moment there lurked the possibility of an unexpected event, a

human intervention, a strange attractor emerging and taking us in a new direction. A bored student could at least hope that something interesting might happen.

Learning, or any other type of organic growth, is not an additive but a transformative process. For an organic, living creature to incorporate something new, a transformation in the organism must occur. Professional teachers have many opportunities to share a variety of miniscule and mighty transformations with students. In my collaborations with professional teachers over a period of over 30 years, and in particular in this action research study, I have witnessed a particularly acute sensitivity in teachers to issues of transformation. Some teachers prefer to encourage deep and profound transformations in their students while other teachers prefer to initiate subtle, almost imperceptible changes in student perceptions. I have not yet worked with a teacher who was resistant to the concept of change, on the contrary, teachers are immersed in a daily, experiential, situation-based, change process called education.

In *Democracy and Education* (1916) and in *Experience and Education* (1938), Dewey claimed that democracy was an experience and that educational experiences (in a democracy) should be democratic experiences. Dewey's interpretation of democratic experience in education focused on the dignity and respect of persons. In Dewey's view, the teacher was to take a student's rights and responsibilities as a democratic citizen seriously, engaging with her in relational, relevant discourse and activities.

I end this narrative without an answer but with new questions: Why not examine the roles that social scientists play as we carry out our research? How are

we creating culture as we study it? What interpersonal dynamics do we create as we converse with participants? As social scientists, it is our job to create definitions of culture. To abstract and concretize the ephemera of experience so that people can use our research to make informed decisions surely requires us to broaden our perspective beyond polarity thinking and the use of distanciation, force, threats, humiliation, or any other dehumanizing perspectives in interpersonal communication.

Our culture has spawned a digital technology. A shared, cultural, definition of the appropriate use of digital technology in educational environments will require deep and sincere questioning, many scientific and artistic experiments, and a democratic, conversational praxis, in order to emerge and evolve. As social scientists, we cannot afford to neglect our responsibility to participate and self-reflect as we question, observe, predict, describe, and inform.

Appendix A
State Guidelines for Technology Education

[A Southwestern State] Essential Knowledge and Skills for Technology Applications

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)...

(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 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) 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.

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…

(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) 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.

(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) code modules for 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) 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.

(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; 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.

(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) 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).

(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 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.

(9) 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.

(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 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.

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.*

(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) 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.

(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 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.

(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) analyze the impact of desktop publishing on society including concepts related to persuasiveness, marketing, and point of view.

(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 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.

(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 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.

(6) 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) select 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.

(7) 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.

(8) 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.

(9) 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.

(10) 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.

(11) 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.

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.*

(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) 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.

(2) 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.

(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) 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.

(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 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.

(5) 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.

(6) 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.

(7) 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.

(8) 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.

(9) 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.

(10) 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.

(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 or monitor display; and (b)publish information in saved files, Internet documents, CD-ROM discs, or video.

(12) 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.

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.

(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) 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.

(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 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.

(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) 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.

(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 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.

(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 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) use fundamental concepts of graphic design including visual composition and lighting when analyzing multimedia.

(7) 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.

(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 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.

(10) 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.

(11) 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.

(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 input from peers and professionals in evaluating the product.

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.*

(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) 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.

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.

Appendix B - February 2001
Letter 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 Sable 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

Appendix C
State Guidelines for Art Education

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 a vocational 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.

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 vocational 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.

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*.

(1) 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.

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*.

(1) 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.

(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) 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.

Appendix D - Eduard Lindeman and Adult Education

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 at Michigan Agricultural College. 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 asserted 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.

Appendix E - November 2000
E-mail initiating contact with research community from the Fine Arts Academy Coordinator, Sable

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 Sable

Appendix F - March 2001
Excerpts from online interviews with parent webmaster, Elvinor

TR: How did it come about that [your child chose to] enter the Academy…?

Elvinor: B. has expressed her/himself through music since s/he was very young. In fact, his/her pre-school teacher told me when s/he was 2 that s/he would be a drummer. S/he also started playing and composing on the piano when s/he was 6 or so, and then started percussion in middle school band as well as various bands outside of school. So s/he naturally gravitated toward the high school courses offered in [music]. When s/he was a junior, s/he realized that for the most part s/he was taking the classes that were required to obtain a Fine Arts Academy degree anyway, so s/he might as well join. Also at that time s/he started seriously considering pursuing music as a career and majoring in jazz in college, so s/he figured being in the Fine Arts Academy was a natural step in that direction...one that would help her/him prepare for music as a major in college.

TR: Were you ready for that? lots of parents want their kids to not be artistic because they worry about the economics of it.

Elvinor: Sure…but I feel it is most important for her/him to live his/her life according to what his/her heart tells him to do. In his/her heart, s/he's a musician, and I am thrilled that s/he's following his/her dream. When I asked her/him why s/he'd chosen music as a major, s/he said, "because I have to." I have a couple of other thoughts on the subject...his/her private drum instructor has been able to make a "good" living (a nice home and food on the table for his/her 3 children) by doing a combination of things involving percussion -- teaching, performing, recording, touring...and s/he seems quite happy and fulfilled as a musician [and parent]. S/he is a good role model for B.. Also, B. is … smart … and has done well in his academic courses. S/he could do anything s/he wanted in school, and s/he's chosen music. I think that says a lot.

TR: There are lots of studies that show that kids who are good at art are good at academics and often that's used to justify arts programs... for me …that's not necessary, to prove that a kid is "also" anything... from my point of view, art is very hard and requires a lot more self discipline than business studies

…..

TR: How did you get involved in the web site at Captain Dewey High? As it after B. became a Fine Arts' kid or before?

Elvinor: I started learning how to do some basic web development at my job ... When I was thinking about how I could be involved in helping out at Captain Dewey High after my 2-year stint as PTSA secretary, I thought of the idea of creating an all-school-events calendar on the web. I approached the PTSA president and the Captain Dewey High webmaster and they said go for it. That was the summer before B.'s junior year and it was at some point in his/her junior year that s/he decided to join the Fine Arts Academy.

TR: So s/he got involved with the band pages after you got involved with the events calendar?

Elvinor: Yes. S/he was elected band president at the end of his junior year and s/he told fellow band members that as president, s/he wanted to create a web page for the [group] S/he took a web-development class during that summer … and I helped her/him when s/he ran into some problems creating his/her pages at the end of the summer. S/he worked hard on it until his/her … schedule became so full. S/he really hasn't done much with it recently. That's one of the major obstacles with web pages…the maintenance can be very time-consuming.

TR: What do you think of the web? I am kind of in love with it I think. Berners-Lee, the guy mostly responsible for it, had two scientist parents and he studied at Oxford, classification systems and he got from his dad a belief that the brain works like a big neural network and he made the web design to act as a giant brain... I think it's an amazing idea.

Elvinor: Very interesting about the development of the web....I find it fascinating as well. I love the way it connects people whose paths would never have crossed otherwise...The interweaving of minds and spirits over such a distance, and in such a short time....I consider myself fortunate to be part of it.

TR: … for me, to go to Captain Dewey High to work with them with their web site is an interesting idea because there are so many layers... there is the idea that kids get their work out there for anyone in the world to see.. there is the layer of teachers experiencing a kind of validation of the work they do... there is the layer of letting folks know about the Fine Arts Academy... and underneath it all is a feeling that personal relationships will form through the work and because of it too... as a parent, but also as a person who has been working on their site, do you have any visions, even if we can't do them now, of what a school web site might be or do?

Elvinor: I think you have just mentioned several of them - For teachers, I can see them using the web in several ways: informative ways with links to various helpful and relevant sites that could expand a student's learning experience and postings of homework assignments and due dates; in philosophical ways....expressing why they teach what they teach and what inspires them, and in a representative way by exhibiting students' work or sharing lesson plans. I can see students, parents, and other teachers benefiting from such teacher pages. Students could follow similar models in posting information/news re: their areas of interest, like for various clubs and organizations that they are involved in. Again with the understanding that an adult actually puts

the info up on the web, so that appropriateness of subject matters is monitored … Students could also share their creative projects on the web.

TR: You gave me an idea! Thank you! I hadn't actually thought about how parents use the site or might contribute to it and here I am talking to a parent who makes a huge contribution to it! hmmm... Can you tell me some about the parents and their involvement/needs and whatever else you think is important... gosh, I feel very dumb to have forgotten parents!

Elvinor: Parents like to have things like dates and times of various activities, sporting events/game results, that type of information that is interesting to them (and they can't easily obtain from their teenager or the newspaper). Parents involved in various booster clubs would probably be the most likely to do this.

TR: I think it's way too much work for only one person to have the password to upload things and I don't think [the district] has any rules against more than one person having access as long as it's an adult and supervised... do you think it's ok to have individuals not in contact with each other but just with [the web master], each putting up information related to their needs and interests? I'm talking about adults, teachers and parents .. I think it's ok because co-ordinating it all through a committee or one person seems way too daunting and would probably kill the whole experiment. But then, if we had adults doing this then maybe besides the web club for kids, I ought to think about a workshop for parents who are interested? Is that a really bad idea?

Elvinor: I think a workshop for parents would be great! There are several parents (mostly those involved in the PTSA and/or booster clubs) who give a great deal of their time and energy to Captain Dewey High. I think if they had the support of someone teaching them how to do the web work, they would take the ball and run with it. Also, yes, I think it would be fine to have any number of adults uploading (with the Captain Dewey High webmaster's permission), because I agree it's way too much work for any one soul to do. That's also the beauty of the interwovenness of the web that we were talking about....the more brains at work, the better... Really, of the three populations we've talked about...teachers, students, and parents, the parents (at least a handful--a rather large handful-- of them) have the most time to give to this sort of thing. There are several Captain Dewey High parents, like I said, who already give so much of themselves. If we could help channel that time and energy into web development, great things could happen! What they need is the support of someone teaching them how to do it. It may appear overwhelmingly difficult to those who don't understand how easy web development can be!

TR: …When you read about artists working in schools around the country, the programs that end up lasting usually accomplish that because somehow the community, especially the parents, get involved and excited about it... and yet when I am in the school itself, the parents are kind of invisible... I don't think I've ever worked with parents before ... in their capacity AS parents that is...

Elvinor: I think it would be good if you contacted the PTSA president and approached her/him … about coming to a PTSA meeting and bringing up the subject in that setting. That would be a good place to start, anyway. I'll check on the next PTSA meeting date and time, and give you [the] contact info. All this is on the Captain Dewey High web page, if you want to look

for yourself. It's true about excited parents accomplishing wonderful things...I think we may be on to something...just look at how you and I got hooked on the web...I think there are any number of other parents out there ready to be reeled in! Also, I see more of the parents, since I am a parent myself...true, I tend to see them at meetings and musical events after school hours…. but there are many who actively volunteer during the school day in the office, etc., too –

Second conversation, next day…..

Elvinor: I believe it is in the arts that we experience truth and meaning in our lives.... through the creative process our spiritual beings are free to express themselves...and as a lover of the arts, my spiritual being connects with the artist (be it a musician, writer, dancer....) and I am filled with a sense of awe and wonder.. like I've been blessed with a glimpse of the Truth and it is truly beautiful. It is difficult to express this without sounding totally cheesy, but it really is what gives my life meaning.

TR: Yes, I agree.. for me, that's exactly what it does, it connects me, now this will probably also sound really cheesy but like a good religious ceremony can do the same thing for me and though I am not a sports fan, I think I see that those people find a connection there. But for me it's art the most because, exactly what you said, the truth and beauty thing come together and especially help my emotions come to a peace. As an artist I like collaborative arts more than the solo parts because I love the feeling of jointly discovering beauty and truth. I am a total addict of that experience. I think we did that yesterday when somehow we found new thoughts together so I don't think we ought to worry about whether those ideas might damage anyone. We can be very gentle - and sharing need not mean depriving anyone.

Elvinor: …Also, I have a question about your time frame. Will your relationship with Captain Dewey High continue beyond this school year? I sure hope so. I could see some great training opportunities going on this summer for web development that could carry into next school year! School folks seem to be the most motivated in the early Fall.

TR: I think ongoing relationships are best. so if they like me and I don't run out of money I would like to keep working there for awhile till we feel we've seen the roots take hold…Sable said teachers don't like to do stuff in the summer but is that different for parents? it's a good time for me to work also I like getting things sorted ahead of time so I think it would be great to have some things kind of in place before kids come back to school - what did you have in mind?

Elvinor: I know Captain Dewey High has hosted some summer camp for students in creative computer technology (I believe in conjunction with UT ....) For parents, maybe some kind of workshops on possible uses of the web and basic web development training for those interested (most likely PTSA and booster club). It would be good if teachers could be involved as they plan their curriculum for next year, but I'm not sure when that takes place.

Elvinor: Sounds good to me, TR!…. Again, thank you for all you are doing to help our school and community! Peace ;-)

Appendix G - October 2001
Questionnaire and Eight Responses

TECHNOLOGY USE IN YOUR SCHOOL: FEELINGS, THOUGHTS, OPINIONS AND EXPERIENCES

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.

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.

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.

Sincerely, temi rose

Q1 Supporting Factors(including but not limited to - systems, persons, training, information, and experiences) to the integration of technology into the curriculum

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.

Answer 1.1 - Principal Lightyear

The technology support system at Captain Dewey High is very weak. Although we have literally hundreds of computers coming our way, the school district is so fiscally challenged that adequate system support is more often than not unavailable. From my perspective, there needs to be more district alignment between district technical support and campus level support, ideally with a tech support person assigned to each campus basic table of organization. Our fiscal management has not caught up with the increasing demands of technology support. Most teachers still teach with the paradigm of the textbook being the prime source of information and instructional focus whereas most students surf the world wide web. Yes, I feel supported but the support exists in a vacuum of limited vision.

Answer 1.2 - Fine Arts Administrator Sable

At Captain Dewey High there is no on-campus tech support. One can call [the district's] tech support help desk and be on hold for over an hour to then submit a work order for someone from [the district] to come to campus and provide support. Classroom teachers can't hold for an hour, so one can imagine the problems this system presents. After receiving a work order number, school personnel can expect the [district] techie to help within one day to two weeks from the time they are reached. But often it takes several days to reach the help desk. This, of course, does not give us the feeling that we are supported adequately.

And, in my case, when the technical support person tried to load memory on my old computer which needed to run a heavy new [district required] software and my computer crashed as a result, that left me feeling less than confident about the techie. What I later learned was that this person was new to this type of work.

After my system crashed, no one as [the district] could take that computer and retrieve the data, so I completely lost my system and all information input after my save of data on the last day of school the prior year.

Answer 1.3 - Head Fine Arts Department Tower

There is a technology "Help Line," which I suppose is the closest thing to a technology support system available. This Help Line addresses problems with hardware and software. In terms of a support system in a broader sense, one that would help in multiple areas to acquire and integrate technology into the classroom, I do not feel "supported" at all.

Answer 1.4 - English Teacher Wiser

The technology support system is better than it was last year; however, there is only one on site person who is qualified and given time to assist teachers. Although the teacher is very willing to help, she is also a full time teacher. The help line for [the district] is almost always busy, but when I finally get someone on the phone they are very helpful. The waiting time for a service call after they are contacted is much shorter than in the past.

Answer 1.5 - Head Librarian Genesis

The support system on campus is poor to non-existent. We are one of the only campuses at the high school level that does not have a technology person on campus (not even part-time). For support, we must rely on teachers who are already overburdened - or on [the district's] "Help Desk." One teacher who has "volunteered" to help others has missed a whole week of instruction with her students. The "Help Desk" is often busy and most teachers don't have the time to sit on hold for half an hour at a time - only to be told to do a work order. Very little training on computers or new software [even the software the district requires us to use for grading] is available on campus, and information regarding computers and software is seldom distributed. In most cases, learning about something newly available is spread only through word of mouth; either you hear about it or you know nothing about it. In short, there is a great need for someone on campus whose sole job is computer support. With over 400 computers on campus - and many, many problems - the district should be supplying a full-time 'techie" for every high school, rather than making the schools use a teaching position to fill a tech position.

Answer 1.6 - Technology Teacher Bryght

We really need a technology person here at Captain Dewey High. We need someone who is trained to work with networking, troubleshooting, as well as software. Right now, we are learning to operate the technology and use software on our own. We have a teacher that went to get the training on [the new required grading and attendance software] this summer. She helps/assists the teachers with their grades, progress reports, and attendance on the computer. She really can't help us when we need it because she has classes to teach too. We call downtown for support and we only get run arounds. We call our supervisor and she doesn’t know much either.

Technology support is a Band-Aid situation. Of course a complete technology program, including support comes from commitment. That commitment is budgetary as well as technological. Support is far and few between and we must do patchwork to make the system work.

Answer 1.7 - Technology Teacher Miller

I find it difficult to integrate technology into my curriculum because of the lack of properly functioning computers. When the computers will not perform the required activities of the classroom curriculum, it becomes frustrating to both the teacher and the students. I have had numerous problems with the aging computers we have here at Captain Dewey High. [A detailed list of problems follows] I do not feel that we have received much technical support [more details follow] I am embarrassed that the students must see inoperative computers frustrating the teacher as well as themselves…The students become angry at me because the computers do not function properly.

Answer 1.8 - Latin Teacher

The district sees fit to spend thousands of dollars on equipment and only a fraction of that on tech support. These machines are useless without them. Whenever support does arrive, they have been known to do shabby (at best) work.

Q2. Imagining the Future of the integration of technology into the curriculum

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.

Answer 2.1 - Principal Lightyear

My ideal is to participate in a teaching environment that is completely integrated with distance learners and video and computer technology. As dynamic as this environment may be, it is no substitute for the presence of an effective, caring and challenging teacher who has the ability to nurture and sustain relationships with his or her students. The best of all possible worlds is to have both the technology integration and the teacher-student relational dynamic. Technology is a wonderful tool that is changing the way that we access information but in and of itself there is no bonding.

Answer 2.2 - Fine Arts Administrator Sable

In the Fine Arts classrooms and studios, there are varying needs for technology. A) For our Theater Arts students, we would like for their Technical Theater course to rely heavily on technology instruction for both lighting design and set design. At this point, we have not integrated technology into that curriculum to any extent. B) For Music students studying music theory, we would like to have a learning lab that would allow students to practice ear-training and sight-singing using theory software. We have a piano keyboard lab that we would like to become a

Midi-lab. C) The Band director needs a new computer in order to run half-time marching band charting software. She knows how to use the software and wants our drum majors and other interested students to learn how to do charting. Any students who want to become band directors need to learn to use charting software. Band directors pay as much as $3,000- $5,000 per chart, so it is a lucrative skill to acquire. D) Because we are interested in Career Preparation for our Visual Arts students, we want to have a graphics lab. Our students could be working as interns with graphic artists their senior year if they were skilled in the use of PhotoShop and Illustrator. We have prototyped workshops using Illustrator and PhotoShop and animation software and have now purchased some of that software, but need more training and support to integrate this into our curriculum.

Answer 2.3 - Head Fine Arts Department Tower

In my own classroom I suppose I'd like to have electronic media and knowledge of how to use it as readily available to students as other media. I'd like our art department to have an electronic media course taught by an art teacher whose primary medium is electronic media. I'd like to see technology used in student portfolio creation. I'd also like to have a better understanding of technology research tools available and have whatever technology is available, such as projectors, that would allow dissemination of that information to a class.

Answer 2.4 - English Teacher Wiser

My ideal classroom would have a permanent section for computers, scanners, etc. My average class size is 30, and I would need at least 15 computers. Truly utilizing the computers on a daily basis would require extra planning, but the rewards would be great in terms of research, organization, graphics, photography and writing skills. I also feel that a teaching assistant would be necessary for maximum productivity.

Answer 2.5 - Head Librarian Genesis

As a librarian, I definitely see the value of technology. In fact, many print sources are being replaced by online versions or databases, so I have no choice but to embrace it. I try to encourage classes to combine print and online research - this is the ideal to me. One fills in and supplements the other, making learning and research more complete. We've slowly moved beyond print and online research to projects which integrate images, videos, and audio (e.g., PowerPoint presentations) with text (though few teachers are yet willing to go this route because they themselves aren't comfortable with it or because they don't feel they know enough to embark on such an endeavor). But I definitely don’t' want to see the 25,000 volumes of books fall to the wayside; technology is not the only solution!

Answer 2.6 - Technology Teacher Bryght

Since my classes are Business Computer classes, we do business-like applications. We cover software such as Microsoft Office…PageMaker, Quicken, PhotoShop, FrontPage, internet usage, and keyboarding tutorial. We use Dell computers. The students use at least one or more of the programs in other classes such as English, Social Studies, Science, Foreign Language, and Math.

Technology can be integrated into the curriculum. It will take co-ordinating between the department and [a] technology [that presently] does not have to bend or compromise to the core curriculum. Ideally, a student having an assignment or a project that coincides with the core curriculum is the ideal situation.

Answer 2.7 - Technology Teacher Miller

The role of technology in my classroom is a must. I cannot "imagine" continuing on in the future with the state of condition of the present computers. If I had reliable computers I could spend more time showing the students how the systems works instead of telling them how it's supposed to work. I would like very much to have a video system assigned to the classroom. I have acquired several videos for student viewing, but it is difficult to get a system on short notice, when I have time to show the videos.

Answer 2.8 - Latin Teacher

My ideal is to have tech available in some classes while not in others, depending upon the content of the class itself. In my area (Latin), I am incredibly reticent to use tech. For one simple reason: nothing is of quality out there. All that is available is a glorified flash-card.

Q3 Limitations to the integration of technology into the curriculum

As far as you are concerned, what limits the use of technology in the curriculum? How do you feel about these limitations?

Answer 3.1 - Principal Lightyear

- Not enough manpower available for technology repair
- Limited number of computers for each classroom
- Department chairs on each campus lack measurable and concrete district goals

Answer 3.2 - Fine Arts Administrator Sable

I have been very irritated that our campus technology person (who controls who will get computers in their classrooms) allocates computers to classrooms based on whether or not teachers have passed a computer competency. There are 4 kinds of [tests]. Our Fine Arts teachers struggle with finding time to complete these competencies. These are teachers who teach every period and have students in their classrooms before and after school doing sectional rehearsals, play rehearsals, marching band, choir practice etc. etc.

Also, when the district first put computers in classrooms, Fine Arts classrooms were not considered classrooms. The theater still does not have an internet drop. And, on average, academic classrooms have probably twice as many computers in their classrooms as Fine Arts teachers have in theirs. Yet, Fine Arts curricula has just as many, or more, technology applications as academic curricula.

So, I think Fine Arts teachers are limited by the person(s0 on our campus who "control" the allocation of computers. And how do Fine Arts teachers feel about these limitations to the integration of technology into the curriculum? They feel discriminated against.

Answer 3.3 - Head Fine Arts Department Tower

Availability, dependability, and expertise. Overcoming the limitations is a full-time job in and of itself.

Answer 3.4 - English Teacher Wiser

The limits of the use of technology in the curriculum are the limits of the imagination and expertise of the designer of the curriculum and the teacher in the classroom.

Answer 3.5 - Head Librarian Genesis

There are several things that limit technology's use. One is access - most classrooms have at most 5 computers, and even the library -which serves as a computer lab since the school does not have a lab that teachers can bring their classes to - has only 18 computers, far less than the average class size at Captain Dewey High. Another limitation, as mentioned earlier, is that only a handful of teachers have the skills necessary to attempt a technology-heavy project. If a teacher does not know, for example, anything about PowerPoint, she will not normally try to assign a PowerPoint presentation (or use of a scanner or a digital camera, etc.). Without the opportunities to learn how to use technology and software, teachers are going to be reluctant to use it or assign projects where they are going to be required to assist students, to be the "experts." Another limitation is that some technology assignments seem to be the equivalent of "busy work," just something to use technology rather than putting the technology to use. There needs to be a legitimate need for the use of technology - it needs to truly be integral to the assignment, and often, it's not.

Answer 3.6 - Technology Teacher Bryght

The lack of collegiality between the departments is what drives the limitation. The more compromising that can be accomplished the greater the result. Also, the limit of software that can be loaded to the computers due to RAM/memory. For example: The Social Studies department has different software on their computers than the Science department has. All computers do have Appleworks (that came loaded with the computers). We need Money, Money, Money for technology to run effectively. *Lack of money - technology outdated.*

Answer 3.7 - Technology Teacher Miller

The only limitations to integration of technology into the curriculum are funding. I have been advised numerous times that the school district cannot support us with the funding for computer repair or replacement.

How do I feel? Uncomfortable at best. I value Business Education and its part of the child development process for the business world. By showing the students that we do not receive the same support as other important basic courses, it tells them something negative about the introduction to the business environment.

Answer 3.8 - Latin Teacher

This question poses a serious problem in today's environment. To even mention limitations in some circles is, quite simply, anathema. We must realize that if, as individuals, we bewail children watching too much T.V. and playing too many video games, an hypocrisy arises when we plop them down in front of a computer monitor.

In the end, the computer is an extremely passive form of learning that truly engages and interacts with the students barely at all.

Specifically in regards to the internet, the lack of true editors is most problematic that the students see little or no problems with that tells me that teachers are not doing their job. Simply because something shows up on your monitor does not make it true.

Q4 Technology and Classroom Practice: the appropriate role for technology

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?

Answer 4.1 - Principal Lightyear

I feel these limitations cannot be resolved until more money is allocated to ensure a proper technology support system.

Answer 4.2 - Fine Arts Administrator Sable

The appropriate role for technology in a Technical Theater curriculum is to provide the students with exposure to state-of-the-art technology used for lighting design, set design, and costume design. Technical Theater should not be limited to stage construction. Students should learn elements of stage design, lighting design, and be able to research period costuming having access to computers.

In an art classroom, students should be able to go to a classroom computer and pull up examples of art. At our school, we teach a course in Art History. Art History students should have access to computers in their classrooms. Also, we want to put our own Captain Dewey High student artwork up on a website, and teach students how to update the website, etc.

The Fine Arts Academy office needs computers, printers, and software to generate marketing materials, programs, build databases, and use [district] software.

To prepare Music students, the Music theory classroom should have a computer for each students. Distance learning could connect these students to university classrooms that have teacher resources we do not have.

Distance learning, in general, for Music, Theater Arts and Dance could give our students access to master classes, workshops, concerts, etc. [The district] has put a Distance Learning lab on our campus with no one funded to train the teachers or administrators to use it and no plans to do so.

Answer 4.3 - Head Fine Arts Department Tower

At present technology is mainly used to organize and present information to the class in a written format and to help with administrative functions. As stated in #2, I'd like to have electronic media available to students as readily as any other media. I'd like to use technology to better present information to students and be used by students for research.

Answer 4.4 - English Teacher Wiser

There is no doubt that the English classroom has endless possibilities for the use of technology. The computer offers the internet for research on any topic: genres of literature and music, playwrights, poets and authors with time lines from the distant past to today and beyond.

The ability to create wonderful graphics and put together a beautiful magazine of student work is also challenging. Incorporating sound is another area of technology that I would like to explore. PowerPoint presentations are interesting and a good beginning to effective class presentations. This list is only a small portion of the many ways I use and plan to use the computers I have in my room. The curriculum and my particular classes evolve and expand as I experiment and expand the use of computers in [my classroom].

Answer 4.5 - Head Librarian Genesis

I use technology when it's needed, but otherwise try to push students toward the appropriate sources for information. I hate seeing students searching the internet, site after site, for information more easily and more readily found in an encyclopedia, almanac, or other reference source. Students need to be more discriminating and not see computers as always holding the answers to their needs. I readily encourage use of computers, the internet, and technology when it's appropriate. But why use a scanner to print out a copy of a picture to a printer when a copier is so much simpler?

Answer 4.6 - Technology Teacher Bryght

Coming up with more projects that pertain to the business world and technology as it is today. And having a room with all the computers working properly 100% -- heh-ha!!!

Answer 4.7 - Technology Teacher Miller

The tools that I have in the classroom have been incorporated totally into my daily teaching. I am new to teaching and have learned from more experienced teachers the value of the various viewing projection systems and computer enhancement tools. An improvement to the computers will be the greatest benefit to technology integration.

Answer 4.8 - Latin Teacher

I occasionally provide a website to use. Frankly, that's it.

Appendix H - May 2001
District Vision for Technology 2001-2005 (excerpt)

Executive Summary

The … School District Vision for Technology provides a framework for enhancing education and business functions using technology. Over the last five years the District has made great strides in making technology available at every campus and administrative building. This plan integrates and institutionalizes the technology transforming the infrastructure into a transparent tool with a multiplying effect on all aspects of education and administration. There are several over-arching themes that comprise the plan:

1. Integrate technology into the curriculum to enhance the educational process for every student and teacher.

2. Provide a unified information management system with easily accessible student and business information to authorized users.
3. Provide access to information for parents and students outside the physical school environment.
4. Provide support that is efficient, timely, and cost effective to ensure technology is available when needed.
5. Create architectures, procedures and standards that allow for technology evolution and streamline regular and frequent processes.

Technology is changing the classroom landscape. At the end of this five-year Vision for Technology, it is expected that every student will have an access device that is used as an integral part of daily instruction. Access to electronic textbooks, the Internet, collaboration and editing tools, instructional software, and electronic notes will be available instantly from anywhere within the school environment as well as via common communication means outside the school. This environment will promote increased parent and community involvement and facilitate communication with schools.

The administrative environment is also changing. Data will be entered and accessed electronically as close as possible to the source with user-generated queries. The Internet and Intranet will be used to conduct general employee and administrative functions of the District. Additionally, this data will be available to increase community awareness of District status and initiatives.

These dramatic changes in process and method require a solid and robust infrastructure. Therefore, technology skills and support are key initiatives in this plan. They are required to unlock the potential of this technology and to allow seamless integration with the conduct of business--whether administrative or teaching.

This Vision for Technology includes ten goals that capture the five over-arching themes and addresses evolution in the classroom and administrative environments. These goals are:

Goal 1: Provide instructional technology leadership for District objectives and initiatives. Using technology integrated into all areas of the curriculum, teachers and students will increase their learning and work more efficiently.

Goal 2: Provide a secure, comprehensive information environment that can be accessed at anytime, anyplace, and from any device. Through a stable, secure infrastructure, staff can access information they need when they need it.

Goal 3: Facilitate use of information resources to improve instruction. Taking advantage of new technologies, students and teachers have ready access to appropriate electronic resources for instruction and learning.

Goal 4: Provide educator development to support instructional goals. As a result of training, teachers will be prepared to use technology in their teaching and analysis of data.
Goal 5: Improve collaboration and cooperation between [district] departments, campuses, and outside entities for effective implementation of [district] instructional priorities, goals, and initiatives. Through closer collaboration between Information Systems and [district] departments, and with community partners, support of District goals in instruction can be enhanced.
Goal 6: Increase effective, efficient use of technology resources. With new software systems, enforcement of standards, staff training, and a retooling of current practices, staff can become more productive.
Goal 7: Ensure Customer Satisfaction. As a result of a highly trained support staff, remote network management, and communication with staff on processes and procedures to access customer service, hardware, software and the network will be maintained in optimal condition.
Goal 8: Provide [district] staff, students, parents, and community the opportunity to access appropriate information. Using a common interface, staff and community can search [district] information resources.
Goal 9: Improve [our] reporting process. Using new software tools, … data will be entered, tracked and reported consistently.
Goal 10: Improve data integrity for the District. To ensure reliability of District data, up-to-date software, training, and new procedures will be implemented.
All these goals provide an environment to allow learning to continue outside the walls of the classroom after school hours. However, another issue remains; many students do not have access to computers at home. This is a larger concern commonly known as the “digital divide” and must be addressed by the community in partnership with the District.

Appendix I - August 2001
Sable's memo to Lightyear and parents (excerpt)

A need for additional Fine Arts Classes, "Mastery" of the intricate Master Schedule and District Support for an Arts Enriched Education in the District

L. head counselor, told me that we (the Fine Arts Department) needed to create some more Fine Arts classes because the counselors had no place to put the students who needed Fine Arts credit. The school district "killed" two art classes, a Theater Arts I class, and did not provide Songwriting in the schedule or a second guitar class in Fall of '01. And they used Technical Theater and Piano Lab to place students who were hard to

place. In one instance, a special needs student took precedence over a music major and the music major dropped piano. Many students were placed in Technical Theater and even Theater Arts I who did not ask to take those classes.

And yet the school district will not pay for sections of Fine Arts that the Fine Arts teachers want to teach and the counselors need to accommodate the Captain Dewey High students who needed a Fine Arts credit.

The school district is reviewing the "formula" that was the basis for so many problems (large class sizes; classes not allowed to "make") around the school district. One of the local problems with Captain Dewey High's master schedule is said to be a lack of PE classes 7th period. Other problems with the master schedule are probably even more difficult to understand. It was a new software program and a new person assigned to the task for fall, '01, so naturally problems could (and did) arise.

Losing the classes and curriculum we have worked hard to create and that counselors say we need was a blow to us this Fall, '01:

Songwriting - 26 students registered, but not put in the master schedule

A separate Classical Guitar class for advanced students - no teacher, even though the students were registered

A section of Theater Arts I and at least one of Visual Art I - no money provided for teachers to teach the class, even though they were willing to teach them

An accelerated Art I class exclusively for academy art "majors" who showed a portfolio to be accepted - ten non-auditioned students were added who needed Art I

Advanced Art Classes that are not so large that the teacher cannot get to help a student but every third or fourth day

Fall "fight" to keep 3 separate orchestra classes for the new full-time teacher

Dance Classes that were scheduled with no regard to the dancers' levels

How do we address the surprising attitude expressed by local administration that Dance and Art and Theater Arts students do not deserve to be placed in the correct classes or classes that were a reasonable size?

Who can best advocate for re-instating these classes in Spring Semester of '02 or at the latest, Fall of the following year? PTSA President and Lightyear were not successful. The Fine Arts teachers and the Fine Arts coordinator were not successful. But in the instances where parents got involved (in the cases of Orchestra and Visual Art), classes were saved and funding was "found."

Appendix J - November 2001
Sable's letter to Lightyear and parents concerning the mural project

When I went to the web to search for Fresco Painting, I found only 17,306 sites! After spending the next month reading those 17,306 articles, I discovered that none of the Fresco Painting throughout centuries of art history was painted on boards. The award-winning Captain Dewey High Fine Arts Academy Art Department integrated the art of fresco painting into the curriculum, not with a web search, but with a hands-on project to create a work of public art. Our learning started with a design phase and we studied how fresco paints are mixed and culminate with erecting scaffolding and painting a large outdoor fresco to become the focal point of the PTSA's Courtyard Beautification project. Not taking lightly a painting that would become a permanent work, the design phase stretched from one school year to the next. But in that tedious and disciplined creative process, a work of art was born, and the students' design was accomplished.

When I went to Italy last summer and was moved to tears at the frescoes of Michaelangelo and spent three hours in one small room reading every word in my 100-page guide while poring over magnificent frescoes of Raphael; when our group traveled to see frescoes at the monastery in Assisi and in the magnificent Duomo in Sienna; it never entered my mind to be thankful that these frescoes hadn't been painted on boards, which of course, would never have survived the centuries, as did the frescoes.

In pleasant anticipation of doing our own mural, when I drove to [another part of town] and saw other murals and remembered the mural that had been on the exterior of Captain Dewey High's old field house until it was torn down to make way for a new track, and drove to [other local high schools] to see their campus beautification projects, it never entered my mind that Captain Dewey High PTSA's renovation project would not be another feather in the cap of the school district. We should applaud parents and teachers who take on beautification projects on their children's campuses---projects completed at no expense to the district.

When I called Risk Management last spring and told them about our mural project and asked permission to have students on the roof of the breezeway and called Construction Management about obtaining the architectural drawings and again later to send someone out to look at the breezeway roof and got their advice about having proper footings of the scaffolding so as not to damage the roof, and enlisted the time and expertise of University Art professors and architects and an Artist in Education from the State Commission on the Arts to work with us, it never entered my mind that after we had

all spent months fund-raising and had the very expensive paints and heavy emulsion delivered, scaffolding erected and inspected, and the student's design for their mural carefully chalked on the wall, that the Facilities Management committee would meet, with no representative from Captain Dewey High's Beautification Project present, and make a decision to disallow our fresco painting that had been 9 months in the making. That is a miscarriage of justice, and I object to the decision and to the process. The district's decision: paint on panels of wood instead; the district no longer allows painting on brick.

Imagine being a student who has studied acting for years and is finally cast in a leading role in the play. After several months of taking instruction and memorizing lines and spending hours in after-school practice, you are told, after the huge set has already gone up, that a play that others schools have done is now to be disallowed and you cannot get on that stage and have a chance to publicly perform your work. Imagine that.

Appendix K – May 2001
Memo to faculty from Lightyear and Gold regarding computer competency test

Date: May 14, 2001
Re: Computer Competencies
This memo is intended only for those who have not completed their computer competencies.. sorry for the shotgun approach but too much is happening these days for me to send individualized letters.

One of the goals of our CIP this year has to do with the completion of teacher computer competencies. As of today's date, several teachers have not completed these competencies and, thus, run the risk of losing the computers that have been assigned to your classroom, Captain Dewey High has been allowed to receive these computers only as a reward for following the District's plans for increasing the level of teacher proficiency. Those who fail to cooperate with this expectation will have to forfeit their computers to someone else.

Please inform me in writing of your plans to finish these competencies. Once you have them finished please turn them in to me and I, in turn will make sure that the members of our DTLT receive them. Once again, failure to comply with these computer competencies

will have to result in assigning the computers in your room to other who have remained on schedule for the completion of their competencies.

Appendix L - October 2001
Pierce's report to the Fine Arts Technology Committee

The Academy tries to blend Fine Arts and Technology in the process of creating enhanced curriculum for Captain Dewey High students. Past successes have included the creation of a state of the art digital recording studio (two years old) and a technology lab with introductory software modules (one year old).

This year, technology development will again be a primary emphasis for the Academy. Our past successes and the rapid pace of new developments have directed us to creating a technology plan for the whole school. A Technology Strategic Planning Committee has worked over the summer and determined to include the following major components in this technology plan.

4) Tech support/maintenance - the need for support of the hardware and software has not kept pace with the implementation of this technology. The long-range plan for the school must address this problem.
5) District initiatives - the district objectives of computers in all classrooms will be continued.
6) Library Computer Lab -use of the computer lab presently located in the Captain Dewey High library has been disjointed due to lack of planning and organization. Systems will be put in place to assure that this resource is more effectively utilized.
7) Mobile Lab - teachers' desire for a computer lab for the purpose of group presentations exceeds the room capacity of the school. Captain Dewey High will seek grants to develop a mobile lab of networked laptop computers on a cart. This mobile lab, similar to the one being implemented at [our vertical team's] middle school, can be "checked out" from the library.
8) Tech (Modules) Lab - the introductory modules in the Tech Lab have already led to related full courses such as the new Computer Aided Design (CAD) course beginning this year. More new modules are in the works for the Tech Lab this year.
9) Recording Studio - the recording studio has a new home in the library and has expanded to include video production. Incorporating the video component in the curriculum will be the objective for this year.
10) Distance Learning - Captain Dewey High will have a distance learning lab this year. Using it effectively will be the challenge. The Academy is now working on a plan to staff and manage this facility.

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Vita

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