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GENERAL ARTICLE

Curriculum Revolution: The Infusion and Diffusion of New Media

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ABSTRACT

The authors raise questions and present options about how art education must change to more effectively help students meet the challenges of life with and beyond the computer screen. The thesis is simple: in the age of electronic media, artists need much more than training in the technologies of the "image world" in which we live. Students must become media philosophers, trained to reflect on the characters of electronic and other media and educated in the philosophical disciplines of epistemology, ontology and axiology. The article is organized around specific conceptual questions and discusses five proposed courses to aid students in addressing complicated questions raised by electronic media.

Last night I dreamt that I was re-inventing [U.S. comedian] Don Novello's 1970s mail-art book The Laszlo Letters, in which he sent monkey-wrenching letters of feigned madness to corporations and politicians, usually receiving an institutional offer of free samples in reply. In my dream I always ask the same question in the letter: "What place does art have in our culture?" I send this letter to IBM, Apple, Compaq, Motorola and to the Clintons. And to each of my letters I get an exact reply, the only difference being the letterhead: "There is no place for art in our culture." Letter after letter, a big stack of them: "In response to your letter of January 5, there is no place for art in our culture. Sincerely . . ."

—Mike Mandel

Art critic Lucy Lippard once wrote that artists cannot save the world, and neither can anyone else, alone [1]. While our intention with this article is certainly not to save the world, we do intend to raise questions and present options about how art education must change in order to effectively help students meet the challenges of life with and beyond the computer screen. Some of the questions that we address are: How can we demonstrate to new generations of artists that art has a profound cultural function in contemporary culture? How can we create an intelligent interface between art and life in cyberspace and the art and life we have known in actual phenomenological reality? More generally, what will the artist's role be in future societies? What are the goals of art education? What is the role of visual literacy in other areas of university education? How should we prepare students to work in multimedia forms?

The authors of this article work together in the Fine Arts Department of Washington State University. From our different perspectives—art history and theory, photography and electronic imaging, printmaking and artists' books—we all work on issues concerning electronic media. We are especially convinced that art education must respond to both the potentials and the dangers of media. We have taken this unusual opportunity to engage in an extended conversation, for it too often happens that colleagues working at the same site do not have enough such dialogues. Our process involved several two-person dialogues, in-person three-way conversations and e-mail exchanges about a range of issues and questions over many months. Tensions inevitably arose in trying to integrate our three voices and three perspectives.

While there are significant differences among us—our backgrounds, our values and our respective optimism about the potential for institutional change—we share the conviction that, in addition to technical training, students must learn analytical skills for dealing with new electronic media. They need to learn how to evaluate what they encounter in cyberspace, how to analyze media and how to investigate the way in which corporate interests increasingly determine what transpires in virtual space. The students need to learn how politics intersects social and economic life and what it means to talk about increasing democratic participation through and with electronic media. They need to learn about the "art world" and about the changing nature of the public sphere in virtual worlds. They need to contemplate what art is and what function it plays in contemporary culture. They need to consider the possibility that electronic media simply promote escapism and a pervasive commercial and consumer ethic. They need to consider the nature and role of community in personal and networked public life. They need to learn about the past and to reflect about the future.

Our thesis is simple: in the age of electronic media, the artist needs much more than training in the technologies of the "image world" in which we live. This visually saturated media culture that surrounds us demands that students become media philosophers, trained to reflect on the character of electronic (and other) media and educated in the philosophical disciplines of epistemology, ontology and axiology (although some people might simply call this "theory" and dismiss the historical and philosophical significance of such levels of inquiry).

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This article is part of the *Leonardo* special project entitled "Planetary Collegium: Towards the Radical Reconstruction of Art Education," guest-edited by Roy Ascott. This project features writings that address the present and future needs and nature of art education in light of contemporary developments in technology, science and the arts.

While our era has aptly been called anti-foundational (it is impossible to define a singular, stable foundation of knowledge or of life in our ever-more-rapidly shifting social and cultural context), it is possible to define some of the essential arenas of historical and theoretical study with which all students should be familiar. What will help us not only to survive in the present but also to imagine possible futures?

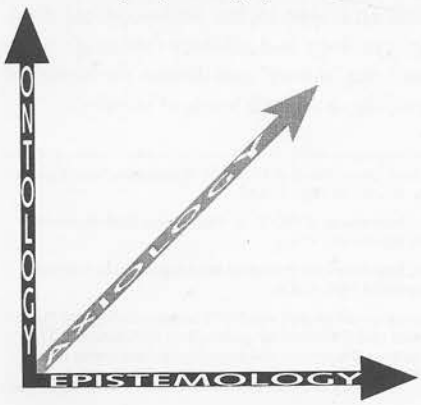
It is, of course, relatively easy to speak of encouraging critical self-consciousness about the future, but how is this accomplished? How does one become a "media philosopher," able to comprehend and translate for others the implications of electronic media? What role do images play in people's lives, and how do these translate into actual art courses? What are the non-objective, democratic and art-making potentials of these media?

Such complex questions are at the core of our proposed 5-year curriculum. In each year of this curriculum, students engage technical, conceptual and historical issues and questions, all of which are organized thematically. Internships and coursework, designed to prepare students to earn a living after completing the program, are basic components of the curriculum. All students learn technical skills of sketching, rendering and electronic imaging, and are exposed to a range of traditional art media as well.

The first foundation year centers on fundamentals of design and an introduction to the history of art focusing on contemporary issues and integrated with the studio exercises. The second year addresses a range of personal questions—the nature of the self, personal expression, identity—and how these issues have been developed by artists from different cultures. The third year addresses social and political issues in the community and in the world, with an analogous focus in world art history. The fourth year strives for an integration of personal and social issues. An overall chronological schema of international art history would be taught at this level, so that students would have an adequate map of the art of the past. The fifth year is individually designed by students to meet their creative needs.

Because the limits of this article do not allow us to outline the entire curriculum in detail, what follows is a discussion of specific conceptual questions and five particular courses to aid students in addressing the complicated and thorny questions raised by electronic media.

Fig. 1. Diagram of three axes of analysis. The horizontal axis is epistemological; the vertical axis, ontological; the diagonal axis, axiological. Each of these axes represents a mode of philosophical analysis. Concept by Deborah Haynes; drawing by Mike Mandel.



INFUSION

A range of epistemological, ontological and axiological questions form the conceptual foundation of our curriculum. Figure 1 shows three axes or coordinates from which to (re)view electronic media: the horizontal axis is epistemological; the vertical axis, ontological; the diagonal axis, axiological [2]. Each of these axes represents a philosophical mode.

Epistemology

We have placed epistemology at the horizontal axis because it is the most fundamental of philosophical discourses addressing the questions: How do we know? What does it mean to know? What does it mean to know when the technologies that produce information and knowledge are transformed, made both smaller and more ubiquitous? How does information differ from ideas? What are the differences between information, knowledge and wisdom? Which of these phenomena constitutes authentic knowing? Without answering such questions, both ontological and axiological questions are spurious.

Information, available from a variety of sources and easily manipulated using computers, is the factual organized data that surrounds us [3]. Computers are good at storing, retrieving and organizing data, but they also support a particular model of empiricist thinking that is rooted in the early modern European philosophy of Francis Bacon, René Descartes, John Locke and others [4]. Although this is but one model of thinking that evolved in Western Europe among a few elite philosophers and scientists, its consequences are profound. In every sphere of life, our efforts to control the world have had disastrous consequences. In addition, our society seems to be centered around the increasingly rapid collection and consumption of enormous stores of information for its own sake or for entertainment. Unfortunately, however, the speed of data-access is inversely proportional to the ability to mentally retain and understand what is being collected and consumed [5]. In an era in which metanarratives have lost their potency and truths are multiple, we have come the closest we can to an axiom: The more information we have, the less we understand what it means. Understanding, however, is not the only casualty of speed. Our nervous systems—addicted to the speed at which images appear on television and to the speed of data-transfer and cut-and-paste methods—cannot slow down. Information leaves us gasping to catch our breath.

Ideas are more complex than information. They evolve through the intricate interplay of direct experience, memory, insight and engagement with the ideas of others. Ideas help us investigate what things, events and experiences *mean*. Knowledge and wisdom evolve as we grapple imaginatively with ideas.

In our interconnected and changing world, is it possible that the saturation of the senses with information and data not only cripples, but also actually *cauterizes* the imagination? The image of cauterizing is vivid: tissue is burned, seared, sealed off. If information saturation cauterizes the imagination, artists (and all of us) must pay attention to the dangers of data overload and to the pleasures of electronic data manipulation.

The first course that we will discuss, Methods of Observation and Speculation, is designed to wrestle with these issues and is recommended for artists as well as for pre-medicine, architecture and science students. This course involves the examination of both phenomenological and virtual worlds. While the course addresses the traditional two-dimensional language of art, it also focuses on comparing different types of media. How does our seeing change when we add the use of a camera, a scanner or a computer to the possibilities of the unaided eye? How does this affect students' use of each medium? Students need to be taught methods by which they can go fluidly back and forth between media.

For instance, a portrait drawn with a pencil might be scanned into the computer along with a photograph with the intention of contrasting information and

Fig. 2. Mike Mandel and Chantal Zakari, *The Turk and the Jew*, 1996, screen capture, <http://www.wsu.edu:8080/~mikeman/>. This website evolved during the period that Mandel and Zakari were conducting their relationship in cyberspace between Pullman, WA, and Chicago-Boston.

perspectives. Then, an imaging process might be used to reveal other ways of observing a human face and its internal molecular structure. In critiques, students would examine the discoveries and reveal how images create different meanings based on medium and context. Such critiques are important because information should not be separated from the way in which it is displayed. Other traditional skills, such as working with color and color theory, might be enhanced as students undertake exercises using pigment, film and the computer. Working with the relationship of color to move through these various media might help students understand how individuals perceive color in unique ways.

Another basic course is called The Visual Image. This class helps students develop a repertoire of collected and created images. The discipline of keeping a sketchbook is taught with a focus on developing observational skills and the imagination. What creates visual pleasure? How is this culturally defined? Asking students to visualize their physical relationship to their communities is one way to help them learn techniques for making visual diagrams and maps. The process of sketching ideas and reworking them, combining two or more visual ideas to form another, helps students develop the habit of visual thinking. This is not a course in the craft of drawing, but in visual representation as a method of thinking. The class therefore includes techniques of observation, perspective, scale, visual hierarchies and collage to expand students' visual vocabulary. Discussions include historical forms of visual language and imaging devices. Students might also post images on the World Wide Web (WWW) in order to see what they could learn about their own thinking, about their own and world cultures, and about our own cultural biases.

Ontology

Ontology is the study of "the relative reality of things," or the differences between the real and the unreal [6]. The ontological axis shown in Fig. 1 is vertical because it raises questions about the nature of the self in the world. What is real? What is the relationship of actual phenomenological reality to virtual worlds? What is the nature of "being" in virtual space? What is the self and what is it becoming? How are new technologies reshaping individual and communal identity? What does it mean to be embodied in our era of bionics and virtual reality?

We are certainly not the first to conclude that electronic media challenge our most basic ontological assumptions about the world and the self [7]. Some people, and some artists, live their lives increasingly on-line. Will the depletion of non-renewable natural resources, the pollution of the land, sea and air, the breakdown and increasing violence of urban centers, the accelerating extinction of species, even the contingency and fragility of life itself, be of but fading significance if we are anticipating a future in air-conditioned rooms where all of our interactions are conducted through a screen? Will the external world matter at all once we have created virtual worlds that do not suffer from these kinds of

problems? Moreover, we should ask what happens when the electricity or servers shut down because of terrorist sabotage or simple overload. These questions, of course, are partly rhetorical; they are meant to affirm that what we value as "the real" has tremendous implications for the quality and sustainability of life.

Assigned coursework can deal with such issues in many ways. For example, in the course Introduction to Virtual Communities, students identify themselves using HyperText Mark-up Language (HTML) home-page construction, narrative, storyboards and video. This class poses elementary questions about self and community, such as those already mentioned. In a university, the class might include developing and articulating an understanding of the structure of the school by asking, Who is the president? Who is on the governing board? What is the university's role in the community? How does this structure create the students' experiences?

Instructors might help students develop on-line relationships with sister schools, in the United States and abroad, in order to discuss the results of research. Electronic-imaging classes not only help to ground students in solving basic life problems, but they also offer an expansive sense of the world. Computers and other photographic media often allow us to delude ourselves that perfection is possible, that control is a reality of technology. Yet, unquestionably, the strongest works using these media deal with human foibles, power plays and the mundane in daily life—for instance, the animation *Dr. Katz,* the photographs of Diane Arbus and installations of Antonio Muntadas, such as *Message of the Messiah* [8]. Like many others, we enjoy web-surfing, with its global connections. But our daily needs are more likely to be neighborhood- and community-based. How are we, as well as our students who use these new electronic tools, going to perceive, engage and create within our own communities? This question will remain difficult and significant.

Students learn to apply their image-processing and drawing skills to the creation of HTML documents for their own websites, emphasizing their responses to this wide-ranging medium. At first they make their site a scrapbook of personal interests—"Welcome to my world! My favorite bands, my best friends, my favorite TV programs and ads! All available on the WWW. Universe take note!" But, very quickly, the inherent aesthetics of the medium begin to suggest alternative experiments with sound, animation, movies, image-maps, frames, cgi, client-pull and other illusionistic devices that enable the student to design an engaging experience. The students recognize the break from linear thinking. Students' links are not only radial in structure, but can also lead beyond themselves into the vast WWW community. Their next level of understanding is to decode the WWW culture. Just what is this WWW: Who uses it and for what purpose? What drives its technological advance? Where do I fit into this stream of information dissemination?

Programming is another arena in which students can develop mastery, or at least develop modest expressive capabilities. HTML is really a tiny programming language that forces one to forgo the serene computer surface and get into the mechanics of how it all works, tag-by-tag. Sherry Turkle distinguishes between user, hobbyist and hacker attitudes toward the computer [9]. The user is content to use visual click-and-drag simulation on the screen that corresponds with real-world concepts, whereas the hobbyist and the hacker want control over the mathematical logic that drives the machine. HTML may be the only programming experience that many contemporary computer users have, and it provides glimpses of a logic usually hidden from view.

Any young person who is immersed in our commercial media environment knows that the computer is a tool of powerful illusionism. *Immersion* is the operative term here. Whether one assumes multiple identities for role playing within interactive Internet games or simply becomes witness to the three-dimensional electronic animations that pervade TV and movie viewing, the psychic effect is compelling. At Washington State University, we have no trouble filling electronic-imaging classes, because students want to get in on the action. This is similar to the boom in photography programs in the 1970s, when that medium was recognized by youth culture as the language of the moment. Cheap, mass-produced 35-mm cameras enabled young people to have access to the same medium that made the news and captured family histories. Now, the computer is the commonly used tool. As Gene Youngblood puts it, this *universal tool* simulates all others in making music, writing letters, building buildings, even creating relationships [10].

For 3 years Mike Mandel and fellow artist/designer Chantal Zakari have conducted their relationship in cyberspace between Pullman, WA, and Chicago-Boston:

> *We created* The Turk and the Jew *[11] (Fig. 2 and Color Plate A No. 3) to identify a virtual space in which to have a relationship. In one set of pages, our portraits morph into each other. We respond to each other on family, religion, nationality, distance and intimacy. Another set of pages changes daily and concerns the moment, the ephemeral. In this work we collaborate on our presence, our lack of presence, HERE, in our own virtual construct. While advertisers on the WWW are looking for "hits," we are making an artwork that is rich, complex, surprising and free. Art, in its most intelligent form, is not a commodity. When it is a commodity, art is seen as an unnecessary luxury in our era of a diminishing standard of living. But in the largest sense, art is the last hope for interrogating the commercial/consumption ideology that permeates our cultural experience. How do we relate to each other, to the community, to the polity? Answers to these and other questions do not necessarily take the form of tangible objects for sale. When they do, they do not necessarily find a seller's market. There may not be much of a (market)place for art in our culture, except in the margins. The few opportunities that do exist for making a living as an artist are as rare as opportunities for high-school basketball stars in the National Basketball Association! One can, however, get a job if computer-literate, and most of my students are. But my message is simply this: There is a new place for making and distributing art that is beyond the commercial art world. No matter what means we use to make money, we can all participate in this new public space. The most influential artists of this century are those who have focused their sensibilities on the popular, immersive medium of film—perhaps web pages and web-based projects will now allow all of us to make our own movies!*
>
> —Mike Mandel

Computer illusionism so sensually stimulates our imagination that it is being harnessed simultaneously by artists and by corporate advertising to stimulate our desire. Hence, Youngblood warns that we need to "create on the same level as we destroy" [12]. If we remain passive observers and consumers of electronic

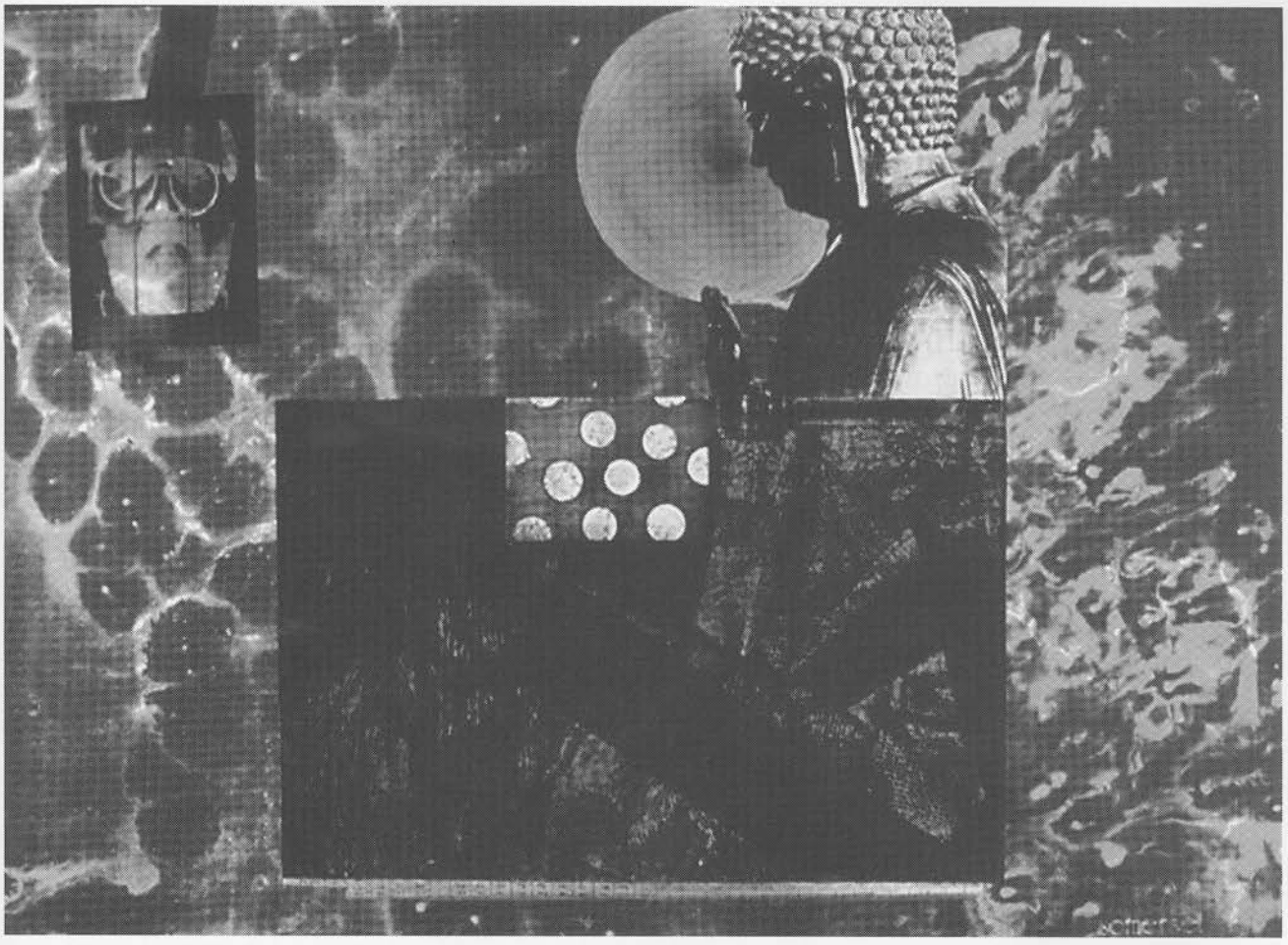


Fig. 3. Rita Robillard, *Almost Anything is Negotiable*, mixed-media screen print, 22 × 30 in, 1996, from *Votives for Cary* series. The series *Votives for Cary* is an ongoing project that the artist developed in response to media reports about the Hanford Nuclear Reservation in Washington state.

illusionism, we are annihilated by the corporate cyborg.

The goal of courses such as Introduction to Virtual Communities is to challenge this passive tendency. By raising ontological questions and by accessing tools to make creative works that rival the seamlessness of the commercial world, power relations begin to shift; and when we can distribute these works so that they are instantly accessible from any networked computer in the world, then we have indeed created an opportunity for artistic participation and communication that stands up to the corporate monopoly.

Axiology

Axiology is the study or theory of values. Each of us inhabits an axiologically informed worldview and ethos. In its most general sense, axiology addresses a range of questions concerning rightness, obligation, virtue, beauty/ugliness, truth(s) and holiness. In speaking of an axiological axis, we seek to bring attention to the ways in which values, both tacit and overt, come through in all of our attempts to understand selfhood and the world(s). What are the dominant values defined by electronic media? What kind of axiological analysis will articulate the basis for both informed resistance to and informed engagement with the new technologies?

An axiological analysis of the present should include consideration of concepts such as industrialism, industrial capitalism, globalism, militarism, patriarchal domination and anthropocentrism [13]. Here we want to say more about patriarchy and anthropocentrism, for they are fundamental to the functioning of industrialism and industrial capitalism, globalism and militarism. Patriarchy refers to gender hierarchy, which many would say is the first and most pervasive form of domination/subordination. In this discussion, we also use it to describe the hierarchy of privilege that operates all over the planet. In examining patriarchal systems, we are looking also at the ways in which privilege and power are determined by race, class, ethnicity and other differences. Within contemporary U.S. culture, hierarchy and privilege are maintained through direct violence against women and against men of color, through reassertion of cultural, gender and ethnic stereotypes and through the backlash against affirmative-action initiatives and diversity efforts in many academic and other institutions. While there is widespread rhetorical appreciation of diversity, oppressions based on difference still prevail in our social and cultural institutions. Increasing racism, conservatism and religious fundamentalism in this decade make continual analysis of patriarchal values all the more important.

Anthropocentrism is the ruling principle that governs most of our thought. We mean "our thought" in the most inclusive sense, for every culture in which religious monotheism and/or secular humanism play a role is based on anthropocentric doctrine and dogma. Even polytheistic or henotheistic systems such as Hinduism are based on giving the gods and goddesses a human face. Reality is interpreted in terms of human val-

ues and experience; "Man" is the measure of all things, as Leonardo's *Vitruvian Man* so vividly depicts. We have become convinced that we are entitled to everything—all of nature, all life forms, all the planet's resources. We ignore the fragility and finiteness of life, certain that everything should be used for personal gain and to fulfill the needs and desires of those with the most power. When taken to extremes, anthropocentric values lead nowhere, and are opposed to biocentrism and to a wider spiritual identification with all of life.

One of the works in Rita Robillard's print series *Votives for Cary* was born out of a question dealing with the consequences of anthropocentric values: What can we do with nuclear waste?

> *This topic grew out of my concern about my proximity to the Hanford Nuclear Reservation in Washington state. For several years after I moved to Pullman, the clock-radio awoke me with information so horrific that I finally had to create work that addressed it. I learned from the news media that a 45-year old holding tank that held radioactive chemicals was now leaking. There were no longer reliable records of this tank's contents and scientists feared that drilling into the tanks to analyze the contents would create sparks that might ignite them.* Votives for Cary *(Fig. 3) is my series of image-text pieces that present a few possibilities about how to deal with nuclear waste, discovered through my research on the suggestions of scientists and bureaucrats. The work uses computer-technology to collage historic and sacred images in a seductive form with ironic captions that display unthinkable hubris and fantasy. The series, as large screen prints, has been shown throughout Washington State and in San Francisco. Because dealing with radioactive waste is a world-wide issue, I plan to create an on-line project using the original electronic images. A title of one of the works,* Almost Anything is Negotiable, *is a quote from the local newspaper [14] about a salesman hired at a salary of $75,000 a year to sell nuclear fuel-rods to governors and Native American tribal-chiefs. He was quoted as saying "Almost anything is negotiable".*
>
> —Rita Robillard

Students born into the electronic era instinctively know that money and power are connected, although they may not have the analytical and critical skills to articulate this knowledge. In a course titled A Room of One's Own, students use computers not only to explore their potential for imaginative play but also to develop analytical skills around personal and cultural values. With electronic-imaging technology, students are able to create a playground or toy box for exploring their values, aspirations, dreams and fantasies, and to create simulations and artifice. They create a hypothetical autobiography including their date of death and death notice, with reflections and images on their "ideal life." Throughout this course they explore what is possible and what limitations exist, what they are responsible for and what satisfies them now. Other topics of the course include exploring life in outer space, in cyberspace and in other cultures. Students are especially encouraged to ask how they might play a significant role in their culture. The goal is to empower students to imagine themselves as part of the world and to understand the role that personal, social and political values can have on their lives. Such a course might be directly connected to internships in the community.

We use the title "Links" to identify another range of interdisciplinary classes that offer practical knowledge of the world. Among these might be a course on entrepreneurship, marketing and starting a small business. An introductory course in computer-programming languages offers examples of how students can create solutions to graphic problems. Students might study surveillance and robotics technologies, thus learning how to access environmental information on specific sites. For example, a course on "Technological Futurism" might address questions about the role of robotics in society and how technology might become a new avenue for understanding and responding to the natural world. History classes would address the role of artists in cultures by categories of artistic practice. History of the broadcast media is also an essential aspect of this new program. A class on how to be a research-navigator and information-evaluator would replace the traditional How to Use the Library course. While the specific content of such Links courses differs, each of them calls for developing integrated knowledge.

Many students have practical considerations in mind when they take electronic-imaging courses in a state-university art-program. Many of the students do not aspire to become fine artists by the end of their academic journey, but want to find their own place within the commercial matrix. As teachers, our strategies must include helping students augment their commercial aspirations by laying the groundwork for an art that is experiential, conceptual and performance-based: art that cannot be objectified, that cannot be bought or sold, that is interested in audience-participation, perhaps even in community interaction. The WWW fits these parameters, although it is not the only outlet for distributing student work. Cheap, large-scale color prints from plotters, photo-quality ink-jets and better designed video and multimedia programs suggest a variety of electronic forms of art. But only the WWW offers simple tools, cheap access, an unlimited audience and an evolving aesthetic richness in a completely non-objective forum. This is one place where an artist can be at home. Courses with an axiological focus specifically ask young artists to engage questions concerning core social and personal values.

DIFFUSION

Few of us feel intellectually prepared for the challenges of the epistemological, ontological and axiological analysis described here. It is not, however, impossible or impractical for artists to become active media-philosophers; this is indeed the direction that art education and creative work should take.

Let us embrace an art that has the courage to reveal both the complexity of life and life's unknowable qualities. Art functions as a way of holding together what is unknowable, in both our personal lives and society, with what we already know. It is a way of confronting irrational fears so that we can learn and go beyond them; it is a way of bringing forth aspects of ourselves with which social and political institutions may be uncomfortable. In short, art reveals what is hidden.

In the process of making art with physical materials, unconscious information—perhaps a deeper wisdom—surfaces, creating a transcendence of reality. In electronic imaging, with its controlled, conceptual reality, we can find ways of losing our personal, idiosyncratic selves and developing new awareness of what it means to be a self and to be a self in community. Think of the beauty of the trances when the Orisas (deities of the Yoruba religion) inhabit the body of the African/Brazilian Condomblé or Mocumba religious practitioners—could one have this experience through virtual reality (VR)? Would it nurture and

deepen one's knowledge and connection to life, as it appears to do for the participants of these practices?

Teachers and professors must design broad new art curricula to include multimedia-authoring systems that focus on the value of the arts in life and society. We believe that art education can strengthen students' abilities to express their unique vision and ideas. It can empower them to define themselves and their culture, creating an antidote to the increasingly homogenized corporate/media culture that pretends to take on life's ontological questions but is only interested in securing its own profit and power. Many of us sense the need to change traditional media-based art education, yet we are aware of the problems of separating techniques from ideas. Perhaps we can agree on a set of exploratory postures that will lead students through different media and towards an understanding of the inherent properties of each discipline. A corollary goal here is to encourage changing the role of the teacher/professor/artist to one of collaborator/facilitator.

We began this article with Mike Mandel's pessimistic dream about the future of art, but it should be clear now that we are passionate and optimistic advocates for the arts in contemporary culture. Artistic expression demonstrates truths, especially the truths of diversity, and multiple possibilities for seeing and grappling with the world around us. Visual languages must be given the same esteem as verbal literacy. Artistic disciplines require constant risk-taking, which develops confidence in dealing with the constantly changing world. Indeed, the courage to envision that world is one of the goals of this new art curriculum. Through the visual arts, and particularly through working with new electronic media, the new world of the future will be shaped.

Our conversations for this article have ended, but our musings about the issues addressed here have just begun. Institutional change does not occur simply. We have identified a series of problems and questions; our proposal must now find a larger audience among our colleagues. The twenty-first century is indeed upon us—it is time to respond to its call.

Acknowledgments

The authors especially wish to thank Margaret Sherve and an anonymous reader for their excellent editorial suggestions.

References and Notes

1. Lucy Lippard, "First Strike for Peace," in *Heresies* **20** (1985) pp. 12–15.

2. We have borrowed the notion of axes from Maggie Morse, although we interpret them quite differently than she does. See Margaret Morse, "Nature Morte: Landscape and Narrative in Virtual Environments," in *Immersed in Technology: Art and Virtual Environments*, Mary Anne Moser, ed. (Cambridge, MA: MIT Press, 1996) p. 201.

3. Theodore Roszak, *The Cult of Information: A Neo-Luddite Treatise on High-Tech, Artificial Intelligence, and the True Art of Thinking*, 2nd Ed. (Berkeley, CA: Univ. of California Press, 1994) p. 100.

4. As a philosophical perspective, empiricism claims that experience is the proper basis of knowledge, i.e. that all knowledge should be built on an experiential foundation. One might well ask, however, *whose* experience is deemed worthy as the source of knowledge, and *how* does power and privilege figure in this process? Comprehensive discussions of philosophers such as Bacon, Descartes and Locke, as well as discussions on empiricism in general, may be found in Paul Edwards, ed., *The Encyclopedia of Philosophy* (4 Vols.) (New York: Macmillan, 1967).

5. Mark Taylor and Esa Saarinen, "Speed," in *Imagologies: Media Philosophy* (New York: Routledge, 1994) p. 6.

6. Michael Heim, *The Metaphysics of Virtual Reality* (New York: Oxford, 1993) p. 157.

7. See Rozsak [3] and Heim [6]. See also Sherry Turkle, *Life on the Screen: Identity in the Age of the Internet* (New York: Simon and Schuster, 1995).

8. *Dr. Katz, Professional Therapist* is an animation created by Tom Snyder and Jonathan Katz, which is shown weekly on the Comedy Central cable television channel. Diane Arbus (1923–1971) created photographic portraits of unusual people who lived at the edges of society. She has had major retrospectives at the Museum of Modern Art in New York and the Venice Bienniale. Antonio Muntadas, born in Barcelona, has lived in New York since 1971. His work examines contemporary social, cultural and political issues. His recent piece, "The File Room," can be found on the WWW at <http://red.ntticc.or.jp/preevent/ic95/profile/muntadas-e.html>.

9. See Turkle [7].

10. Gene Youngblood, "The New Renaissance: Art, Science, and the Universal Machine" in *The Computer Revolution and the Arts*, Richard Loveless, ed. (Tampa, FL: Univ. of South Florida Press, 1989) pp. 8–20.

11. *The Turk and the Jew* can be seen on the WWW at: <http://www.wsu.edu:8080/~mikeman/>.

12. Gene Youngblood made this statement during a symposium, "Art/Technology/Culture," at Washington State University, 27 September 1996.

13. Kirkpatrick Sale has tried to offer such an axiological analysis of some of these values in *Rebels Against the Future: The Luddites and Their War on the Industrial Revolution, Lessons for the Machine Age* (Reading, MA: Addison-Wesley, 1995).

14. *Moscow-Pullman Daily News* (15 June 1988).

GLOSSARY

CGI—Common Gateway Interface. A server-side scripting language that generally handles form-processing on a server.

client-pull—a command within the META element of a web page that performs actions such as loading a new page automatically.

frames—a method of designing page layout with some HTML browsers. Individual frames contain different documents that make up the page.

image maps—images within a document with defined areas that link to other HTML documents.

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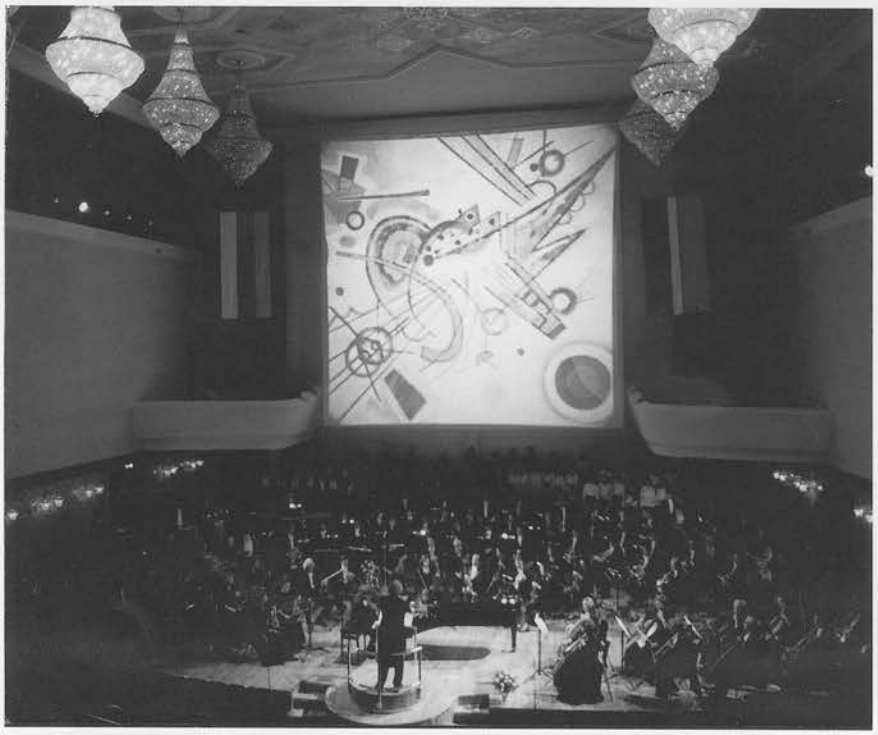
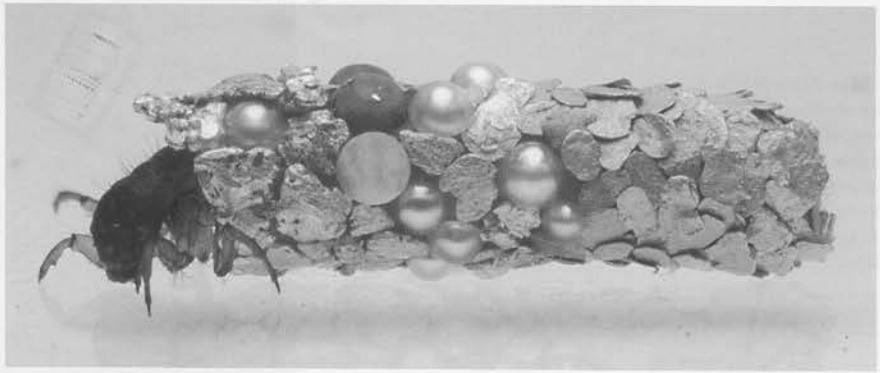
Color Plate A



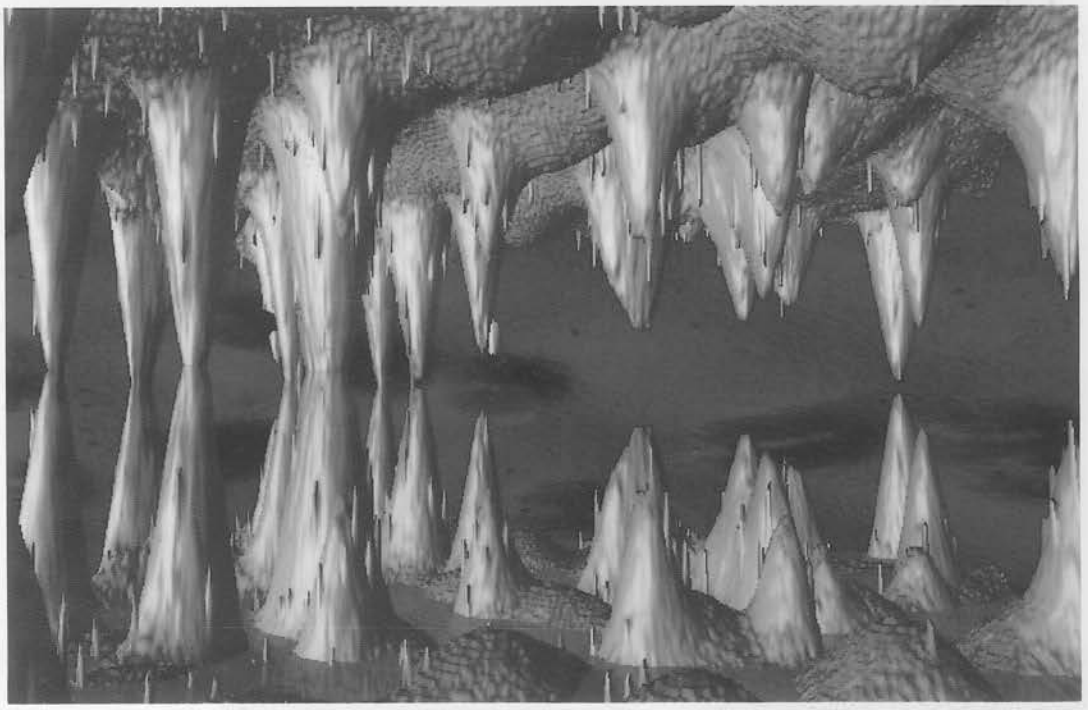
Color Plate A No. 1
Scene from the concert *Prometheus:* Scriabin + Kandinsky, 21 June 1996, Kazan, Russia. (See Artists' Statement by Vanechkina and Galeyev.)



Color Plate A No. 2
Hubert Duprat, aquatic caddis fly larva with case, gold, pearls, precious stones, 2–3 cm, 1980–1996. (Photo: H. Del Olmo) By removing caddis fly larvae from their natural habitat and providing them with precious materials—gold spangles, gems, jewels and tiny 18-karat gold rods—the artist prompts the larvae to manufacture cases that resemble jewelers' creations.

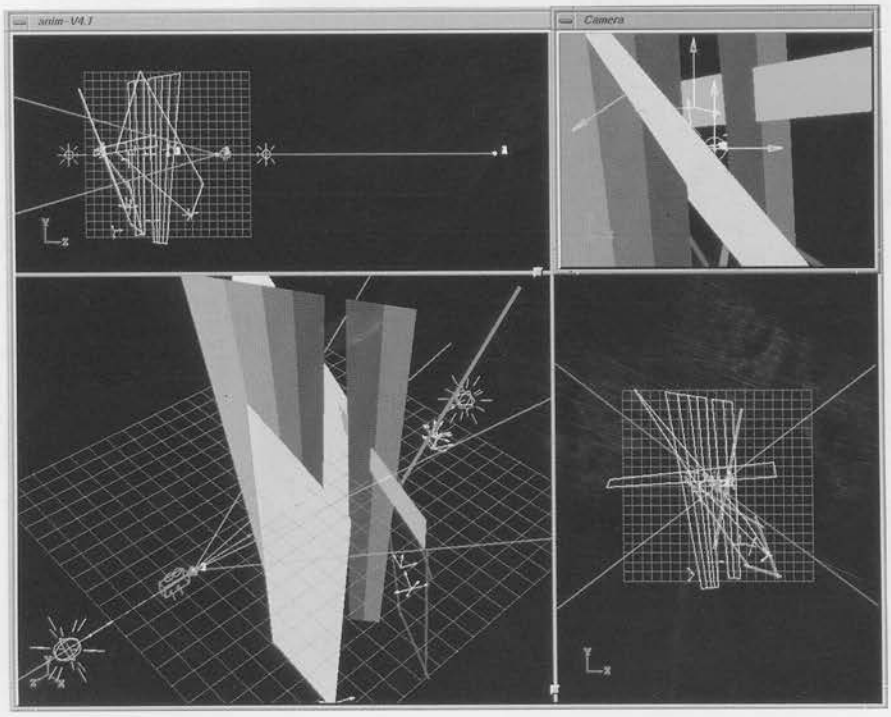
Color Plate A No. 3
Mike Mandel and Chantal Zakari, *The Turk and the Jew,* 1996, screen capture, <http://www.wsu.edu:8080/~mikeman/>. This website evolved during the period that Mandel and Zakari were conducting their relationship in cyberspace between Pullman, WA, and Chicago-Boston. (See General Article by Deborah Haynes, Mike Mandel and Rita Robillard.)

Color Plate B



Color Plate B No. 1
Clifford Pickover, virtual cavern produced by simple mathematical simulations and rendered with computer graphics. For an animated version of this cave, see <http://sprott.physics.wisc.edu/pickover/home.htm>.

Color Plate B No. 2
Lively Bodies Lively Machines, performance/digital arts workshop, Split Screen Festival, Chichester, England, 1996. Tessa Elliott's "Periodyssey" scene depicting screen/projection of flames in virtual space and actual body forms captured by digital camera and encoded in computer memory. (See Artist's Article by Johannes Birringer.)



Color Plate B No. 3
From the *Animato* project, written and directed by Gottfried Jäger and Karl Martin Holzhauser, 1995. The computer screen is divided into four sections. The top left and bottom right areas show the geometric elements as wireframes only. The top right and bottom left areas show the constructive elements filled in (solid, with color), and the bottom left image also includes the virtual camera and studio lights. (See Artist's Note by Gottfried Jäger.)