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EMERGENT DISCIPLINES AND CULTURAL DIVISIONS:
MELVIN KRANZBERG'S "LAWS OF TECHNOLOGY" AND NEW HUMANITIES

by

MATTHEW SANBURY

Under the Direction of Lynée Lewis Gaillet

ABSTRACT

Dating back to the dialectic between Socrates and Plato, innovative technologies have disrupted the traditions of discourse and created cultural divisions relevant to composition studies. These conversations are echoed in the Twentieth Century through the work of Melvin Kranzberg. Looking to the future, he sought to record the history of technology to maintain the constant upsurge of innovation. Like Kranzberg's history of technology, the field of rhetoric and composition and this thesis seek to define technology and understand its value in order to navigate and interrogate effectively the deluge of twenty-first-century new media. Kranzberg—like many scholars in computers and composition—utilized various rhetorics to advocate for technological literacy despite its unpopularity in the academy.

INDEX WORDS: Technological literacy, Digital humanities, New humanities, Computers and Composition, Innovation, Pedagogy, Rhetoric, Twentieth Century

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I would like to thank Lynée Lewis Gaillet for teaching me the ways of archival research and inductive discovery via primary research methods. Thank you for introducing me to the serendipitous world of August mushroom hunts!

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1 INTRODUCTION

Composition historians live by necessity in a polemical universe of discourse. Since our discipline has a unique genesis—having been created to solve a social problem and not by the evolution of a body of knowledge—we are forced to make judgments and take sides in everything we write.

—Robert Connors, *The Politics of Historiography*

An alternative position would entail the appropriation and redefinition of texts currently “held” by other disciplines, which, despite their names, concern rhetorical issues. . . . As daring usurper (rather than marginalized hoarder), rhetoric could step into its role as meta-discipline and create opportunities for dialogue among historians, critics, and theorists across several disciplines.

—Susan C. Jarrat, *The Politics of Historiography*

The Present State of Scholarship in the History of Rhetoric, edited by Lynée Lewis Gaillet and Winifred Bryan Horner, indicates a gap in the history of rhetoric and technology. The field needs more scholarship: in “The Twentieth and Twenty-First Centuries,” Krista Ratcliffe argues that “rhetoric and technology have transformed each other. . . . [T]wo corollary questions inform rhetoric scholarship: what is technology, and what is its value?” (207). Melvin Kranzberg’s texts, published and archived alike, answer Ratcliffe’s call. He was longtime editor of *Technology and Culture*, a founding member of the Society for the History of Technology, and Callaway Professor Emeritus of the History of Technology at the Georgia Institute of Technology. His theories, papers, pedagogy, and work in the twentieth century provide praxis in technological literacy and historiography that helps answer Ratcliffe’s questions about the definition and value of technology and respond to Gaillet and Horner’s call for historical, rhetorical scholarship.

In “The Politics of Historiography,” James Berlin argues that “there must be multiple histories of rhetoric, each identifying its unique standing place—its ground for seeing—and the terrain made available from this perspective” (Octalog 6). Robert

Connors adds: “Meaningful historical writing must teach us what people in the past have wanted from literacy so that we may come to understand what we want” (7). In “An Argument for Archival Research Methods: Thinking Beyond Methodology,” Barbara E. L’Eplattenier posits that “[h]istorians are a small group within rhetoric and composition and tend to research a wide range of periods and rhetorical activities” (68). Viewed using these combined lenses of Berlin and L’Eplattenier, Kranzberg’s theoretical discourse and rhetorical artifacts begin to fill gaps in our knowledge of twentieth-century technological rhetoric and historiographical pedagogy.

Our philosophical and theoretical arguments grant us the credibility, expertise, and awareness of our own biases to explore the rhetorical activity and impact not only of the classical rhetors, the Scottish rhetor/philosophers, and the polis, but also of women’s groups, African American groups, labor groups, and religious groups, as well as various sites of literacy, civic discourse, and propaganda. This gives us a rich, multidisciplinary, multifaceted body of history. (69)

In Kranzberg’s personal papers at Georgia Tech, there are several archival boxes dedicated solely to his courses. Ephemera from the class “Introduction to Humanities, Man and Nature” are especially relevant to new media scholars and composition historians. New technologies and pedagogies constantly replace or integrate with current ones, and the process yields discourse relevant to rhetorical studies.

Methodology and Purpose of Study

Kranzberg’s texts and lectures about technology and the new humanities tell a rhetorical tale about the impetus of the history of technology and new humanities as emergent,

thus culturally divisive, fields of academic study. Nan Johnson's guiding question assists with the exploration of archival materials: "what does this everyday artifact tell us about how rhetorical genres and values are put in place and upheld?" (299). Kranzberg's lecture notes indicate that many in the older generation fear technological advance because it "suggests unemployment because of the experience of the 30s when it was felt that machines forced men out of jobs." These are the rhetorical beginnings of the history of technology and new humanities. Emergent disciplines are comparable to innovative technologies because they both problematize extant rhetorical situations and ongoing academic conversations.

Archival pieces often focus on either materiality or availability. In "(Per)forming Archival Research Methodologies," Lynée Lewis Gaillet states, "[a]rchives are now viewed as primary sources for creating knowledge rather than mere storehouses for finding what is already known" (39). According to archival theorist Wolfgang Ernst, "the testimonial function of archival records was once firmly rooted in their material authenticity. The same holds in media-art archives with respect to originals" (88). Researchers in the field of media archaeology, for example, value archival materials for their originality. Other scholars, like those in new media studies and digital humanities, value archives for accessibility of primary sources, and digital archives create completely new strata of availability by remediating and making available artifacts that would be inaccessible beyond a site visit to a repository.

If we extend archival methodology beyond these typical discussions, it is possible to utilize the archives as a heuristic for writing and research. Making meaning from primary resources is generally an inductive process, and experts in the field indicate

that archival discoveries often lead to other studies and topics. During a webinar series hosted by Rhetoric Society of America, Jordynn Jack encourages researchers to dismiss the traditional view of archives as only repositories of information and update their definition to reconsider the archive. She says, “we are thinking about approaching archives as an inventional resource for our work.” Even digital storage and dynamic presentation media offer writing-researchers invention heuristics and inductive discovery processes that aid their work. Like Johnson posits in her autobiographical chapter of *Working in the Archives*, collecting is thinking; thinking is collecting (295). Navigating the seemingly endless boxes and organizing countless data are processes made simpler by employing inductive reasoning; the consequence of these primary research processes is new meaning discovered and channeled through the archive. To explicate this point, I offer a narrative of what Robert Connors would call “something like [my first] August mushroom hunt” (“Dreams and Play” 23).

During my first site visit to the Georgia Tech archives, I used scanning software to collect archival documents and primary materials. With the archivists’ permission and my smart phone in hand, I scanned and thereby remediated over a hundred pages of content. I felt like a child sneaking into my grandparents’ forbidden trunk in the attic. With white gloves and pencil in hand, I retrieved the first box, suddenly feeling the weight of another’s intellectual property and a newfound need for the ethical treatment of his papers. Long had I stood on the shoulders of scholars before me; never had I searched through their rough drafts and epistemic writings to make new meaning.

Johnson compares “the archival process to an inexplicable dance between what we go to find and what is there to recognize” (292). I went to Georgia Tech to find

twentieth-century narratives about technology, innovations, and emergent media, but I found much more: Kranzberg advocated for the history of technology as a field of study, calling future scholarly composition and discussion about man's technological endeavors "the new humanities" (Georgia Tech Archives, MS157, Series 1, Box 1).

This thesis is an archival exploration of Kranzberg's theories about technology, its literacies, and the cultural divisions associated with its emergent disciplines; using archival methodology, my goal is to extend the definition of technology and explore its value for rhetoric and composition as well as its subfield, computers and composition, by situating Kranzberg's work as a foundation for the new—if not digital—humanities.

2 MELVIN KRANZBERG'S PERSONAL AND ACADEMIC BIOGRAPHY

The interrelationship of society and technology is of two kinds: one is the sociological situation that gives rise to invention and discovery and their use by society; the other [represents] the effects upon society of the uses of invention and discovery.

—Melvin Kranzberg, "Lecture Notes"

In 1917 Melvin Kranzberg was born to a prominent businessman in St. Louis. Known in some circles as a "romantic, passionate ladies' man," he married four times (Segal). His first two marriages ended in divorce, and his third wife died of cancer; he remarried in 1984. Kranzberg attended Amherst College for history and economics. For both graduate degrees, he studied at Harvard University, finishing the PhD program in modern European history in 1942. Before temporarily working for Harvard, however, Kranzberg served in the Signal Corps and infantry during World War II (Segal). He was a founding member of the Society for the History of Technology, the initial editor of *Technology and Culture*, Callaway Professor Emeritus of the History of Technology at the Georgia Institute of Technology, and the progenitor of an academic discipline: history of technology. By engaging rhetorically with various communities as well as academic and governmental authorities, Kranzberg increased technological literacy in the twentieth century throughout his prolific career.

An acclaimed public speaker and thoughtful correspondent, the multiple archives containing his papers from Washington, DC to Atlanta, GA are bursting with memos, lecture notes, letters, articles, and other correspondence. All biographical essays and articles commemorating his life refer to his unique personality: "Any introduction of Mel Kranzberg, the consummate after-dinner speaker and raconteur, can appropriately begin with that disclaimer he must have heard on many occasions—that he, indeed,

needs no introduction.” In her appreciation of Kranzberg in their text, *In Context: History and the History of Technology: Essays in Honor of Melvin Kranzberg*, his longtime colleague and collaborator, Carroll W. Pursell, Jr. adds “his scholarship; his frequent speaking engagements; his founding of institutions; his service on innumerable . . . [committees], by the very energy, enthusiasm, and generosity of his character, he has done more than any other person to nurture and shape the field here and abroad” (21). Kranzberg and Pursell’s *Technology in Western Civilization* “served as a core text in the history of technology for a generation of students” (ii). He received multiple prestigious awards such as an NASTS Honorary Lifetime Membership, the Bernal Prize, and the Leonardo da Vinci Medal. His numerous refereed publications continue technological conversations even into the twenty-first century as new scholars and historians interact with Kranzberg’s rhetorics.

Kranzberg joined the Case Institute of Technology in Cleveland (now Case Western Reserve University) in 1952 to implement “a better-designed liberal-arts component to the curriculum of its engineering students” (Ceruzzi 658). During his time there, he chaired the first history of technology graduate program in the United States. The program was interdisciplinary by nature, seeking to connect some of the disparate fields within the sciences and humanities. As a pedagogue Kranzberg crafted “courses [that] asked otherwise historically indifferent future engineers to examine the reciprocal relationship between technology and culture in Western civilization. That in turn interested them in literature, economics, politics, philosophy, and other disciplines” (Segal). He was the principal founder of the Society for the History of Technology (SHOT), serving as the first editor of its journal, *Technology & Culture*, as secretary of

the organization from 1959–1979, and as president from 1983–1984. Rhetorical communication was part of his everyday life. For example during his time as SHOT secretary, all participants who presented an essay at the society’s annual meeting received a letter from Kranzberg that requested “the name and address of the appropriate dean. . . . Mel took the time to write to each, praising the scholarly contribution and congratulating the dean on his or her fine faculty” (Pursell 22). He understood the importance of discourse to a developing academic field. By sending these letters, Kranzberg endorsed the participant, the emerging field, and the appropriate dean’s college, all while furthering the conversation about history of technology. Ever aware of his audience and purpose, he was clearly a dedicated professional and an exuberant rhetor.

Making history by embracing technology in the realm of historiography, Kranzberg penned the initial pages of *Technology & Culture* in 1959 to introduce and defend the impetus of the history of technology; the resulting article, “At the Start,” discusses the field and journal’s audience, purpose, and appeals:

Indeed, the development of technology and its relations with society and culture are such broad subjects that our new Society and its publication must be interdisciplinary in scope. We are concerned not only with the history of technological devices and processes, but also with the relations of technology to science, politics, social change, economics, and the arts and humanities. . . . The interdisciplinary nature of our subject matter inevitably dictates the form and scope of our journal. It accounts also for our audience. We intend to appeal to the engineer, to the social scientist,

to the scientist, to the humanist—to the academic scholar as well as to the intelligent layman. (1–2)

The field's purpose is to gather various perspectives to promote a more inclusive and extensive historical narrative for its admittedly diverse audience. His 1962 essay in *Science*, “The Newest History: Science and Technology,” also continued the conversation in print. These initial talks focus on the changing nature of history and various disciplines that inform the history of technology.

Another continuation of the twentieth-century technology discussion, *Dimensions for Exploration* is an archival pamphlet Kranzberg composed in the early 1960s for what he would have called the “State University College Oswego, New York.” *Dimensions for Exploration*, subtitled “Technology and Culture,” is “one of a series of publications designed to explore the contribution of education to the study of [humanity] and technology” (i). In it he establishes technology's role with humanity as well as the cultural interplay between science, technology, and society:

Despite the role of technology in the panorama of human history, we frequently come up against those people who regard technology as something divorced from the essence of humanity. The humanists ask us: What is human about a monkey wrench, a lathe, a computer? What repels them about technology is the very “inhumanity” of its objects, for example, the monster automatons which it has created and which threaten to make men expendable here on earth. (5)

The mid-twentieth century's rhetorical situation involved a great deal of skepticism regarding technology's role in society. Kranzberg considers the multiple voices in this

interdisciplinary conversation; his papers indicate that he maintained constant correspondence with members of various disciplines and departments in order to supply his audiences with a multifaceted approach to technological historiography. His writings about technology often employ fictional and even spiritual metaphors. Referring to angels, demons, futuristic robots, and monster automatons, his work creates a connection, especially to the skeptics, with its audience by exploiting “technophobic responses”¹ (Murray 8) that were culturally commonplace throughout the twentieth century.

In 1963 Kranzberg’s collaborator and coauthor, Pursell, became a member of the Case faculty: “Kranzberg and Pursell laid a foundation upon which historians of technology have subsequently built” (Ceruzzi 659). Also around 1963, the United States Armed Forces Institute (USAFI) contacted Kranzberg. The head of its Instruction Division, Ripley Sims, indicated an interest in colleges and universities offering historical courses about technology.

Kranzberg responded in his usual enthusiastic fashion with a detailed letter, and out of this exchange of correspondence there grew an agreement that historians and social scientists would develop a two-semester, freshman-level course. . . . [T]he project ultimately transformed itself from a freshman syllabus into the two large volumes published in 1967. (660)

Using their available means, Kranzberg and Pursell built the 1967 text, *Technology in Western Civilization*, to form curricula as charged by the university and the USAFI

Instruction Division, ultimately recognizing the rhetorical need for the history of technology and establishing its credibility via academic and governmental authorities.

Kranzberg continued to create academic interest and build the discipline in 1967 and 1968 by publishing his complementary articles in *American Scientist*; they are published versions of his 1966 and 1967 Sigma Xi—RESA National Lectures: “The Unity of Science-Technology” and “The Disunity of Science-Technology.” In his exploration of unity, Kranzberg utilizes relationship metaphors to explicate his point: “History suggests that science and technology, though wedded today, went through a long, indifferent courtship.” He goes on to call it a marriage of convenience that did not culminate in happily ever after. Placing “[r]un-away metaphors aside,” he writes, “I want it thoroughly understood that we historians otherwise have orderly minds. We really think everything has a beginning, middle, and an end in some careful context of our own devising. This gives us what is called perspective” (48). According to Kranzberg history is a social construction or collective narrative told by more than one type of voice and from more than one field of expertise.

His piece on disunity breaks out of the marriage metaphor entirely. “The Disunity of Science-Technology” has an emancipatory purpose. Science should be free, “which means not controlled by men or society other than the scientists themselves. Technology, on the other hand, is subject to limitations, many of them economic or social, which are imposed by other than the technologists themselves” (21). Recalling Galileo’s plight and other governmental restrictions on science, Kranzberg uses his essay as a platform to deliver a warning and render “a picture of the American people themselves in the aspect of their demands upon science and technology, and the work

of the scientists and technologists in response to those demands” (33). Both texts close with a call to members of this newly formed field to record the metamorphosis of unity and disunity throughout science and technology.

He relocated to the Georgia Institute of Technology to be the Callaway Chair for the History of Technology in 1972, remaining at the post until his retirement in 1988; Kranzberg was seventy at the time. Similar to his work at the Case Institute, “[a]t Georgia Tech Mel helped transform the Department of Social Sciences, a small service unit that included undergraduate courses in the history of technology, into a School of History, Technology, and Society that offered both an undergraduate major and a graduate program” (Segal). Author or editor of eleven books as well as countless articles, papers, and speeches, he was a clever rhetor, known for his sense of humor and sociable personality, who organized his lecture notes as effectively as his prose. One of his lecture modules from a 1978 seminar entitled “Machine-Made America: Technology and Democratic Ideals,” offers discourse regarding the collaborative future of the humanities:

This is the new humanities—the humanistic study of science [including technology] through its history, its cultural contacts, its humane aspects. Instead of an antiquarian view of science, this will transform the subject for scientists and non-scientists alike from dead description of natural events and a lifeless abstraction of theories into a living subject made by man that is a part of human culture. (GA Tech, MS157, Series 1, Box 1)

As a twentieth-century historian, Kranzberg approaches writing through its historical application instead of rhetorical theory. He notes the need to change the traditional

delivery of the sciences from ineffective “dead” descriptions and theoretical abstractions to include aspects of humanity. Audience analysis is an important consideration of his work because he constantly had to persuade engineering students that studying the humanities is a valid and worthwhile experience.

For the fact is that the academic world has lagged behind popular opinion in its appreciation of the role of technology and of the demands . . . it makes upon human skills and creativity. Until relatively recent times the world of scholarship has concentrated its attention upon the humanities, particularly the classics. The ivory-towered life of contemplation, stressed by ancient philosophers, seems incompatible with the study of contemporary changes in society, especially those concerned with the feared, and often hated, technology. (*Dimensions for Exploration* 11–12)

By focusing the scholarly discussion on the intersection of humanity and technology, he helped legitimize his own field by encouraging a sense of community between the disciplines. While he is not directly responsible for the digital humanities, Kranzberg initiated conversations about technology and provided a model for technological historiography years before scholars began considering the ramifications of computers in composition studies.

The digital humanities do not, yet, constitute a separate academic field, but they are a collective of ideas more effectively defined as a movement: “a small subset of humanities scholars have been actively engaged in working with computer technology for over twenty years. . . . Their efforts often concentrated on archiving, digitizing, and preserving the human record” (McPherson 119). With the advent and promise of Web

2.0 came a new participatory culture that includes digital humanities scholars and their academic interests. As recently as 2008, the NEH changed the Digital Humanities Initiative to the Office of Digital Humanities (ODH); its website informs, “digital technology has changed our world. The ways we read, write, learn, communicate, and play have fundamentally changed due to the advent of networked digital technologies.” Despite the continued concern about new media and innovative technology echoed throughout the past century, writing researchers and pedagogues across the disciplines rely on computer technology for word processing, editing, archiving, presenting, and educating: “changes are being addressed in fascinating ways by scholars from across the humanities, often working in collaboration with scientists, librarians, museum staff, and members of the public.” Kranzberg’s new humanities and the digital humanities constitute two facets of the same rhetorical situation: “To best tackle the broad, interdisciplinary questions that arise when studying digital technology, ODH works closely with the scholarly community and with other funding agencies in the United States and abroad, to encourage collaboration across national and disciplinary boundaries” (“About the Office of Digital Humanities”). Kranzberg advocated for the legitimacy of technology within the humanities much like the ODH now promotes the legitimacy of digital technology from within the same group. The history of technology united technologists with the humanities; the digital humanities movement unites humanists with technology.

Kranzberg’s new humanities—studying technology through humanitarian aspects and cultural contacts—are no different than our digital humanities. Modern scholars in English studies endeavor to explore the humanities via digital media. “Cynthia Selfe in

an *ADE Bulletin* from 1988 reminds us, computers have been part of our disciplinary lives for well over two decades now. . . ; digital humanities has accumulated a robust professional apparatus that is probably more rooted in English than any other department” (Kirschenbaum 1). Effectively defining digital humanities is as problematic as thoroughly defining the Internet, but roughly digital humanities is an interdisciplinary approach, methodology, pedagogy, or inquiry process that focuses on computer technology in the various disciplines of the humanities. Kranzberg would be proud of such endeavors. Just as he encouraged young engineers to consider how technology contributes to Western civilization and the humanities, scholars in the digital humanities study how their media and technology affect the disciplines and what may be contributed to the scholarly understanding of new media and digital technology.

“What is Technology?” is a lecture appearing in several iterations in Kranzberg’s papers; he gave, revised, and saved it year after year. In the talk he considers humanistic factors in technology, calling humanity’s technological genius and creative endeavors “the new humanities” (Georgia Tech Archives, MS157, Series 1, Box 1). A celebrated professor, historian, writer, and rhetor, he referred to science and technology as being angelic and demonic forces concurrently in humanity’s existence and spent his career writing about and advocating for technology and its academic future. He employed rhetorical strategies to organize, construct, and maintain the emerging field, history of technology.

In past decades, historians of rhetoric have taken as their materials for the most part texts explicitly calling themselves “rhetorics.” They . . . are not titles “owned” by other disciplines. Aristotle’s *Rhetoric*, for example,

becomes a primary text not only because it establishes a discipline by naming it, but because it is generally ignored by other disciplines—classics, philosophy, literary theory. The primary historiographical trope at work here is the rediscovery and possession of forgotten treasures. . . . As daring usurper (rather than marginalized hoarder), rhetoric could step into its role as meta-discipline and create opportunities for dialogue among historians, critics, and theorists across several disciplines. (Jarratt 9)

Understood in Jarratt's terms, Kranzberg's archival rhetorics provide theories about technology usage as well as the application of interdisciplinarity in the rhetorical assembly and deployment of emerging disciplines like history of technology. Innovative technologies and emergent disciplines are inherently divisive, and members of these communities seek interdisciplinary support from one another to traverse the resulting intense environments and paradigm shifts within academe.

History of technology, rhetoric and composition, feminist rhetoric, as well as computers and composition all represent fields recently established as formal academic disciplines. Digital humanities and new media studies, like their forebears, continue to create ideological divisions between disciplines and departments. Emergent technology, new media, and technological innovation create technophobic responses as well as sociocultural divisions, like the so-called digital divide, that often lead to false dichotomies; technology—and its fields of study—historically causes generational divides, and even apartheid as Prensky argues, as far back as Socrates and Plato's disagreement about written discourse. Traditionalists fear the future, and the past threatens the more progressive members of society. Kranzberg's compositions echo

these sentiments by referring to science and technology as both angelic and demonic forces in human existence (Georgia Tech Archives, MS157, Series 1, Box 1).

Pedagogues of the twentieth and twenty-first centuries repeat the apprehensions of Socrates and Plato's own time period, and the debate about societal integration of technology continues: "Individuals form beliefs about their use of information technologies within a broad milieu of influences emanating from the individual, institutional, and social contexts in which they interact with IT (Informational Technology)" (Lewis 657). In a world of self-updating computers and voice-activated cellular phones, it is difficult to imagine life without technology, but society has done so since at least the advent of the printing press. During the sixteenth century, scribes could not conceive of a world without need of their services, and people feared that those who controlled the presses might manipulate printed materials for sophistic ends: "indeed it was frequently accused of disseminating fictions and falsehoods." Venetian judge Filippo di Strata, "an early sixteenth-century Italian critic of new technology, declared, "*Est virgo hec penna, meretrix est stampificata*" 'The pen is a virgin, the printing press a whore' (Bilton 53). Despite historical resistance to emergent media and technologies even within academe, computers and composition became a recognized field and area of specialization within rhetoric and composition.

Plato first used the word "rhetoric" in his dialogue, *Gorgias*, and Aristotle coined the term "technology" in his treatise, *On Rhetoric*. These men were radical in terms of technological innovation because they collected and disseminated data via writing as opposed to the oral tradition. In *The Present State of Scholarship in the History of Rhetoric*, Ratcliffe reflects on the intersection of Plato and Aristotle's terminology:

Rhetoric and technology have transformed each other, an idea posited in Christina Haas's *Writing Technology* and contextualized in Carolyn Miller's "Learning from History." On the one hand, technology has transformed rhetoric studies as well as composition pedagogy in terms of online databases and wireless classrooms, and in terms of the way people think, analyze, research, and compose. (207)

Kranzberg's technological rhetorics were radically persuasive and transformative; they assisted with the formation of the history of technology and considered humanistic factors in technology years before the advent of digital humanities and new media studies. In a memo to his colleagues in 1978, he writes that The Office of Science and Technology Policy wanted "his comments on their proposed interagency study of industrial innovation. . . . All of us have some ideas about what the federal government should be doing about industrial innovation, and here is the opportunity to contribute our bit to the formulation of science policy at the highest level of the government ("Request for comments on Definition of Issues"). Even his correspondence with—and on behalf of—the government shows his dedication to the academy.

By 1991 Kranzberg's laws of technology were commonplace, and he was a leading expert of technological historiography. Just four years before his passing, he published "Science-Technology-Society: It's as Simple as XYZ!" in *Theory Into Practice*. In it he claims that humankind would not have survived without technology: "The lion was stronger, the horse was faster, the giraffe could reach higher; but tools served as extensions of human hands and amplifiers of muscle power, enabling humans to adjust to an almost infinite number of operations in virtually any environment" (234). In an

effort to explain his title, Kranzberg writes that one needs “the entire ‘alphabet’ of social and human capabilities” to consider interactions among science, technology, and society. He encourages his audience to consider humanity’s connections to its technology.

My humanist friends ask: What is human about a monkey wrench, a lathe, a computer? The characteristic of technology that repels them is what they term the “inhumanity” of technology’s objects, for example, the industrial robots that they fear will make human beings expendable, or the ‘anti-humanity’ of technology’s byproducts, such as the pollution that threatens our environment. In brief, they regard technology as something mechanical. (236)

Kranzberg suggests that machines are not so removed from humankind: “all technical processes and products are the result of the human creative imagination and human skills, hands and mind working together. Behind every machine I see a face, indeed, many faces” (236). By offering a humanistic view of technology, Kranzberg encourages his hostile readers to think beyond their reactions and build literacies necessary for the changing times.

Kranzberg offers interesting connections between technology and literacy. The nineteenth century required many citizens to become literate, an even though the printing press had been around for four centuries already, “books were expensive and literacy remained limited to a small, elite group. Technology gave people an incentive to learn reading and writing because more complex production methods required larger numbers to become educated.” Literacy and technology share a complex history dating

back to antiquity; each has influenced the other in interesting ways for thousands of years. “But most important was technology’s indirect contribution to the spread of literacy by making it possible for the public to have the time and means to become educated” (237). Only two centuries later, it is possible to apply the same theories to the Internet: digital media gives people incentives to increase their technological literacies because modern jobs increasingly demand effective reading and persuasive writing in digital environments.

Serving on committees and keeping an office until the end, Kranzberg passed in 1995. At the next SHOT gathering in 1997, the presidential address commemorated the group’s former leader: “This is the first meeting of the Society for the History of Technology that Mel Kranzberg has not attended. Those of us privileged to know him mourn his passing and roam the halls of this splendid meeting painfully aware of his absence. As an organization, we are clearly the house that Mel built” (Roland 697). Using speech, composition, and other available technologies, Kranzberg constructed one field, the history of technology, while influencing future conversations in another, the digital humanities. Implementing Kranzberg, Selfe, and Hawisher’s interdisciplinary approaches, scholars can make meaning by analyzing the connections between the twentieth-century new humanities and twenty-first-century digital humanities.

3 PEDAGOGY, RHETORICAL THEORY, AND TECHNOLOGICAL LITERACY

One of the things I'd want all English teachers to understand right now is the link between technology and literacy. The importance of technological literacy in an increasingly technological culture is absolutely essential, basic information. I really believe . . . that people are identifying the new cultural codes that will really shape our culture, our society, and ultimately our world in the next century.

—Cynthia L. Selfe, *Issues in Writing*

In the twentieth century, Melvin Kranzberg, charged by his government and professional conviction, set out to fill the gap in technological historiography, but many of his audiences were understandably resistant to changing paradigms and perceptions. These pressures were just as intense inside his classrooms (Georgia Tech Archives, MS157, Series 1, Box 1). As an educator in turbulent times, he had to persuade his engineering students regarding the worth of exploring humanistic concerns of and cultural connections with technology much like modern English educators who must defend the use of technology in humanities classrooms. As an early technological pedagogue and the first editor of *Technology and Culture*, he—and many other scholars of history of technology—ensured that the emerging field had its own Burkean parlor, a place for cultural exchange, meaning-making, and collaboration.

Despite its subject matter, every academic field depends on rhetoric, writing, and publication to survive. The twenty-first century has already provided scholars with similar applications in rhetoric and composition as well as computers and composition: “The primary reason for starting Computers and Composition Press and the main reason we kept the journal (*Computers and Composition*) going was that there were no vehicles to get published when you were talking about technology in English studies, very few anyways.” Gail E. Hawisher and Cynthia L. Selfe are comparable to Kranzberg

in that they are also founding editors of scholarly publications that answered the rhetorical calls of their developing academic disciplines: “We just didn’t want to wait, and we didn’t feel that others should have to either. So we started the series and kept up the journal to provide room for ourselves and other voices to join in the discussion that we found very intriguing and to constitute a field, a self-organizing organism as we saw it” (“Technological Literacy and the Humanities”). In the twentieth and twenty-first centuries, *Technology and Culture* as well as *Computers and Composition* have generated conversations that maintain and complicate their emergent disciplines. These journals continue to define technology and its value, thereby answering Rafcliffe’s questions and calls for scholarship in *The Present State of Scholarship in the History of Rhetoric*. Kranzberg convinced his audiences to apply the humanities to technology, just as Selfe and Hawisher persuade us to apply technology to the humanities—these are the new humanities.

Kranzberg’s Pedagogy

Intermixed with course files and lecture notes, there is a typed quotation in Kranzberg’s papers from Sir Eric Ashby’s 1959 *Technology and the Academics*: “Technology is inseparable from men and communities. . . . Unlike science, technology concerns the applications of science to the needs of man and society. Therefore technology is inseparable from humanism” (82). In his marginalia and lectures, Kranzberg quotes Ashby countless times throughout the archive. These words undoubtedly informed Kranzberg’s pedagogy for over three decades.

A 1978 version of his lecture, “What is Technology,” reveals a sample of topics typical to Kranzberg’s introductory courses. It was necessary for participants to build

technological vocabularies and literacies. The first section indicates that technology is “know-how . . . [and] more than labs, it is social.” Section two, entitled “Why study it,” discusses technology’s relation to society, especially students of engineering and science. “Impact of Technology on Society” or section three asks students to think of the earliest tools and know-how that enabled early humankind to survive. Section four considers the reverse of the previous: “Impact of Society on Technology.” Here he teaches that societal and cultural factors control or at least guide technological innovation. “Present society fosters science and technology . . . [with] great faith in moving mountains. [Are] technology and science creators of human happiness? Man’s creative endeavors [are] the new humanities” (Georgia Tech Archives, MS157, Series 1, Box 1). Such interdisciplinary examinations of science, technology, history, and the humanities were common to his speeches and classes. Like Selfe and Hawisher—who “were particularly interested in women and women’s voices since [the editors] both have some feminist leanings”—Kranzberg understood the importance of interdisciplinarity to a field under development.

Part of his pedagogy involved reflection on the purpose and scope of his courses. He taught that one guaranteed purpose of any education is to help humanity understand its environment: “What are things like—and how did they get that way?” Kranzberg wanted students to make interdisciplinary connections with course content to contextualize their experiences with technology. “It is strange that the social sciences are often treated as if they have no concern with technology. . . . Similarly, teachers in tech schools instruct students in how to make this and construct that; and though these fabrications are to be used by society and have an effect upon social life, such matters

appear to be of no concern to technologists” (GA Tech, MS157, Series 1, Box 1).

Decades later Selfe provides a similar argument in an *Issues in Writing* interview; she says that humanity should be of primary concern with technology as secondary:

At your school, every single technology committee should have a humanist on it. That humanist’s job should be to think about students and what technology and the decisions surrounding it mean for students, for teachers, for the real people in their actual material conditions in the school and in the institution as a whole.” (“Technological Literacy and the Humanities”)

Clearly Kranzberg’s *Technology and Culture* serves history of technology by ensuring that technologists consider humanistic and cultural factors in technology; similarly Selfe and Hawisher’s *Computers and Composition* serves rhetoric and composition by positioning humankind above technology: “It is as if there were a great wall separating technology and sociology. One of the objects of this course is to break down this artificial wall which has been erected and tends to separate two disciplines that are inherently closely interwoven” (Georgia Tech Archives, MS157, Series 1, Box 1).

Through experience Kranzberg prepared lessons and lectures fully aware of the cultural milieu and possible hostilities of incoming students.

Often his pedagogy involved challenging disciplinary barriers as well as traditional historiography; his assignment, the state-of-the-field essay, is an example. Step one involves problems or questions: “History is a way of thinking about things.” The second step is about the bibliography, requiring students to use primary and secondary sources. Step three is titled “Historiography.” In this section the essay should

report on previous academic conversations—listening in Burke’s parlor. Presenting the status of the problem and an evaluation of evidence constitute step four, whereas step five looks to “future avenues of research” by asking “what remains to be done?” Kranzberg’s report assignment ends with step six: “So what?” He encourages students to apply their essay’s problems to other fields in order to make connections across the disciplines.

As a technological historian and pedagogue, Kranzberg lectured and spoke with many different audiences. He often modified class lectures for workshop settings as well as presentations for academic publication; his archived lecture “Introduction (or Why Bother?)” transferred from the history classroom in 1970 to a summer workshop in 1978 sponsored by the National Endowment for the Humanities (NEH). According to an NEH memo, journalists began attending Kranzberg’s workshop for proficiency in reading and writing about nascent technology.

The 1970 classroom lecture “Introduction (or Why Bother?)” has an outline organized into four sections:

- I. The “Irrelevance” of the Past & The “Banefulness” of Technology;
- II. What is History—& why study it?;
- III. What is Technology—& why study it?; and
- IV. The History of Technology. (GA Tech, MS157, Series 1, Box 1)

The lecture’s organization offers students a model for thinking critically about multiple disciplines. Playfully exploring the past, the first part ensures that students confront common notions and feelings about technology. Part two defines history and defends its scholars by focusing on humankind’s journey through time and search for identity.

Considering the humanistic and social elements of history, Kranzberg cites history as experience and calls it a bridge. He takes a similar approach in part three by focusing on humanistic elements in technology: “tools, devices, processes, products . . . human work and environment, [as well as] supportive systems and values” (GA Tech, MS157, Series 1, Box 1). Finally part four of the lecture builds on and combines the previous topics in an exploration of the history of technology. Kranzberg discusses the field’s recent emergence, its present state, and “what to do about it. Engineers are historians,” he argues. Previous neglect and the field’s problems are the final talking points of his fall 1970 “Introduction (or Why Bother?)” lecture.

The 1978 workshop “Introduction (or Why Bother?)” indicates a shift in audience because it includes journalists and their role in history of technology. Modified from the previous lecture, the outline is from a month-long summer seminar sponsored by the NEH for non-teaching professions: “Machine-Made America: Technology and Democratic Ideals”—it was one of five seminars scheduled for journalists. The 1978 lecture is organized similarly to its 1970 counterpart; however, the lecture is updated to include “journalists as instant historians” in the introduction and a reflection of technological systems and values in the “What is Technology—& why study it?” section. To connect with his audience, Kranzberg locates journalists “as historic sources” by reflecting on “past vs. present professional journalists” and their educational role in history. His updated teachings also encourage “serious and responsible journalism” (GA Tech, MS157, Series 1, Box 1). While he was not a compositionist, Kranzberg often taught writers and journalists who employed his interdisciplinary methods in public and governmental sectors as well as across academic disciplines.

Rhetorical Theory and “Laws of Technology”

As cited in *Lingua Fracta: Toward a Rhetoric of New Media*, “Kathleen Blake Yancey, in her Chair’s Address to the 2004 CCCC, called for a ‘new model of composing’ grounded partly in the rhetorical canons” (Brooke 35). Logically, then, such composition praxis may be applied conversely by using the canons as rhetorical lenses to analyze texts and archival rhetorics like essay handouts. New media theorists such as Collin Gifford Brooke indicate that the canons have fallen to disuse; “we also must understand why they fell into disuse in the first place. This understanding cannot happen as long as we continue to view them . . . as a somewhat inaccurate map of the writing process” (35). In a discussion about the “twin fetishes” of theory and practice, Brooke argues that the canons as “five classes of practices are present in any discursive act” (37). Borrowing Brooke’s theoretical framework and Kranzberg’s interdisciplinary methodology, one can apply the rhetorical canons to his historiographical composition process for the state-of-the-field essay assignment.

Invention is the first step to compose a state-of-the-field essay from Kranzberg’s introductory course. Students were to use problems and questions as heuristics for invention; essay topics and theses were direct products of writers having used historical texts to think critically about contemporary issues. He taught arrangement by modeling the ideal order of the paper’s subtopics or ostensible subjects. Style is integral to any graded assignment in the university. Writers of the state-of-the-field essay would undoubtedly consult the pages of *Technology and Culture* as well as Kranzberg’s handout and teachings for the newly developing styles of their field. As historians and students of historiography, course participants would naturally value memory because

the impetus of their craft is to record. Connecting their work to past histories through writing embodies the rhetorical canon of memory. Delivery generally involves dissemination to a text's audiences; in the state-of-the-field essay, Kranzberg delivered the assignment to students, and they delivered their work to him.

Approaching writing instruction via historiographical methods, Kranzberg prepared students and workshop attendees to join the scholarly conversation already in progress in a style reminiscent of Kenneth Burke. By gathering primary data and consulting secondary sources, students could locate gaps and contribute something worthwhile to the ongoing discussion. Having been an editor for *Technology and Culture* as well as president of the Society for the History of Technology, Kranzberg was uniquely situated to lead class talks regarding the history of technology.

Via pamphlets, memos, essays, lectures, speeches, committees, and in various forums such as *Technology and Culture*, Kranzberg touted “the same message for over thirty years, namely, the significance in human affairs of the history of technology and the value of the contextual approach in understanding technical developments” (Pursell 21; Kranzberg, “Technology and History: ‘Kranzberg’s Laws’” 544). Ever the savvy rhetor, he tempered his message by “utilizing various examples or stressing certain elements to accord with the interests of the different audiences [he] was attempting to reach” for three decades, culminating in what he called “Kranzberg’s Laws.” In *The Politics of Historiography*, James Berlin offers his explanation of rhetoric:

A rhetoric ought to be situated within the economic, social, and political conditions of its historical moment, if it is to be understood. A rhetoric is a set of rules that attempts to naturalize—an ideology—to make one

particular arrangement of economic, social, and political conditions appear to be inevitable and ineluctable, inscribed in the very nature of things. To understand a rhetoric, it is thus necessary to examine its position in the play of power in its own time. (11)

Edward T. Channing, nineteenth- and twentieth-century rhetorician, refers to rhetoric as “a body of rules derived from experience and observation, extending to all communication by language and designed to make it efficient” (31). By applying Berlin and Channing’s definitions to “Kranzberg’s Laws,” this body or set of rules is arguably rhetoric in practice.

Ever aware of his multifaceted audiences, Kranzberg clarifies the meaning of his word choices in “Technology and History: ‘Kranzberg’s Laws’”: “These are not laws in the sense of commandments but rather a series of truisms deriving from a longtime immersion in the study of the development of technology and its interactions with sociocultural change” (544). The article gathers together theory and practice from the many rhetorical situations Kranzberg encountered as a technological pedagogue and historian of technology. Having served as a special interrogator for the military, advised the government regarding innovation and instruction, and appealed to skeptical audiences for decades, he was a rhetorical champion and leading expert in his field.

The first law involves technology’s inherent nature: “Technology is neither good nor bad; nor is it neutral” (545). Citing the many possible consequences, Kranzberg explains that his first law ensures humanity is aware of technology’s capabilities throughout different circumstances: “many technical applications that seemed a boon to mankind when first introduced became threats when their use became widespread.”

Nineteenth-century critics and Romanticists blamed the technologies of industrialization for severe working conditions; however, historians such as Fernand Braudel indicate that workers at medieval manors had it much worse (546).

Another important piece of the first law is the public perception or audience awareness that “technological advantages can change over time. A century ago, smoke from industrial smokestacks was regarded as a sign of a region’s prosperity; only later was it recognized that the smoke was despoiling the environment” (547). These smokestack scenarios exemplify the necessity of technological literacy; communities should have full understandings of the ramifications of creating and deploying new technologies before celebrating or renouncing their characteristics as being good, evil, or neutral.

Kranzberg’s second law of technology is an intriguingly inverted maxim: “Invention is the mother of necessity. Every technical innovation seems to require additional technical advances in order to make it fully effective” (548). A dedicated historian, he always connected his work to the knowledge of the past:

The automobile . . . brought whole new industries into being and turned existing industries in new directions by its need for rubber tires, petroleum products, and new tools and materials. Furthermore, large-scale use of the auto demanded a host of auxiliary technological activities—roads and highways, garages and parking lots, traffic signals, and parking meters.
(549)

He understood innovation as a chain of events where each innovative act necessitates the next. Referring to the internal histories of devices, Kranzberg notes the multiple

inventive changes necessary to manufacture an end product: “The completed mechanism in turn necessitated changes in auxiliary and supporting technological systems, which, taken all together, brought many changes in economic and sociocultural patterns” (549). Presenting an awareness of counterarguments, he argues that innovation is a system or feedback loop powered by an original invention that yields innovative necessities, thereby extending the ecological parent-and-child metaphor for humanistic appeal.

The third law in Kranzberg’s body of rules for technological historiography extends the second: “Technology comes in packages, big and small” (549). If invention creates necessities, the entire chain of events would be what Kranzberg called a package or system. Containing multiple processes and components, an innovative system is incredibly complex.

Radar, for example, is a very complicated system, requiring specialized materials, power sources, and intricate devices to send out waves of the proper frequency, detect them . . . and then interpret them and place the results on a screen. . . . That might explain why so many different people have laid claim to inventing radar. Each is perfectly right in pointing out that he provided an element essential to the final product, but that final product is composed of many separate elements brought together in a system. (549–550)

Any new piece of technology represents hours of work completed by more than one person. With each new invention comes another inventor, but someone had to invent the tools used in the process.

Kranzberg's fourth law echoes the humanistic concerns of his speeches and archival papers: "Although technology might be a prime element in many public issues, nontechnical factors take precedence in technology-policy decisions" (550).

Technologists and engineers are often accused of constructing machinery without being cognizant of the far-reaching effects it will have on humanity and its economic and sociocultural systems, proving these "concerns have indeed assumed a major place in public decisions regarding technical initiatives" (552). He adds: "Nevertheless, the fact that political considerations take precedence over purely technical considerations should not alarm us. In a democracy, that is as it should be" (553). Referring to technology assessments as new social instruments, Kranzberg reminds his readers that humanity must fully evaluate the implications of its inventions before introducing them into its systems.

With the fifth law comes a frank application of rhetoric: "All history is relevant, but the history of technology is the most relevant" is Kranzberg's fifth law; "historians of technology must be aware of outside forces and factors affecting technology—from the human personality of the inventor to the larger social, economic, political, and cultural milieu" (553). While technological historiography is unquestionably important to the humanities, most historians would undoubtedly make a similar argument for their field's superior relevance. Kranzberg provides a possible explanation for the lack of technology in the humanities:

Perhaps most guilty of neglecting technology are those concerned with the history of the arts and with the entire panoply of humanistic concerns. Indeed, in many cases they are disdainful of technology, regarding it as

somehow opposed to the humanities. This might be because they regard technology solely in terms of mechanical devices and do not even begin to comprehend the complex nature of technological developments and their direct influences on the arts, to say nothing of their indirect influence on mankind's humanistic endeavors. (554–555)

He is exploring the interior systems of the humanities and its multiple disciplines in an effort to comprehend and deconstruct commonly held fears of technology. Also he is arguing for his audience—like his former engineering and science students—to consider the ecological nature of technological change. Kranzberg's texts are univocal in that they all promote technological literacy and explore commonplace fears as sociocultural misunderstandings. History of technology was most relevant to him because it had been missing for so long from academic and humanistic agendas.

Finally the sixth law fully embodies Kranzberg's new humanities and overall method of technological historiography: "Technology is a very human activity—and so is the history of technology." He situates technology via its humane aspects and cultural impacts; "technology is classed as one of the earliest and most basic of human cultural characteristics, one helping to develop language and abstract thinking. Or, to put it another way, man could not have become *Homo sapiens*, 'man the thinker,' had he not at the same time been *Homo faber*, 'man the maker'" (557). Viewed through these ecological lenses, technological development is an evolutionary complement to humankind's cultural growth.

Neil Postman echoes comparable sentiments in his 1998 speech "Five Things We Need to Know About Technological Change" at a faith-based conference about new

technologies. What Kranzberg called “laws,” Postman labeled “ideas.” Under the possible threat of Y2K meltdown, he expressed doubts about the future of faith and technology. His first talking point was that culture must trade something for new technology. He calls this a Faustian bargain: “Technology giveth and technology taketh away” (Postman). Postman’s own religious bias presents difficulties for the audience. Because Dr. Faustus, a British literary figure, traded his soul to demons for supernatural abilities, Postman’s comparison of technology to evil shortcuts quite literally demonizes emerging technologies at large. Immediately, he revises a familiar scripture, “The Lord giveth, and the Lord taketh away,” substituting “technology” for “the Lord.” He may have included religious tropes in his oratory in an effort to build ethos and reach his audience, but he immediately loses credibility with the technological and non-religious populace in attendance. After the traditional good-versus-evil metaphors, he implores society to consider that technology brings with it as many disadvantages as advantages. One of his examples is the automobile; for all its advantages, it has also poisoned the air, suffocated our cities, and tarnished the beauty of the countryside (Postman).

It is the nature of society to feel by older technologies as having always been. The alphabet is a great example. Postman says that he often asks students when the alphabet was invented: “The question astonishes them. It is as if I asked them when clouds and trees were invented. The alphabet, they believe, was not something that was invented. It just is.” Technologies like rhetoric and the alphabet are so old that they have become mythic, as though given to humanity from the heavens like Prometheus’s fire. People tend to think of technological advance as the natural order of things.

Postman, like Kranzberg before him, argues that “technological change is not additive; it is ecological.” He uses an analogy for clarity:

What happens if we place a drop of red dye into a beaker of clear water? Do we have clear water plus a spot of red dye? Obviously not. We have a new coloration to every molecule of water. That is what I mean by ecological change. A new medium does not add something; it changes everything. (Postman)

After a great deal of scholarly inquiry, Postman concludes his argument with a warning that technology is becoming a form of idolatry. He worries that technology’s mythic nature threatens culture, especially faith and religion. Although his motivations are questionable, he is absolutely correct about technology: it changes everything. If Postman were alive today, he would no doubt be distressed by the current rate of technological evolution, the digital revolution. Kranzberg and Postman constructed and utilized rhetoric as a list of policies and maxims via ecological metaphors in order to encourage their dissimilar audiences to contemplate the ramifications of technology and its interactions with humanity.

To revisit and apply Channing’s definition, Kranzberg’s laws of technology characterize applied rhetoric gleaned through years of experience and observation. By naming them “laws,” he compels audiences to consider the gravity of his argument. He begins with the neutral nature of technology because the good-versus-evil trope is commonplace in conversations about technology; he takes another ethos-building approach by inverting the maxim about invention because cleverness counts in academic discourse communities. The second set of laws situates humanity as a

priority over technology, noting how technology comes in packages and systems. He closes the body of rules by positioning history of technology atop the academic hierarchy of history studies and by reminding readers that technology is a human activity. Overall Kranzberg's laws of technology persuade followers to embrace technology and its associated literacies to expand the ongoing academic dialogue.

Technological Literacy

In concluding the discourse about his laws of technology, Kranzberg reiterates a point also found decades earlier in his *Dimensions of Exploration* pamphlet: "Machines are made and used by human beings. Behind every machine, I see a face—indeed, many faces: the engineer, the worker, the businessman or businesswoman, and, sometimes, the general and admiral." He defines technology as a tool created by and in service of humankind while recognizing the possibilities for its use and abuse. Offering the computer as a metaphor, Kranzberg notes the necessity of human interaction to render the specific technology "usable and useful" to the general public. Ever aware of technological determinism and "the 'technological imperative,' meaning that technology rules our lives," he writes about issues in the field to combat misinformation while helping his audience develop multiple literacies relevant to changing paradigms (558).

Our reluctance to bow to the "technological imperative" is shown by the great efforts to make machines "user friendly"—and we are also embarking on the task of making humans "machine friendly" through educational programs in "technological literacy" and through the work of our SHOT special-interest groups to reach out to a wider public. (559)

The impetus behind Kranzberg's new humanities is to produce a technologically literate public so that citizens can effectively interface with the constant flow of technological creations. If it is the technologist's task to make user-friendly machines, then humanists of the twenty-first century must become technologically literate—machine friendly.

Kranzberg's lifework was technological literacy: "What we can know is how our present world came to be, and that requires a knowledge of the development of technology and of its interactions with culture and society—the very things for which we stand" (559). In a time riddled with fear and suspicion, he initiated uncomfortable conversations about technology in order to create awareness and goad others into participating in the cultural interchange.

In order to publish with the National Association for Science, Technology, & Society, Kranzberg typed an essay-draft, "The Uses of History in Studies of Science, Technology, & Society," that ultimately calls for technological literacy.² After opening with an evolutionary look at humanity and its technology, he writes, "but tools served as extensions of [human] hands and amplifiers of human muscle power, enabling [humanity] to adjust [its] hereditary organic equipment to an almost infinite number of operations in virtually any environment." His compositions generally focus on the humane aspects of technology to create connections with his audience. He posits "that technology and science are perhaps the earliest and most basic of human cultural characteristics" (2). Viewed from this perspective, technology should not be feared as a foreign element but embraced as an ever-changing facet of human culture. The essay contemplates the roles of historians and educators in a technological society. As "historians [we] are interested in the development of science and technology, for we

start by asking the question, ‘How did things get to be the way they are?’” Historical texts narrate previous eras for the present to help readers comprehend the status quo.

And then, as educators, we ask a second question: “What do we intend to do about it?” And that explains why we are concerned about the interactions between science-technology and the social and natural ecology in the past, so that we can utilize that knowledge to improve the lot of mankind in the future. (3)

He indicates the importance of this scholarly work to future generations. Historians and educators above all should be technologically literate to record properly the remainder of the twenty-first-century and its guaranteed explosion of technological developments.

Part of his essay’s rhetorical appeal is the incitement to consider “technology and science as essential components of our culture, affected by and affecting every other aspect of society” (5). This continued ecology metaphor is a vital characteristic of Kranzberg’s work; his texts often encourage audiences to realize that technology has long been an incredibly human characteristic. He credits World War II and the computer revolution for the growing interest in the histories of science and technology at the end of the twentieth century.

It also explains why historians of technology and, later, their colleagues in the history of science, stressed the importance of socio-economic-political context of technological and scientific developments and their interactions with the sociocultural milieu. (5)

Historians from any field must moor their subjects to their appropriate cultural, temporal, and spatial milieus. Science and technology represent the largest gaps in history as

Kranzberg understood it. By ignoring the history of technology, humanity would inevitably lose the ability to reflect on its technical past.

Addressing the democratizing effect technological development has on education, he posits that technology requires and stimulates an increasingly knowledgeable population. According to Kranzberg, technology even promotes traditional literacy:

Technological development both demands and makes possible more education for larger segments of society. For one thing, in order to take part in the increasingly complex world of production, workers must read and write . . . and acquire basic social knowledge, for an advancing technology requires an ever-growing knowledge base. (11)

In accordance with his laws of technology, Kranzberg offers an explanation for the impetus behind technological literacy; one invention yields many necessities, including a culture knowledgeable enough to invent, engineer, analyze, deconstruct, and record it for present and future generations: "Not everybody finishes college, of course, but we have reached the point where great numbers of today's America have an education equivalent to yesterday's upper class." He adds that only a society made rich by technological development could democratize education thusly (12).

To avoid unbalanced writing, Kranzberg admittedly shifts his focus from exhortation to contemplate some shortcomings in the technological democratization of society: "Women can press buttons and do equations just as well as men, and that accounts for the growing number of women in . . . traditionally male professions and occupations. . . . And on the job itself there remains a residue of sociocultural traditions

which work against equality in women's pay" despite the gender neutrality of technology (13). His language itself also shows an awareness of feminist ideals; Kranzberg's early archival documents from the 1960s use exclusively male pronouns and refer to "man" and "mankind," but this draft of "The Uses of History in Studies of Science, Technology, & Society" in the 1990s considers voices that were historically marginalized or oppressed: "Yet, to our shame, we find that the persistence of outmoded—indeed, outrageous—ethnic and racial [stereotypes] and prejudices . . . militate against [people] getting the education or incentives which will enable them to participate constructively in our technical society" (13). While it arguably has a democratizing effect on society, technology is not limitless or infallible. If technological advance is inherent to human evolution, then it is crucial to increase technological literacy via interdisciplinarity.

To conclude his essay, Kranzberg reflects on the interconnections within his field: "The study of science-technology-society interactions is so meaningful. And in that task, the history of science and technology should play a major role in helping to produce a truly educated, technologically literate generation" (17–18). In "Understanding Technology Literacy: A Framework for Evaluating Educational Technology Integration," Randall S. Davies defines "technological literacy in educational situations . . . as the ability to effectively use technology (i.e., any tool, piece of equipment or device, electronic or mechanical) to accomplish required learning tasks." He adds that technologically "literate people know what the technology is capable of, they are able to use the technology proficiently, and they make intelligent decisions about which technology to use and when to use it" (47). Oral culture begat print culture, and their descendant is digital culture; while each medium has gained priority at one time or

another, neither has completely replaced the next, and each form of discourse remains socially relevant to date. Using technology to respond to rhetorical situations is not a new process, so technological literacy should have been commonplace long ago. Kranzberg's call to action passionately situates technological literacy as a new goal for his audience of historians and educators as they prepare to share their crafts with the next generation of upcoming scholars.

4 MELVIN KRANZBERG'S SIGNIFICANCE TO THE FIELD

The American people . . . have embraced technological literacy as the "new basic" for today's world, along with reading, writing, and arithmetic. Technological literacy is not just knowing how to use technology for word processing, spreadsheets, and Internet access. Fundamentally, it is using the powerful learning opportunities afforded by technology to increase learning in academic subjects and increase students' skills.
—*Getting America's Students Ready for the 21st Century, A Report to the Nation on Technology and Education*

In the *Handbook of Literacy and Technology: Transformations in a Post-Typographic World*, Bertram C. Bruce, Maureen P. Hogan, and J. L. Lemke—like Kranzberg, Hawisher, and Selfe before them—approach technological literacy via understandings of ecology and interconnecting systems. In their chapter, “The Disappearance of Technology: Toward an Ecological Model of Literacy,” Bruce and Hogan situate technology within human culture: “Awareness of how technologies merge with daily practices leads us to view technology and literacy as constituent parts of life, elements of an ecological system. This viewpoint gives us a basis for understanding the interpretation among machines, humans, and the natural world” (272). Closely related to Kranzberg’s theoretical discourse about humanity and its systems, Bruce and Hogan’s explanation involves reflecting on technology as an inherent part of humanity, a tool-like extension of our own arms as well as an evolutionary expression of our culture. Seemingly answering Kranzberg’s call for technological literacy at the end of the twentieth century, the *Handbook of Literacy and Technology* certainly complements and extends the technological theories that developed in the history of technology. In his chapter, “Metamedia Literacy: Transforming Meanings and Media,” J. L. Lemke bolsters the ecological metaphor:

Literacies cannot be adequately analyzed just as what individuals do. We must understand them as part of the larger systems of practices that hold a society together . . . if we think the word *society* means only people, then we need another term, one that, like, *ecosystem*, includes the total environment: machines, buildings, cables, satellites, bedrock, sewers, farms, insect life, bacteria. (qtd. in 272)

Using Lemke's theory, Bruce and Hogan argue that technological literacy and its connected technologies must be considered in direct relation to the systems in which such literacy is required, practiced, and deployed. Literacy scholars, digital pedagogues, as well as twentieth-century and twenty-first-century educators alike have increasingly utilized ecology as a vehicle to explain technological literacy.

For twenty-first century scholars of rhetoric and composition—and its subfield computers and composition—Kranzberg's work to increase technological literacy in the twentieth century begins to answer Ratcliffe's poignant questions to the field in *The Present State of Scholarship in the History of Rhetoric: What is technology, and what is its value?* (207). According to Kranzberg, technology is an extracorporeal extension of the human body and intellect; it is one of humanity's basic characteristics, the evolutionary trait that separates our species from previous iterations. Multiple academic disciplines have formed and continue to emerge in order to research technology's value; however, for digital humanities, rhetoric and composition, computers and composition, as well as new media studies, technology's value is in its ability to set cultural codes through literate practices. Modern historians and compositionists must practice literate activities with students, so they might successfully navigate the digital revolution of the

twenty-first century; as Connors posits, meaningful historiography indicates what previous generations wanted from literacy and how they defined the term so that contemporary researchers can do the same with their own sociocultural and temporal milieu (Octalog 7).

Exploring Invention via Kranzberg's "Technical Act"

In a piece entitled "Understanding the Technical Act," Kranzberg provides his audiences with a definition and explanation of invention: "the motivations which impel the technologist, the creative impulses of the technical innovator, the forces which account for the acceptance or rejection of technical innovations." To help connect engineering and science students with the users of their inventions, Kranzberg contemplates the creative processes of inventors and technologists; "for the area of our greatest ignorance lies in the realm of the interrelations of technological developments with society and culture" (1). Citing academic traditions and the nature of technological development, he posits that interpreting technical innovation is always a culturally polemical endeavor. Technologists and humanists agree that inventions, new creative processes, and groundbreaking theories all create cultural divisions, thereby escalating extant scholarly conversations. The recent history of rhetoric and composition itself provides an excellent example with the infamous published polemics of Peter Elbow and David Bartholomae at the end of the twentieth century. Bartholomae taught "students to be able to work closely with the ways their writing constructs a relationship with tradition, power and authority—with other people's words. . . . [I]t is the idea of 'criticism' that most marks our different positions on the role of the teacher. It is important to Peter to appeal to what students can learn 'in the absence of instruction'"

(Bartholomae and Elbow 87). Elbow responded by agreeing with major portions of Bartholomae's work before identifying the major difference in their pedagogical approaches: "I want students to hear my comments but still be able to resist or deny them" (92). Their dialectic about classroom agency continues to inform composition theory and pedagogy in the twenty-first century.

To increase and complicate the ecological metaphor further, part of the ecosystem of technology involves societal disagreements with its implementation; each technological revolution somehow threatens the status quo, including extant sociocultural values and political subsystems. Such dissonance creates cultural divisions like the digital divide, encouraging citizens to choose between tradition and innovation. Writing threatened memory and the oral tradition. The printing press supplanted the almighty pen. Computers revolutionized the printing industry, and digital media (e.g. e-readers and tablets) are threatening the cherished book's very existence.

Part of the problem with understanding the technical act or creative process is the academy's classical tradition according to Kranzberg: "our education has a classical bias. Reaching far back into Western culture, we find that Plato made a distinction between the mind and the hand: formulations of the mind were considered superior to the products of the hand." Process and product represent an open system as well. To prioritize one above the other is difficult because they are so intricately connected and influenced by other systems. "What might be termed snobbishness on the part of those who have written our history and who have directed our higher education has led them to regard man's technological development as something inferior to his intellectual history" ("Understanding the Technical Act" 1). His essay encourages readers to

resituate technical products as counterparts to their technical processes because Kranzberg detested the perceived intellectual hierarchy of the university. This invention theory extends the ecological metaphor for the humanities. If technology is a human characteristic, then studying the history of technology and its literacies is the pressing task of technologists and humanists alike as evidenced by the combined interdisciplinary works of Kranzberg, Hawisher, and Selfe. Technological development is an inherent part of human evolution; therefore, technology cannot be inferior to humanity's intellectual history because *Homo sapiens* (the thinker) is also *Homo faber* (the maker).

The Industrial Revolution provides examples of the divisive nature of innovation. "The magnificent achievements of the Industrial Revolution in supplying man's material wants and creature comforts served to develop an awareness of the role of technology in civilization. . . . Paradoxically, the widespread use and appreciation of the products of technology did not result in greater esteem for the . . . engineers" (*Dimensions for Exploration* 10). Kranzberg says that the eighteenth century's educated population was certainly aware of "the importance of technological development"; but "very little scholarship was directed toward investigation of the Technical Act." Historians during the revolution did not busy themselves with the creative processes of inventors, and scholars, "themselves products of a classical education, felt that they could not comprehend the workings of machines and hence believed themselves incapable of writing about the machine in any meaningful fashion" ("Understanding the Technical Act" 2). Without scholarly records of the technical acts used to create it, sustaining any given innovative technology becomes incredibly problematic. Ever the faithful advocate,

Kranzberg employs historical narratives about technological development and its cultural divisions throughout his work to explicate the importance of technological literacy. By having engineers and scientists contemplate their cultural connections and creative processes, he participates in his so-called new humanities. Applying the same methodology, scholars can interrogate the twentieth-century's computer revolution for literate practices within communities to prepare for the twenty-first-century's digital revolution and torrential deluge of new media.

Ultimately Kranzberg's "Understanding the Technical Act" calls for scholars to learn more about the creative processes that yield technological innovation; "even with the best of intentions the technologist—or anyone else, for that matter—cannot always foresee the results" (7). He notes that inventors cannot possibly predict future implications of their technology.

[W]e must know much more about the Technical Act—its sources, its nature, its impact. To accomplish this, we must study the relations of technology with all aspects of society and culture. For technology does not exist in a vacuum; it develops in a social context, as do all other human activities. Instead of being a mechanical monster which determines [humanity's] destiny, or a Frankenstein's monster [that] threatens to destroy its creator, technology has always been, and still remains, an essential part of [humanity]. (8)

Humanities scholars, however, can study inventors' technical acts, creative processes, and praxis to increase awareness and combat the intellectual bias of Western academic culture. Conversely technologists can benefit from understanding the ecological nature

of their profession and its interrelated humane systems. By building technological multiliteracies, scholars and inventors can scrutinize cultural divides as well as deconstruct academic biases; doing so will guarantee future interdisciplinary conversations in extant and emergent disciplines.

The Ecological Nature of Technology and Its Literacies

Dimensions for Exploration, Kranzberg's pamphlet, investigates the early history of humanity to prove that technology is not a novel idea: "Man has always been living in a technological age, inasmuch as his life and culture—his very survival—have been dependent upon his technology." He argues that tools, know-how, and technologies are extensions of our own humanness; understood from this perspective, traditional literacy—reading and writing—has always been missing its counterpart, technological literacy—understanding and interacting with humankind's technical subsystems. In fact, according to Kranzberg, "man himself is a product of technology. Anthropologists seeking the origins of mankind have attempted to differentiate between what constitutes 'almost-man' and the genus man. The chief distinction they can find is that man employed tools, thereby distinguishing him from his almost-human predecessor." By examining such interactions between humanity and its innovative tools, it becomes possible to perceive the ecological nature of technological innovation. If humanity is indeed the product of technology, then reading, writing, composing, and interacting have changed only to meet the demands of our technological environments and rhetorical situations: "technology is perhaps the most basic of human characteristics and activities" (4). Feasibly humanity should be more machine friendly.

To connect with his academic audiences, Kranzberg utilizes their perceived biases of Western culture via classical allegories. His work often cites Greek myths and references Plato as an educator.

It is true that we ordinarily think of technology as something mechanical, yet the fact is that all technical processes and products are the result of the human creative imagination and human skills. The story of how man has utilized technology in order to master his environment is part of the great drama of man fighting against the unknown; this is the continuation of the struggle of Prometheus who stole fire from the gods in order to bring it to mankind. Ever since that time, man has sought to use nature to his own ends, to master the environment, to control nature. This is a very human activity—this is technology. (5)

He posits that the unknown is what inspires inventors to initiate their creative processes. Most members of the academic community value Greek traditions and ideals, so mythology and cultural references are especially appealing. Arguments regarding controversial topics (e.g. technology) are easier for audiences to digest when coupled with anecdotes that glorify the listeners. Rhetoric and composition as well as history of rhetoric scholars use some of the same traditional and idealistic references. Such allusions connect these fields to extant academic traditions and exist as commonplaces for scholarly discourse of any kind.

Kranzberg's primary audiences were humanists and technologists. He constantly gave speeches and disseminated essays that often addressed both groups at once. Interdisciplinary approaches were vital to the history of technology during its formative

years. “Every technological activity has social consequences. Technology is thus of humanistic interest, not only because it is a product of the human mind, but also because it affects the course of human and societal development” (6). During the twentieth century, humanists required new perspectives regarding technological developments, and technologists needed to consider the humane aspects and cultural impacts of emerging technologies. Just as twenty-first-century scholars in the digital humanities study humanistic concerns in digital environments, Kranzberg, a scholar of the new humanities, explored such concerns in the technological environments of the twentieth century.

Another complex facet of Kranzberg's rhetoric involves audience motivation. His compositions indicate a lack of public interest in technology's history: “Even among engineers there was little concern with the history and sociology of their field. Why bother with the past? Why investigate what has already been superseded? The study of political or intellectual history admitted no such questions” (12). By making connections between the history of technology with extant fields of history, the text offers a comparison that attempts to legitimize the emerging field; “past politics, past philosophy, past literature—all were believed to teach valuable lessons, as well as have intrinsic value. No such claims were made for technology” (12). It was regarded as unworthy of scholarly pursuit, and technology's past was definitely immaterial at that time. His compelling explanation appeals to a range of academics to stimulate interdisciplinarity.

Offering an alternative line of reasoning, Kranzberg's *Dimensions of Exploration* contains another argument that resonates into the twenty-first century. During the previous century, “technological advances occurred so rapidly that both scholar and

student were hard pressed to keep up with the newest developments, let alone peer into the lessons of the past or even to investigate the social impact of their activities” (12).

Scholars in the history of rhetoric and history of technology echo these words in countless ongoing interdisciplinary conversations.

After all, we all know that the technology is with us today and that our jobs—either as students, as instructors, or as professional communicators—have become virtually impossible without the new information technologies. However, we should not forget how these technologies made, and continue to make, their way through our culture in general and our profession in particular. (Selfe and Hawisher 235)

Rapid technological advance has been humankind’s way of life for centuries now, and technology itself is evidence of humanity’s ability to adapt to its ecosystem; however, education will always be difficult in swiftly changing environments because instructors must hypothesize about best practices for emerging innovations and praxis while building new literacies themselves.

Arguably education is one of the most precious subsystems within the human ecosystem, and the academy often inspires and houses cultural divisions caused by innovative technologies. The previous “neglect of the study of the development of technology and its relations with society and culture has distorted much of our education. Technology is an essential component of our culture, affected by and affecting every other aspect of society.” Kranzberg perceived a gap large enough to be filled with an entire field’s worth of knowledge. Humanity was steadily losing its

technological history, and history of technology was his rhetorical answer to the pressing academic situation:

How can political scientists ignore it, if they wish to tell the story of the rise and fall of states, the pressure and power groups within nations, the development of new political procedures, forms, and institutions? How can teachers of literature ignore it, if they believe that literature is a mirror which reflects the texture of a society with all its defects and all its good points? How can historians and social scientists ignore it if they believe that their duty is the interpretation of the changes and transformations of a whole culture? Nevertheless, technology is scarcely given more than passing mention in their work, and the teachers of technological skills are treated with a supercilious snobbism. (12)

A college's ecology is closely connected with that of other human systems in that new ideas complicate all associated processes. The system processes the innovation and analyzes its relevance based on previous models and extant techniques. Emerging disciplines are naturally considered irrelevant by scholars who have become calcified in their closed academic systems and small social circles.

The conclusion of the pamphlet to industrial arts teachers contains a call to action. The entire piece speaks directly to technological pedagogues who may or may not have training in all the emergent areas in which their departments want them to teach.

The many changes occurring in our rapidly accelerating technology place heavy demands on the teachers of industrial arts. Yours is not simply

training your students to live in a changing world, a world which is being transformed by dynamic technological advance. Hence, it is incumbent upon you to realize the social significance of the industrial arts in our society, and to transmit to your students a sense of the value and worth of participation in the technological process which is so vital to our civilization. (12)

The text makes connections between industrial arts teachers and their role in the ever-changing sociocultural milieu of technological development. If educators are willfully unaware of transformative changes within the human ecosystem, there can be no hope for upcoming students to function in their fluctuating environment. These early conversations in the new humanities encouraged discussions between humanists and technologists regarding the intersections of their fields.

Cynthia L. Selfe and Gail E. Hawisher echo Kranzberg's sentiments in an investigation of a subset of technical communicators from 1978 to 2000: "Technical communication instructors and workplace supervisors now expect both students and professionals to acquire electronic-literacy skills." Selfe and Hawisher's "A Historical Look at Electronic Literacy: Implications for the Education of Technical Communicators" also considers ecological approaches for understanding and acquiring new literacies: "Yet, despite the ubiquitous presence of electronic environments, the profession itself knows less than it might about the social, economic, political, and educational factors that affect the acquisition and practice of electronic literacy" (231). In times of extreme technological development (e.g. computer revolution), it is critical that scholars and

educators involve themselves with the immediate acquisition of new literacies or multiliteracies in order to remain relevant in the changing human ecosystem.

5 CONCLUSION

Selfe and Hawisher's case study defines and problematizes the notion of electronic literacy: "the practices involved in reading, writing, and exchanging information in online environments as well as the values associated with such practices—social, cultural, political, educational" (232). They go on to differentiate among the extant terms associated with the concept: "To distinguish electronic literacy from computer literacy, literacy scholars have also used the related terms *technological literacy* (Selfe and Hawisher) or *digital literacy* (Tyner); both terms are synonymous with our use of electronic literacy" (233). Selfe and Hawisher's research focuses on the literate practices of online communities instead of the actual skills to use computers or technology. Opponent of digital communications technology, Mark Bauerlein, posits his arguments against such communities and their practices in a book entitled *The Dumbest Generation: How the Digital Age Stupefies Young Americans and Jeopardizes Our Future (Or, Don't Trust Anyone Under 30)*. The text echoes the fears of the same generation of educators who refuse to evolve technologically. In the introduction, Bauerlein says:

while teens and young adults have absorbed digital tools into their daily lives,...while the world has provided them extraordinary chances to gain knowledge and improve their reading/writing skills,...young Americans today are no more learned or skilled than their predecessors, no more knowledgeable, fluent, up-to-date, or inquisitive, except in the materials of youth culture. (8–9)

Bauerlein makes the familiar “kids these days” argument. He expects young adults to behave differently because of technological advantages. Adolescents need direction, plain and simple. Access to technology does not change the fact that most students dislike homework. Social media generally will be more appealing during time spent outside the classroom. Instead of finding fault with the status quo without proposing viable options, educators (or authors over 30) must find a way to take advantage of young adults’ digital literacy. For example, teachers could incorporate social media and online research into the classroom instead of complaining about what students do in their spare time.

Digital natives, those born during or after the general introduction of digital technology, have few if any advantages when it comes to the Internet. Online research shows that “teens displayed reading skills, research procedures, and patience levels insufficient to navigate the Web effectively. They harbor the same traits of other Web surfers, only more so” (146). Failing to live up to terms like “technowizards” and reputations for living “wired lifestyles,” “teenage users scan skipingly like older users, though a bit faster, and they likewise struggle to stay on point as they travel from page to page” (146). Older generations will always misunderstand younger ones; younger generations will always misunderstand older ones. The situation is no different with technology. It rests on educators to motivate students to read and practice writing. If digital tools have provided a new medium for adolescent distraction, it stands to reason that they have also created new educational opportunities.

Complaints abound in college classrooms before the professor arrives. Students often groan about the length of assigned reading or that the professor does not

understand how busy the students are. Opponents to digital technology like Bauerlein attribute the Internet as creating such problems with attention span and aversions to rigor: “hard texts irritate young people, for they’ve spent years clicking away from big blocks of prose and thick arguments” (148). Junior scholars attend universities to be challenged by assignments, even if they sometimes forget by the midpoint of the semester. Bauerlein writes, “[f]orming reading and thought patterns through screens prepares individuals for only part of the communications demands of the twenty-first century.” He closes with a claim that reading screens hampers “the abilities to concentrate upon a single, recondite text, to manage ambiguities and ironies, to track an inductive proof” (148). His arguments are the same as those of Kranzberg’s rhetorical opponents in the twentieth century, revamped and decorated with digital terminology. Perhaps Bauerlein depends on the pathos of fear-inspiring rhetoric to sale books. Students are constantly alternating between wanting the least amount of homework possible and yearning for mental challenges provided by a formal education. The answer is to juxtapose traditional rigor with high-tech creativity in order to create a generation of balanced professionals instead of ignoring certain technologies entirely. Tradition deserves a place in academe; however, there will always be opportunities to teach via innovative technology and access entirely new pedagogical strata across the disciplines.

Soon after the publication of Kranzberg’s “The Uses of History in Studies of Science, Technology & Society,” in which he calls for a technologically literate generation, President Clinton announced his Technology Literacy Challenge, a “program, perhaps more than any other single piece of government legislation, [that]

fueled the country's ability to graduate large numbers of computer-savvy students. It also helped to show both educators and the publics they served the value of electronic literacy" (Selfe and Hawisher 233). By the end of the twentieth century, Kranzberg's *Technology and Culture* as well as Selfe and Hawisher's *Computers and Composition* were established journals representing emergent disciplines whose charge, among other things, was to increase technological literacy.

Education has historically utilized technology to its ends, including the alphabet, mathematics, rhetoric, the printing press, microscopes, computers, etc. Over the past decade, there have been many opportunities for professional development made available in an effort to keep up with technological trends. Although these "opportunities for teachers [have] increased, our understanding about what constitutes quality professional development, what teachers learn from it, or its impact on student outcomes has not substantially increased" (Lawless and Pellegrino 576). The federal government has spent millions on recent education initiatives to "technologize" US schools. These include:

improving the capacity of schools to use technology, training the next generation of teachers to use technology in their classrooms, retraining the current teaching workforce in the use of technology-based instructional tactics, and minimizing inequitable access to technology. (576)

The government has established a student-to-computer ratio (5:1) and set performance goals that will be monitored annually. Educational research indicates that "technological literacy has fast become one of the basic skills of teaching" (580). If educators on any

level choose to ignore available pedagogical technologies, one day they might be forced to select a tutor from among their students.

The constant increase of available technologies does create a considerable workload for teachers willing to embrace the future of pedagogy. Teachers should be “prepared to effectively integrate technology into their instructional practices.

Unfortunately, the evidence suggests that technology is often poorly integrated with other classroom instructional activities” (580). Even the federal government recognizes the deficiency of technological education. Recent data from the US Department of Education indicate that most students across the various economic and cultural strata will have access to communication and information technologies in their schools; however, “less clear...is the likelihood that they will have access to teachers who know how to use that technology well to support [twenty-first] century learning and teaching” (578). These governmental studies remind us that technology is multifaceted and ever changing; educators must be technologically literate to remain pedagogically relevant. Digital pedagogues like Selfe and Hawisher apply Deborah Brandt’s oral-history and life-history methodology to Bruce and Hogan’s aforementioned ecological model. The values and practices of technological literacy are “constituent parts of life, elements of an ecological system . . . that [give] us a basis for understanding the interpretation between machines, humans, and the natural world. . . . Literacies, and the technologies of literacy, can only be understood in relation to larger systems of practice” (272).

Kranzberg’s work is significant to the field because his texts argue that technology is the most fundamental human characteristic, a byproduct of the human intellect. By ignoring

the history of technology, humanity was losing vital pieces of its cultural and historical narrative, thus rendering many scholars technologically illiterate for quite some time.

To combat such illiteracies and update the academy, new media and literacy scholars must work together to situate humanity as a priority while recognizing technology as human characteristic or ecological subsystem—not a harbinger of the apocalypse. Compositionists should adapt to their changing environment, or they risk becoming illiterate. Stuart A. Selber's *Multiliteracies for a Digital Age* adds: "Many in the profession are understandably skeptical about getting involved in computer literacy initiatives" (2). Despite popular skepticism, archival and media researchers should continue recovering texts and displaced rhetorics regarding cultural divisions caused by technical innovation as developing sites of new literacies:

Computer literacy is certainly a worthwhile project for teachers of writing and communication. Not only are teachers obligated to prepare students responsibly for a digital age in which the most rewarding jobs require multiple literacies, but students will be citizens and parents as well as employees, and in these roles they will also need to think in expanded ways about computer use. Teachers obviously have the potential to help enact productive change if they think about computer literacy in the right ways. (Selber 4)

Kranzberg's rhetorics offer some answers to Ratcliffe's questions as well as Gaillet and Horner's call in *The Present State of Scholarship in the History of Rhetoric*. Kranzberg connected technologists to the humanities; digital pedagogues must reconnect humanists to technology. It is both a human invention and an ecological subsystem of

humanity. Some of technology's value is the study of its interconnected literate practices; though, to understand the true value of technology to history of rhetoric as well as computers and composition, it is important for literacy scholars to interrogate emerging technologies and new media. Doing so will prepare educational communities for the increasing multiliteracies of the twenty-first century. By situating humanity and its innovations within an ecosystem, innovative technologies and their literacies become a natural progression in the grand tradition of Plato's academy; therefore, outmoded academic biases in the humanities against technological development are fallacious. Twenty-first-century pedagogues and rhetors should harness new technologies and media as their available means of persuasion. Luddites have no place in the university's future; they belong in another century entirely.

NOTES

¹ New media scholars indicate a need to consider technophobic responses when protecting oneself from the possible dangers of new technology; however, these sources usually argue against the use of specific mediums that encourage rapid cultural progression (Wardrip-Fruin and Montfort 8)—see *The New Media Reader*.

² The essay was ultimately accepted and published in *Bulletin of Science, Technology, & History*: Kranzberg, "The Uses of History in Studies of Science, Technology, & Society."

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