Educating the Posthuman is an exciting and refreshing book. Bravo! This book is unique and unusual. Weaver explores the intersections between literature, biosciences and curriculum theory. Understanding the posthuman best happens when scholars explore these three interrelated areas of study. From Frankenstein to Einstein, Weaver creates a fascinating text that all educators, literary scholars and scientists should read. From the problematics of pharmaceuticals to the promise of scholarly debate, this text dazzles. Weaver argues that the scientific issues of our day are best understood through the study of fiction. What does fiction teach that science does not? Are scientists blind to their own conundrums? Certainly colleges of education and public schools—Weaver claims—are bottomless conundrums. One of the most troubling and fascinating claims that Weaver makes is that curriculum scholars should leave colleges of education and find their homes elsewhere. Colleges of education—at least in the United States—have become unthinking, rule-bound, accrediting nightmares. Weaver says that colleges of education as well as public schools are worse than nightmares because at least at the end of a nightmare we wake up. But now, in colleges of education and in public schools, the nightmare goes on and on without reprieve. Clearly educating (the posthuman) is not happening in either colleges of education or public schools. What is happening is that professors of education and teachers as well as students are being miseducated to think that all that matters are instrumental outcomes and getting a paycheck. As if education has anything to do with getting a paycheck!! Weaver weaves these disturbing and exciting thoughts together in a most imaginative way. This book is a must read for students, teachers, professors and everyone who grapples with what is post about the human.

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Cultural studies provides an analytical toolbox for both making sense of educational practice and extending the insights of educational professionals into their labors. In this context Transgressions: Cultural Studies and Education provides a collection of books in the domain that specify this assertion. Crafted for an audience of teachers, teacher educators, scholars and students of cultural studies and others interested in cultural studies and pedagogy, the series documents both the possibilities of and the controversies surrounding the intersection of cultural studies and education. The editors and the authors of this series do not assume that the interaction of cultural studies and education devalues other types of knowledge and analytical forms. Rather the intersection of these knowledge disciplines offers a rejuvenating, optimistic, and positive perspective on education and educational institutions. Some might describe its contribution as democratic, emancipatory, and transformational. The editors and authors maintain that cultural studies helps free educators from sterile, monolithic analyses that have for too long undermined efforts to think of educational practices by providing other words, new languages, and fresh metaphors. Operating in an interdisciplinary cosmos, Transgressions: Cultural Studies and Education is dedicated to exploring the ways cultural studies enhances the study and practice of education. With this in mind the series focuses in a non-exclusive way on popular culture as well as other dimensions of cultural studies including social theory, social justice and positionality, cultural dimensions of technological innovation, new media and media literacy, new forms of oppression emerging in an electronic hyperreality, and postcolonial global concerns. With these concerns in mind cultural studies scholars often argue that the realm of popular culture is the most powerful educational force in contemporary culture. Indeed, in the twenty-first century this pedagogical dynamic is sweeping through the entire world. Educators, they believe, must understand these emerging realities in order to gain an important voice in the pedagogical conversation.

Without an understanding of cultural pedagogy’s (education that takes place outside of formal schooling) role in the shaping of individual identity—youth identity in particular—the role educators play in the lives of their students will continue to fade. Why do so many of our students feel that life is incomprehensible and devoid of meaning? What does it mean, teachers wonder, when young people are unable to describe their moods, their affective affiliation to the society around them. Meanings provided young people by mainstream institutions often do little to help them deal with their affective complexity, their difficulty negotiating the rift between meaning and affect. School knowledge and educational expectations seem as anachronistic as a ditto machine, not that learning ways of rational thought and making sense of the world are unimportant. But school knowledge and educational expectations often have little to offer students about making sense of the way they feel, the way their affective lives are shaped. In no way do we argue that analysis of the production of youth in an electronic mediated world demands some “touchy-feely” educational superficiality. What is needed in this context is a rigorous analysis of the interrelationship between pedagogy, popular culture, meaning making, and youth subjectivity. In an era marked by youth depression, violence, and suicide such insights become extremely important, even life saving. Pessimism about the future is the common sense of many contemporary youth with its concomitant feeling that no one can make a difference.

If affective production can be shaped to reflect these perspectives, then it can be reshaped to lay the groundwork for optimism, passionate commitment, and transformative educational and political activity. In these ways cultural studies adds a dimension to the work of education unfilled by any other sub-discipline. This is what Transgressions: Cultural Studies and Education seeks to produce—literature on these issues that makes a difference. It seeks to publish studies that help those who work with young people, those individuals involved in the disciplines that study children and youth, and young people themselves improve their lives in these bizarre times.
Educating the Posthuman

Biosciences, Fiction, and Curriculum Studies

John A. Weaver

Georgia Southern University,
USA
To My Friend Joe Kincheloe (1950 to 2008)

To My Katherine Driscoll
Peter Appelbaum

It is really uncanny, the way we are always both here, in this place, in the net as it were, I in my body, you in your body, and yet, not actually here, at this time, in this location. I say ‘my body’ with that detached tone of an observer, both in the digital image of MyBody™ and distinctly outside of that same image, learning in and out of school at the same time...well...I would imagine, learning and unlearning while not-learning and mis-learning. I (that is, the I you are manipulated to interpolate from the characteristics and attributes I now crave to place before you, to which you suspiciously hazard an ironic ‘acceptance’ that supports your assumptions about Me© ...I...found myself becoming the sort of Foreword Author who begins with a declaration of the uncanny that day someone I admire called me a hacker.

At first, I heard ‘hack’, as in ‘old hack’, an outmoded term for ‘old geezer’, as in ‘over-the-hill’. But no, she who will remain anonymous, the bestower of descriptors, had meant a parasitic lurker who discovers those cracks and holes in the system, and then gets blamed for them. Schools and Universities are each examples of such systems, as are the networked, inter-faced collections of these institutions and their affiliated corporations, social agencies, media conglomerates, and cosmetic surgeons. At any rate, John Weaver is a fellow hacker. At least, I think so. He carries out — indeed provokes us to join him in—modes of investigation that both learn how to infiltrate systems usually unexamined, and that develop strategies for exploration. He explores, we explore with him in the posthuman, the ways that these systems and webs of connection function; and in the process he reprograms, we reprogram, their operations. A bit of a paraphrase in those last two sentences; the idea and definition of ‘hacker’ in them comes from David Gunkel (2000). As in “other blasphemous and parasitic endeavors,” writes Gunkel, [hacking] does not aim at either conforming or refuting the systems in question; it works on and in them in order to learn how and why they function in the way that they do and to experiment with alternative deployments of their own programming.” (p. 807) What John hacks here are not individual components of schools, curricula, administrative policies, or educational programs, but the various systems that structure, inform, and program Curriculum©.

Now, you might harbor concerns about hackers, mistakenly borrowed from the nefarious media goblins who raise the specter of hackers in connection to disabling computer viruses run amok, and other less-than-honorable hokum. Try to set those anxious worries aside in favor of a welcome and virtuous HandBook™ to the PostHuman Educational Moment. What we hack as we travel with John (in reality, leaving our virtual bodies behind in silly, organic-carbon-space) are not technical tools and materials of education, but the much more useful and critical-to-understand infrastructures and processes of actualization through which these tools and materials—and their cultural/historical/political contexts—have come to be determined, delimited, and debated (Gunkel, p. 807; we are entering a 3-D space!).
We are hacking together in this book, you and Me™ and John, the systems that connect and internetwork, the various pedagogical techniques, curricular frameworks, epistemologies, narrative strategies, research practices, reviews of literature, visual representations, and marketing platforms, that constitute posthuman education, both as experienced and as it might, or ought to, become.

There are two caveats that came to my mind as I sat here in my version of our common Scenery©, contemplating your use of this Handbook™. First, there is a way in which one might find the book most useful if one brings to it an appreciation for the simultaneity of categories in educational discourse. These categories allow us to make sense of our work, and in the process they construct that three-dimensional space of determination, delimitation, and debate. They work variously to foster our working within binaries or trichotomies. The Handbook™ you now caress will enable you to understand and work with or in spite of those binaries and trichotomies, living both in and outside of them, as if to provide a very metaphor for the process of posthuman conceptualization itself. The second caveat is a specific example of the first: the posthuman educational moment makes it possible for us to explore, relish, and worry about the relationships among technology, our organic bodies, and the consumer-technoculture that these categories foster, buttress and supplant. Be prepared, I warn you, for a joyously horrific amusement-park-ride through the constantly shifting oxymorons of posthuman humanism. The juxtaposition of opposites as at once constructing the picture and missing the point is just one symptom and artistic production of this cultural process. In constructing the three-dimensional space of determination, delimitation and debate, the juxtapositions ironically open up the possibility of other dimensions, of thinking outside-the-box, of questioning the discourse of body-technology-culture itself, even as we are living within that discourse and in that sense cannot be outside of it!

There might have been a panel of experts convened to discuss the potential of the posthuman educational moment and to herald the publication of this book. The grand dame of the panel is Tanith Lee, British author of many fantasy and science fiction novels, and in particular, the two-part Biting the Sun (Lee, 1976/1999) which, back in 1976, provided one of the first glimpses of our contemporary bildungsroman. Joining her are the younger but equally insightful North American writers Nancy Farmer, well-known for The Ear, the Eye, and the Arm (Farmer, 1994) and The House of the Scorpion (Farmer, 2002), and M.T. Anderson, chosen for this panel based on his artfully crafted Feed (Anderson, 2002). The purpose of our panel, to discuss this latest work of John Weaver, begins with the need to seriously confront questions of education and culture in light of those di- and trichotomies we ignore at our peril: the human-machine opposition and machine-organism-consumerculture triathlon now turned by educational policies and practices into hierarchies of value and power. In the mundane practices of our everyday work, technologies serve the educational objectives, and in the process, privilege mind over body, as if the body and the mind were somehow completely separate from those technologies in the first place. Who could have come up with such a silly fantasy? But through some quirk of fate, we apparently live and enact this confusing fantasy and in this way simultaneously train ourselves in an ignorance
of the interconnections of technology, biology and culture. Realizing that an
authorial voice rarely serves to sway in its rhetoric, John’s HandBook™ offers
readings of key texts of our cultural moment—novels, films, popular consumer
purchases, texts of our own bodies, and in doing so, the HandBook™ invites us to
read together. Our panel members enjoy such work, too, but have chosen another
path, where they construct apparently virtual, non-real, worlds, and in their worlds
they weave stories More-true-than-truth-itself©. By sidestepping the authorial voice,
they replace the rhetoric of policy with the actions and beliefs of characters. We
can only consider our own beliefs and actions in response.

Nancy Farmer’s characters, Ear, Eye and Arm, are iconic representations of the
biological transformations caused by environmental havoc, children of their new
millennium. Technologies and their wastes have created mutants who live with
superpowers. Ear can hear an insect miles away, Eye can see that same insect, and
Arm can reach and feel at least as far. For the rest of us, in our Scenery©, we might
simply strap on a bionic ear, eye or arm replacement, take an enhancement pill,
or jack into the net, and accomplish the same prosthesis-as-super-power goal.

What I got from Farmer’s book, though (Appelbaum, 2008), was the ways that
technologies limit as much as extend our powers: these three characters market
themselves as detectives with special gifts, and then we see the ways that Ear is
traumatized by the constant din surrounding him at all times, Eye is blinded by the
pains of what he sees, and Arm is almost completely debilitated by the feelings and
pains of everything and everyone he touches. They save the day in the end, but not
thanks to their technology-as-prosthesis talents; rather, they manage their lives both
with and in spite of their prosthetic enhancements. In Farmer’s House of the
Scorpion, Matteo lives an early life of privilege and comfort. He eventually learns,
however, that such a life is merely a narcissistic projection of the Estate’s Lord,
who routinely harvests clones (exactly) like him for organs and other body parts as
needed to extend his own life. Matteo’s life is both possible and likely to end
prematurely through and because of the technological and scientific advances of
his historical moment. The Estate is powered by the hard work of ‘eejits’ on the
plantation, who produce high quality drugs for world distribution. Where and how
does education take place in these representations of our world? The rise of
technology and the biosciences seems accompanied by a decline in formal schooling,
establishing a clear statement of the direction we are headed in this (other) world of
ours, the one where I© and You© might touch.

In Feed, we are treated to the great relief that school can finally achieve once it
is taken over completely by corporations. Adolescence can be a time where school
really teaches you what you need, as in how to use the feed, the net, now that we
have the jack implanted in our bodies. Everyone is always smart, that is, has access
to all information needed or deemed worthy of being accessible, at all times. This
is just one tiny step beyond where we are now, carrying some small jack-in device
like a cell phone or laptop around in search of wireless, but it makes an
analogously small difference: We really can be linked-in at all times, sharing in the
bliss of advertising targeting precisely at our interests and tastes, chatting with
friends and consuming entertainment within our bodies at all times. We no longer
look at screens; we just are the net. The only casualty of the system one might remark on is the loss of metaphor. At least, Anderson helps us to consider the possibility through one character, Violet, who notes this lack of metaphor within the feed. And, of course, any person who recognizes this loss is, we can see by the end of the novel, likely to be anti-social and likely to experience a very early death. What might it mean for us to maintain a virtual world of formal schooling that trains us in making the most of the consumer opportunities our networked bodies afford? We are merely asked to pay for this hedonistic heaven with the sacrifice of metaphor and the lack of anyone who can see that as a loss.

It is a truism of our historical moment that science fiction is so uncanny. We look into this alien world and see ourselves; posthumanity is our updated Freudian mirror. Oh my, how alike we are! The fantasy professes difference; but really, we see our own world in the virtual fantasy. We don’t know where our ‘bodies are placed’ – which is the image and which the object? And in warmly repeating this truism – oh, how uncanny! – we let the horrors of the message slip by, unaddressed and unattended. We lament the lack of theories, tools, to make a difference, tossing our obligations into the void of justificatory ‘lack’ and absence. John mentions Eugene Thacker, who whines that we still do not have “a way of understanding the relationship between biotechnology and popular culture that is unique to the concepts, technologies, issues and knowledge specific to biotech” (Thacker, p. 340). We’ll see, though, that John’s reading is more useful for us than Thacker’s: as long as we buy into a trade-off of side effects and unintended consequences, we can enter the nirvana of biotechnology. This has become our ideological imperative, taught and re-taught over and over again as the explicit and implicit curriculum of popular culture and formal schooling. However, as Violet finds out in Feed as her concerns for metaphor lead to a new way to play the consumer game, unless your illness is profitable, then corporations are sorry to say that your illness is not curable. There is no incentive to research your problem. One place where I might disagree with John, and You© will have to make up your own Mind© about this, is whether public schooling has strayed from a different intention. Is it really the case that “Public schools have willfully become intellectual vacuums, cultivating a generation of superficial minds”? (see p. 7) I profess a belief that schooling, as instrumentalism, has always been about control and governance of governable ‘citizens’.

Tanith Lee’s books from the 1970s raise this last point. In the protracted adolescence of the “Fours”, life is usually forever, and the apprenticeship of community members encourages frequent changes in body, drug-induced fantasy, and joyful change of one’s physical sexual identity, sexual preferences, and partners. Hypno-school leaves everyone capable of meditating on multidimensional polyhedrons, yet all necessary work to support life and community is carried out by quasi-robots, melds of organic and inorganic flesh and programming that differ from humans only in the absence of a life spark. Human life is rendered superfluous if not the grounding reason for the existence of the Fours in the first place. The hedonistic education of adolescents over centuries leaves them ready to take on the lifestyle of older people, those who push buttons and move levers no longer necessary to push and move. The first-person narrator, an every(wo)man stand-in for You© and Me©,
predominantly female her body choices, is led, as is John in Chapter 8, to the poetic. Her search to understand “what it means to be in this world—a world that is simultaneously natural and artificial, human and technological,” (see page 137 in Chapter 8) guides her first to explore the historical experience of the romantic poets, in the body of a male for some reason, on the way to a final commitment, as a female, to a life outside of the Fours, a life of hard work focused on “a humane environment” where “these overlapping and interdependent realms emerge” (p. 137), turning a desert into an Eden of technologically-supported ‘natural’ farming.

One simple lesson of our expert panel and, I suggest, found in this Handbook™, is that we should expect our explorations to be received as threats by some in power. John notes the biosciences are likely to recoil at our reaching out to touch them, even as we, like Nancy Farmer’s Arm, are condemned to feel the trauma of our reaching in the process. Let’s take a very concrete example: I am sorry, but I recoil in horror at the thought of black market trading and selling of human body parts, as much as I condemn and argue against the legal harvesting of such pieces of our bodies-as-commodities. Is this a commitment I am to act on within a mathematics curriculum? Social studies? Language arts? Biology? Until we can transform our categories of curriculum so that my question would have no purpose, until we no longer need to utter the question in the first place, we need books like this one in your hand. Now for a more abstract example: are we teaching people who are bodies? We might be tempted to locate an amnesia of the body in the ‘discovery’ of DNA that transformed our biology into information strings, and move on, to the practice of trading in our bodies for new ones on a whim, as in Tanith Lee’s ‘stories’. They are hardly different from the tales of cosmetic and prosthetic surgery John uses to make a host of points in this book. However, in claiming that ‘hardly different’, I feel like I am creating a false border between the stories told by Lee, Farmer and Anderson, those reported in newspapers and on-line news-feeds, and recounted by John. What resides in the border pedagogy of story and journalistic or academic analysis? “Uploading,” writes Richard Doyle, “taken as a practice and not simply as an imaginary ideal...becomes...a “technology of the self,” a comportment or “fashioning” of subjectivity that humans carry out through a certain number of operations on their own bodies and souls, thoughts, conduct, and a way of being, so as to transform themselves in order to achieve a certain state of happiness, purity, wisdom, perfection, or immortality.” (Doyle, p. 845) In the dystopias of our expert panel, the posthuman has become more of what Doyle terms a “post-fucking community” (p. 840), governed less by reproduction and its taboos, that is, less by wielded power and control, than by machine-mediated replication and its associated limitations. These kinds of replications are not spread biologically by sex or death, but through copy and citation, These communities offer an ‘ethics of the machine’ that, in the posthuman, post-fucking narrative, seeks less intentionally to obliterate than to proliferate, as machines no longer obey a false border of their contexts, and spread through human desire.

Dystopias cry out for detoxification in their smudging of the machine-organism opposition. “Organisms...are now moments in an evolutionary syntax” (p. 840)—is Richard Doyle resonating with our panel? I believe so. In the unlimited character
of the upload, are we, by which I suggest You© and Me©, sampled rather than ‘lived with’? Perhaps the strategy best suggested by this HandBook™ is to celebrate the discomfort that emerges when we become the characters in a world that foregrounds the desires we enact. Do we want a new body? A new life? A different idea? New opportunities or something that others routinely experience, now made possible through bioscience? At what cost, and to who’s cost? And who is exiled or pained by the desires we enact? Those with special gifts, as in The Ear, the Eye and the Arm? Those whom we harvest for our benefit, our clones and slaves, as in The House of the Scorpion? Those who question the lesions that are the strange side-effect of a jacked-in life, as in The Feed? Surely it is no better to escape to the desert and join the others in a utopian vision of biotech-based independence, as in Biting the Sun. We don’t have to think about any of this if we say we lack the conceptual or technical tools, or spend another century on protracted adolescence. Our modes of investigation determine, delimit and debate how we reboot: Reprogram. Eject Curriculum©, connect to data-cloud: Uncanny®.

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I would like to thank my graduate students. I was able to think through and express many of the ideas in four seminars I taught through 2006 to 2008 including The History and Culture of Genetics, Education and Drugs, Biotechnologies and Technocultures, and Reclaiming the Liberal Arts. In particular Shelley Stahl, Domenica Devine, Melanie Watson, Teresa Ferguson, Barry Krakovsky, David Owen, Monica Radcliffe, and Becky Stodghill have helped me develop my ideas.

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I want to acknowledge and affirm all those people who feel their health and well being does not matter. You are cherished by many and in a living democracy all would love you.
CHAPTER 1

EDUCATING THE POSTHUMAN

Interdisciplinarity With/in the Mind, Body, and Heart

To give space for singular events, to invent something new in the form of acts of writing which no longer consist in theoretical knowledge, in new constative statements, to give oneself to a poetico-literary performativity at least analogous to that of promises, orders, or acts of constitution or legislation which do not only change language, or which, in changing language, change more than language.

—Jacques Derrida, Acts of Literature, p. 55

In such a glomus, we see the conjunction of an indefinite growth of techno-science, or a correlative exponential growth of populations, of a worsening of inequalities of all sorts within these populations—economic, biological, and cultural—and of a dissipation of the certainties, images, and identities of what the world was with its parts and humanity with its characteristics.

—Jean-Luc Nancy, The Creation of the World or Globalization, p. 34

The nightmare that is the present—in which educators have little control over the curriculum, the very organizational and intellectual center of schooling—has several markers, prominent among them ‘accountability,’ an apparently commonsensical idea that makes teachers, rather than students and their parents, responsible for students’ educational accomplishment. Education is an opportunity offered, not a service rendered.

—William F. Pinar, What is Curriculum Theory, p. 5

Another way to put this is to say that the university is the place where what really counts is the ungoverned, the ungovernable. The un governable does not occur all that often. Most of what goes on in the university is all too easily governed.

—J. Hillis Miller, Black Holes, p. 181

These embodied excerpts from four of the leading intellectual figures in the world represent the heart of the matter, the state of the mind in the United States. Two philosophers, one literary critic, and a curriculum theorist capture the intersection of science and literature as they manifest themselves in the university, public schools, and society. This book is about the merging of biotechnologies
(pharmaceuticals, cosmetic surgery, germline engineering, and stem cell research) as they converge with/in our bodies and reshape our identities as human beings. It’s about how certain forms of literature (Frankenstein, A Scanner Darkly, The Picture of Dorian Gray, Stoner, Harry Potter and the Order of the Phoenix, and A Mercy) have prophesized our present condition and forever altered our mind’s imagination as we think through pressing issues facing scholars, teachers, students, and citizens of democracies throughout the world. It is also about what universities (in particular schools of education but also the whole institution of higher learning) and public schools can and should be (the hope of curriculum theory) and, unfortunately, what they are (anti-intellectual).

A POETICO-LITERARY PERFORMATIVITY OF THE MIND

In the Origin of the work of art, Martin Heidegger suggests that every word in a language contains a poetic essence but just because every word shares this potential does not mean words reach their poetic power. The essence of language loses its poetic life force through an impatient public who wishes to receive, like a passive learner, only the most concise and clear of speeches and sentences. Anything else muddles meaning, taxes the brain, and challenges patience. Metaphoric language is lost in the desire for clarity. The poetic force of words is also lost in the dominance of instrumentalism in which everything has to have a purpose, an usefulness, an economic value. Words lose their literary potential too through a desire to turn language into a technique or a process with easy steps to follow as if every piece of literature were a user’s manual. Fortunately, in spite of these trends to belittle the poetic and to make language ultra-efficient, language has a life of its own. Metaphor is the source not of obfuscation but enlightenment and potential, instrumentality is not the source of importance but death, and literature is a user’s manual but it is one that has very few steps to follow yet contains countless lessons to nurture the imagination. Language, through literature but in other areas as well, circulates and creates new opportunities to change our minds with/in the world. That we live in an instrumental, hyper-efficient, stale world of global capitalism highlighted by the meteoric rise of the biosciences should come as no surprise to most readers. What should come as a pleasant and ironic surprise is it is the poetic and literary worlds that provide us with the most hope to understand what it means to live in a posthuman world.

Since the early 1970s when the universities in the United States experienced unprecedented hiring within the professorial ranks, the humanities have enjoyed only a little of the growth universities experienced. Professional schools such as business, education, nursing, and information technology, select profit-potential disciplines such as biochemistry, and genetics, and burgeoning fields such as physical therapy, marketing, and hotel and restaurant management represent the growth universities have experienced since the early 1970s. Fields such as literature and literary criticism have become less important and lost favor in the instrumental university. As a result of these shifts within the university, literature programs disbanded in some liberal arts colleges while others were restructured
and downsized. The number of Ph.D.s earned from literature departments stagnated as the status of literature as an important field of study in shaping citizens of democracies declined. Yet as a testimony of the performative power of language and the embryonic promises in all poetico-literary creations, literary scholars did not accept their declining role in society as a sign to retire and retreat. Instead, literary scholars have become more important as they reshape their role as cultural commentators within a posthuman world.

Initially gleaning their power from the national and cultural power of literature to shape citizens and refine young men and women, literary scholars now find their intellectual authority in their abilities to extend their reach out into other fields such as the biosciences. These scholars offer the most comprehensive and thought provoking accounts of what it means to live in a posthuman world and what the implications of the biosciences are not only for humans but for other species as well. A short list of these scholars I hope proves my point. The work of Katherine Hayles (1990, 1999) for the past twenty-five years has demonstrated the connections between such scientific fields as chaos theory and cybernetics and literature. Mark Hansen’s (2004, 2006) work connects Bergsonian philosophy with digital technology and digital art. Donna Haraway (1990, 1997, 2007), although a biologist by profession, relies on her literary familial background to connect the sciences with humans, animals, and machines. George Landow (1997) connects literary projects with hypertext technologies and David Porush (1985) sutures cybernetics to fiction. These projects were born not only out of the poetic curiosity of these individuals, but also the necessary restructuring of literary fields within universities. Without the renewing power of language and the renewing potential of the university to promote creative thought, none of these works could have been accomplished.

Even before Derrida spoke of a Poetico-literary performativity literature possessed it. Mary Shelley’s Frankenstein is considered, rightfully so, to be a canonical piece of literature. Before the biosciences emerged as legitimate and productive fields of study Shelley warned of the effects of science on the human body and soul. Shelley did not save her warnings only for science. Mary Shelley also offers as least four pedagogical theories including the one theory, status quo learning, that holds a vise like grip on public schools and universities today. In chapter three, “Mary Shelley’s Graduation Gift,” I suggest that Shelley’s visions of what science and education will become were accurate but her visions have had the opposite effect of what she predicted. In science, Shelley’s warning against tampering with human nature and the creation of unwanted monsters has gone unheeded. In the realm of cosmetic surgery the “monsters” are coveted and the creators have not run from their “creation”, except in cases of malpractice. Instead, cosmetic surgeons gloat and parade their “creations” on television, in advertisements, and popular magazine articles. Cosmetic surgery has become so common that it has become a popular graduation gift for high school seniors across the United States. What better way could parents say we are so proud of your intellectual accomplishments than with a gift of love, a nose job? After all, more and more, it is the case that a nose job and other surgical procedures will lead to a good job. And this has become the reason for education.
CHAPTER 1

What is often ignored in Shelley’s *Frankenstein* is her views on education. Shelley presents three versions of a liberal arts education, one that is dangerous if unguided, one that is acceptable if harmless and useless in the practical world, and another, the monster’s “home schooling experience,” is ideal. The fourth version of education she presents is the form of education that prevails in contemporary schools and some universities. Shelley argued for an education that encouraged students to accept their station in life and to never test fate since one cannot be sure what monsters may lurk in the future. While Shelley’s scientific monsters have become artificial beauties, Shelley’s educational monsters have come to dominate our schools as learning has become job training and test taking. The curiosity of Victor, poetics of Henry Clerval, and the dedication of the monster have been lost in the rush to secure a mundane job and pass a meaningless test.

In Chapter four, Mors Ontologica, I will introduce Philip K. Dick’s *Scanner Darkly* to discuss the alarming trend to drug young people with pharmaceuticals in order to control them. We are a nation at war, supposedly, not just with this thing called terror but also with drugs. However, as more and more people fill their internal systems with prescription after prescription in order to control a supposed learning disorder, restless feet, disappearing feet (that’s obesity), wrinkles, aging and limp penises, and other intellectual or physiological concerns it is harder and harder to determine with whom the United States is at war. Is it the poppy growers in Afghanistan whom we continue to let grow their cash crops or is it children whose growing bodies are filled more and more with “kiddy cocaine,” Ritalin and Adderall, at the same time their moldable minds are filled with such trite slogans as say no to drugs. Should we be surprised that children today seem a bit confused? “So let me get this straight,” a child today might ask a doctor or teacher, “you want me to take this pill that might make me feel as if I were stoned or on speed and may cause me to feel emotionless and suicidal while suppressing my appetite but I am suppose to avoid smoking marijuana and taking speed in order to feel happy and get through the mundaneness often referred to as my education?”

In his groundbreaking book, *Global Genome*, Eugene Thacker suggests “we still lack a way of understanding the relationship between biotechnology and popular culture that is unique to the concepts, technologies, issues and knowledge specific to biotech” (2005, p. 340). In chapter five, Posthuman Art and Advertising, I focus on *The Picture of Dorian Gray* and pharmaceutical commercials. In this chapter, I discuss how pharmaceuticals take biotechnology knowledge to shape a world image that allows viewers to enter into a pharmaceutically constructed Nirvana if, and only if, they take the latest wonder pill and accept the inevitability of side effects. Many of the images pharmaceutical companies project in their advertisements are comical at times but always serious in their effects on human bodies. No matter what they promise and how they try to shape this world with images rivaling Coleridge’s drug induced Xanadu it is a world constructed by and for the pharmaceutical industry. If you do not have an ailment that needs relief do not worry the pharmaceuticals will create a problem for you to fit their solutions. Now that is proactive medicine with a supply side economic twist! Pharmaceutical companies will cure you even before you are sick or even before you knew you were sick with the latest acronym. They have a colored coded pill for everything.
Unless of course your illness is not profitable, then I am sorry to say your illness is not curable. There is no incentive to research your problem. Why is it corporations need incentives to do what is morally right and ethically responsible?

A GLOMUS BODY

For the French Philosopher Jean-Luc Nancy, a glomus is an “‘agglomeration,’ in a sense of the conglomerate, of the piling up…a concentration of wealth that never occurs without the exclusion of a margin that is rejected into misery” (Nancy, 2007, p. 3). A Glomus is like that fictitious B movie creation, the Blob. It grows and grows, preying on the efforts of billions of people and as it grows in its gluttonous state the billions around it become emaciated. The glomus though is different in one very important way from the blob. While both the glomus and the blob are objects of terror millions in the world seek out the glomus while everyone fears the blob. The glomus is globalization, international trade offering up trillions of dollars, yens, and Euros to the most powerful and aggressive. It is the merger of techno-science with globalization offering wonder drugs to the insured and wealthy of Europe and United States while the poor and sick throughout the world are offered up as test subjects in clinical trials. It is the latest gene therapy from numerous genome projects, local and international, as geneticists throughout the United States and Europe partake in an international exchange of ideas and Western companies benefit from spin off products from taxpayer funded research while the rest of the world is barred from partaking in the serious research because they are not from the West. The glomus is the privileging of the artificial body over the natural body. The artificial body represents accumulation of wealth, access to state of the art medicine, and disposable income to stave off aging, live longer, and avoid genetically influenced diseases. The artificial body is the first site in which the privileged are able to touch and interact with the natural world. Those with artificial bodies are like a Disney theme park, gated off from the real world of diseases, starvation, aging, poverty, and misery, free from worry where every wish comes true. It is where humanity abandons its brotherhood/sisterhood. The natural body, on the other hand, is where the body intersects with the real world, not the real world constructed by MTV, but the world of colonialization, exploitation, and inequality. It is the other side of the Disney theme park fences where crime exists, hardship, strife, and nightmares occur everyday. It is where humanity is dehumanized.

The biosciences are a major player in the world of surgeries, drugs, and genetic alterations. They are also players in colonialization, corrupt politics, and dehumanization. In chapter two, Theorizing the Posthuman, I will discuss in more detail what I mean by the posthuman condition including its more humanizing aspects. Thus far, what I have discussed concerning the posthuman is less than hopeful and down right apocalyptic. There are numerous dimensions of the biosciences that are noteworthy and do not deserve harsh criticism. For as many “graduation gifts” high school students may receive in the name of vanity, there are just as many if not more young people who are benefiting from cosmetic surgery techniques that assist them in overcoming sinus problems and more importantly tragic burns or accidents. A similar statement might be said about the pharmaceutical
industry. Although there are too many students who are falsely diagnosed with ADHD (Attention Deficit Hyperactive Disorder) others take pills to help them with their allergies or breathing difficulties without major side effects or deal with serious depression and numerous other legitimate illnesses. The biosciences are part of the glomus but they are also part of the solution as well. What is needed in regards to the uses of the biosciences is a democratization of international science policy. This is not a science matter but one of political will.

THE WILLFULLY DYING HEARTS: PUBLIC SCHOOLS AND UNIVERSITIES

Have you ever heard of a story of an elderly couple who lived together for 50, 60, even 75 years through the peaks and valleys of life and when one of them passed away the other quietly passed too a few months later? And when you attend their funeral people cannot explain why they passed away in such a short time frame from each other so they draw the only conclusion they can: The surviving spouse died of a broken heart. It is as if they willed themselves to die. This is exactly what public schools and universities are doing. There is a slight difference in this analogy between an elderly couple and public schools and universities. While the surviving elderly person passes from loneliness or the heart felt pain of reminiscing over memories of a life that is no more, public schools and universities are willfully adopting principles that are sucking the life blood and air out of these institutions. It is very difficult to top William Pinar’s nightmarish description of public schools. But I am afraid it is worse than a nightmare. A nightmare at least ends when you wake up in the morning. Teachers, students, and scholars interested in public schools are experiencing a very long night. Once where schools offered hope in creating citizens of an active democracy and once offered hope to those who wished to receive an education, now there is no covering the public school agenda with a veneer of democracy or individual enlightenment. Democracy and the development of the mind are the latest casualties in the rise to dominance of global capitalism. Now public schools exist for three reasons: job training for future workers, docile test takers, and future consumers. Public schools have become an integral part of the local and global economy. Where corporations use to spend millions educating their workforce, part of corporate welfare is a sense that they are entitled to a workforce already trained to do a specific job at taxpayers’ expense and at the expense of the individual’s intellectual development. Where schools use to be accountable for creating opportunities for individuals to learn, public schools are now seen as training sites in which successful test takers are created so politicians can proclaim they are holding teachers accountable and local real estate agencies can proclaim potential homebuyers are entering into a quality neighborhood with good schools since 95% of their students passed the latest battery of standardized tests. Students are taught that their role in society is to be a major part in the economic engine of the United States but the only way they can perform this patriotic duty is to earn money and buy as many things as possible no matter how indebted they may become to loan sharks disguised as credit card companies.
As you may already see from the previous paragraph I am not very hopeful about the democratic and intellectual future of public schools. In Chapter seven, Installing Mimesis in Public Schools, I will argue that public schools have willfully stopped their beating heart by submitting to basic principles that do not match the original intentions of public schools. Public Schools have submitted to an economic instrumentalism that reduces everything to a usefulness defined by economic value. Anything, such as art, music, reading, or writing, cannot be allowed to flourish unless it can be justified as test preparation. To allow time to think or free time for reading would be inefficient and a waste. Students have to read in order to get Accelerated Reader points, write to score well on the Scholastic Aptitude Test, and participate only in those activities that prepare them for the state wide battery of tests. Individual development of the mind will be tolerated if it can be quantified as an indicator of how many students are taking advanced placement courses or can be used as publicity of the academic success of a school. Public schools have willfully become intellectual vacuums, cultivating a generation of superficial minds. How far are politicians and economic leaders willing to sacrifice the intellectual development of a generation in order to create satisfactory test scores? Congratulations, school administrators, state officials, and business leaders schools are performing at a level deemed adequate. Now what? What contribution will public schools make to the well being of humanity? It is my belief that an interdisciplinary science curriculum can end the nightmare that haunts public schools. Through issues such as cosmetic surgery, pharmaceuticals, the human genome project, stem cell research, and cloning, a complicated conversation about democracy and schooling might return to public schools.

As much as I am pessimistic about the future of public education, I have become equally dismayed at the current course of higher education. In chapter six, Making Room for Stoner?, I want to make a plea for my curriculum theory colleagues to consider leaving Colleges of Education. Colleges of Education have willfully traded its intellectual soul for an accreditation process obsessed with rubrics and learning outcomes, instructional approaches that are anti-intellectual, and the same instrumentalism public schools have willfully adopted. While the whole university is not much better than Colleges of Education at least the humanities still value reading, writing, thinking, and talking. These are the four hallmarks of any graduate education and Colleges of Education do not seem to understand this. Most professors, I hesitate to use the word intellectuals, do not require their students to read much if at all, do not ask them to write well or at all, do not ask them to think, and rarely discuss matters in a manner fit for graduate seminars. Instead Colleges of Education insist on passing down to their students models of learning that do not require much thinking. Education is now a series of steps faithfully followed in order to create the right rubric or learning outcome. The only thing missing from Colleges of Education is life itself. Colleges of Education have abandoned the life force of the university, that which is ungovernable, and coveted the governable. That which is not governable is ignored and wished away.

In the past as a professor of curriculum studies I have always had to defend myself from two camps. The first camp was from the “practitioners” within the College of Education who like to say the same things: “I was not hired to write, I was
hired to teach” and “you curriculum theorists are not practical.” The first, decoded, means some professors do not wish to tax their brain with the struggles of writing, thinking, and reading, and the second implies curriculum theorists have their heads in the clouds with no anchor or bearing on the ground. Both are absurd. One cannot teach well if one does not write, think, or read. It is through writing that we place our thoughts about pedagogy into concrete terms. It is through writing that we breathe life into our teaching and our students and it is teaching that gives meaning to our writings. However, if one develops a model and if one creates an approach to pass this model onto the next generation then what is the necessity of writing, thinking, and reading? With writing, thinking, and reading already done, College of Education professors need not profess anything, they merely have to pass on the model of instruction onto the next generation of non-thinkers. This is why life has left. Writing, thinking, and reading have stopped. The ungovernable that Miller speaks banished.

The second camp comes from the Arts and Sciences. These scholars, and they are scholars, lump curriculum theory with Education instructors because this is where we are institutionally housed, and as a result curriculum scholars are dismissed as too practical and not theoretical enough. This assertion suffers from the same fallacy as the first camp. How can one only be theoretical? There has to be some grounding of theory and that is where practice comes in. Even the greatest of theoreticians such as Einstein grounded their work in a practice that could prove their theories. As curriculum scholars we need to persuade our humanities colleagues that their impression of curriculum theory is incorrect and our work is worthy of their attention. We have a long history of drawing our theories and interests from the humanities and it is time we call their departments our homes. If we are successful in navigating these institutional changes curriculum theory I believe will find life again in the university and perhaps find new reason to reenter public schools. If this effort is not made I am afraid curriculum scholars will continue to flounder in a lifeless academic atmosphere, disrespected, unappreciated and destined to join others who abandoned their intellectual callings for more governable endeavors.

I end the book with chapter eight, Curriculum Studies is (Bio)Technologies: Toni Morrison’s Humanity, Becoming Nietzsche, and Stiegler’s Technics. With Morrison’s latest novel, *A Mercy*, I ask who shall count in the posthuman condition and realm of the biosciences. Morrison’s novel is about Jacob Vaark’s newly built home that remains uninhabited after his death. For me, this empty house is Morrison’s metaphor for a humanity that does not exist. The issues the biosciences raise may threaten humanity if the humanities and curriculum scholars refuse to assert themselves into these debates. If we are to become the people Nietzsche believed we are destined to be then we have to insist the poiesis of technics returns to the use of (bio)technologies. This will require humanities professors, curriculum scholars, and citizens of the world to challenge those forces, a sterile scientific method and an economic reductionism, that threaten humanity. The poiesis of technics requires that we recognize the many ways in which (bio)technologies constitute who we are and the world we inhabit.
CHAPTER 2

THEORIZING THE POSTHUMAN

Almost daily there is a story in the news or an encounter we personally experience that reminds us of the posthuman world. In 2008 and 2009 one of the most talked about news events was the Roger Clemens/Brian McNamee congressional hearings and “public trials.” It continues to be a media circus with the unsightly and undemocratic trial by popular opinion. Is McNamee telling the truth and indeed injected Roger Clemens, Andy Petitte, and Chuck Knoblaugh with Human Growth Hormones and Steroids? Or is Roger Clemens telling the truth when he vehemently denied ever using HGH or Steroids? Minus any conclusive evidence opinions will remain just that, truth will remain a mystery, and testimony will be treated with skepticism depending upon whom you believe. Underlining this spectacle is a very important question regarding society’s beliefs about athletic competition. What are the limits of competition and where is the line athletes may not cross in order to gain a competitive edge? May an athlete ingest a supplement, a form of speed that boosts their stamina as it does a truck driver or procrastinating student, but may not inject anything that might alter their bodies in a permanent way? May an athlete accept natural human athletes acceptable in competition while artificially altered posthumans are not?

The case of Roger Clemens is not the only example that tests society’s notions of competition. Oscar Pistorius, the South African sprinter, was banned from Olympic competition in 2008 because he had two carbon fibre artificial legs. An amputee since he was one year old, Pistorius was dubbed the blade runner and the fastest man with no legs after he finished second in the 400 meters in the 2007 Golden Gala in Rome. The International governing board of the Olympics claimed Pistorius had an unfair advantage with his artificial legs and could not compete in the Summer Beijing games. Pistorius petitioned the board’s decision, won his appeal but in the process of appealing failed to qualify for the Olympics in the South African track and field competitions. Pistorius believed he failed to qualify for the Olympics because he was too busy fighting the Olympic governing board and unable to adequately train for the races. Anyone can point to the examples that make the board’s decision specious and discriminatory since numerous athletes already alter their bodies to gain a competitive advantage, and the Olympic governing body ceded all moral authority when it decided to hold the games in Beijing, a nation with horrific labor practices and known connections with the forces committing the Darfur massacres. Pistorius did not have a choice in altering his body, he merely was trying to make do and demonstrate how people with disadvantages can overcome these barriers and compete with anyone. As it was with the Clemens’ case, this case raises the issue of what it means to be a natural athlete and what the limits of artificial assistance are when performing to the best of one’s ability.
The dilemmas posed by the posthuman condition are not limited to athletic competition. Recently I was walking the halls of Georgia Southern’s Education building and this student captured my attention. She was in the Learning Resource Center walking from a computer to the printer across the room. This was no ordinary student, however, she had a full prosthetic leg along with a natural leg. The fascinating aspect about this student is how perfectly natural her gait appeared. Most amputees have a slight limp in their gait either from an imperfect match between bone/flesh and artificial device or an uneven match between the length of the natural and artificial limbs. This student had no limp, no visible discomfort or discontinuity. Was she a war veteran who lost a limb in battle, was she like Pistorius a victim of an accident at a very young age, or was she born with a genetic disorder that disfigured one of her legs? No one may ever know but was this person, clearly a posthuman, disadvantaged by her life experience? I would suggest not. Prosthetic limbs have been around for centuries now but what makes the current age different is how seamless the move from natural human to posthuman appears.

One final example in education highlights the complexity of the posthuman condition. Every year millions of children are placed on some neuron altering prescription drug to help them deal with what has been labeled Attention Deficient Hypertension Disorder (ADHD). And each year some of these cases end up in court in which a judge orders parents, against their own wishes, to administer the drug to their child because they appear out of control in the classroom. What do these cases say about a society that wishes to drug some of their young citizens in the name of orderly classrooms and successful test takers? What does it say about a nation’s priorities when they seemingly care more about the “naturalness” of their sports heroes than they do about school children? In this chapter, I want to theorize the posthuman condition, the impact of the biosciences on our lifestyles, the political and cultural impact of the biosciences on the world, and the lack of a conversation within curriculum studies about the posthuman condition.

THE POSTHUMAN CONDITION

I want to begin with what I mean when I use the phrase posthuman condition. There is almost as many ideas and definitions of the posthuman as there are people writing about the subject. There are some who believe a posthuman is a person who communicates via the internet and sends good vibes to anyone within “cyberdistance” of their consciousness and still others who define the posthuman as anyone whose abilities are enhanced by such mundane and common prostheses as eyeglasses. In both cases such broad notions of the posthuman condition runs the risk of diluting it and rendering it a meaningless term. Friedrich Kittler in one of his recently translated essays, “Protected Mode,” uses the term posthuman for shock value. Unlike any of his earlier works, in this essay Kittler uses the term posthuman literally as in after humans Johnston, 1997, p. 158). Then there is Gregory Stock (2003), a biophysicist and popular science writer, who proclaims
that the posthuman condition marks the rise of a new type of homo sapiens that will soon replace the current version of humans. He does not predict that the current species will die out like other species have through natural selection. We will just be inferior therefore worthy objects of disdain and discrimination.

While I resist any developments that might support Stock’s prediction, I reject his notion of posthuman as too destructive, the others I reject because they are not helpful in discerning what the posthuman condition might mean and in Kittler’s case, I find it rather meaningless to discuss a condition that implies humanity has no role. If Kittler is correct that posthuman means after humans, I much rather live out my last days doing something more mind altering and numbing then writing something that no one will be around to read or ignore as it collects dust in university libraries. My definition of the posthuman resonates less with the new age keyboarder, more complex then someone who wears eyeglasses, less apocalyptic than Kittler, and less Orwellian than Stock. In defining the posthuman condition I want to begin with a generic notion and then complicate and expand it.

At its core the posthuman condition implies the merging of humans and machines in order to enhance or improve human capabilities. There are two types of posthumans: cyborgs and fyborgs. The cyborg (cybernetic organism) is the more traditional term created to describe any human who is permanently connected to a mechanical devise such as a prosthetic limb, an organ transplant, a pacemaker, or an altered gene sequence. These devices extend the abilities of the recipients to live better or in some cases such as the artificial heart to live period. Very few people would argue that all of these devices make a person’s life better if one’s quality of life is improved. A Fyborg (functional organism) is a more recent term and describes more effectively humans whose lives are enhanced because of some form of biotechnology. A fyborg maintains an intimate relationship with technology but unlike the cyborg the mechanical intersection is not permanent. A fyborg is someone who undergoes regular kidney dialysis, has a hearing aid, wears eyeglasses and perhaps in the near future benefits from some stem cell procedure.

In a practical sense, the posthuman condition is an enhancement of natural human capabilities. For purely hypothetical purposes, lets posit that a person who hypothetically speaking found themselves in an ill-conceived and deceitful war, lost a leg, and gained a prosthetic limb. This new state of the art prosthesis could permit them to run as if they had their natural leg thereby presenting opportunities for this wounded Marine to live as close to the same life they experienced before the unfortunate event. The prosthesis in this case enhanced their ability to live. The same is true for an organ recipient. The life of an organ recipient is enhanced with their new organ and a regiment of expensive prescription drugs.

Enhancement is not the only word we can use to describe the posthuman. Extension is just as important and effective descriptor. When a recipient receives an organ or possibly multiple organs, their lives are literally extended, sometimes years, beyond the prognosis without a transplant. An individual who receives a retina transplant or even goes through routine laser surgery is a posthuman because their eyesight extends beyond what they normally could see. A person who receives a state of the art prosthesis now experiences an extended sense of
touch that was missing when there was no limb to feel. And yes, the person who receives a new pair of upgraded glasses technically is a posthuman whose vision is extended to what either the old pair of glasses or the natural eyes could generate.

Both of these words, enhancement and extension, imply an optimistic state of affairs. As I wrote above few would doubt this optimistic potential of the posthuman condition. Yet, one can readily construct very real scenarios in which this notion of improvement is very limited in scope and meaning, placing in doubt the whole idea that the posthuman condition is a better state of being. Initially the idea of the posthuman condition implying a state of improvement refers to the medical and physical condition of the individual who undergoes a life saving or altering procedure. Beyond this definition of the word improvement, however, the posthuman condition is problematic. For instance, bioinformatics, or the reading of one’s DNA, will do wonders towards the creation of personalized medicine. However, while the promises of personalized medicine are currently futuristic, insurance companies are reading the DNA of applicants and denying people coverage where ever they may find a DNA strand believed to contribute to an illness such as cancer. Such a policy is immoral and parasitic, typical behavior many have come to expect from a corporation in the United States. First, insurance companies are falsely assuming that simply because one has a DNA strand linked to an illness that it is inevitable that cancer will develop. In many genetic based or linked illnesses this is not the case. One has just as likely a chance to contract breast or Ovarian cancer by smoking and living near a chemical plant then they would if they had a mutated BRAC 1 or BRAC 2 sequence. Yet insurance companies are basing their discriminatory decisions on this genetic information. Second, this approach to determining insurability is separating citizens of a democracy into two types of people. Those deemed worthy of living a healthy life and those whose health is deemed value-less. Third, this case demonstrates corporate profits are far more important than the health of the public. Insurance companies are only looking for healthy clients who can guarantee corporate sustainability thereby increasing profits. Those people who cannot provide these guarantees are not important to the health care insurers. Such an approach to business in a democracy reduces individuals to objects, a thing to be bought and sold as a commodity exchange.

I will introduce one more example that will place the idea of the posthuman condition as improvement in doubt. Like insurance companies, the Pharmaceutical industry is devaluing humans. Although most of the innovative drugs developed in this country comes from taxpayer funds through publically funded research institutions or government agencies such as the National Institute of Health, pharmaceutical companies delight in spreading the propaganda that they are the source of introducing these drugs. In most typical cases, pharmaceutical companies enter into a sweetheart deal with the Food and Drug Administration to purchase, at a miniscule price compared to future profits, an innovative drug and then market it as if the pharmaceutical company developed it. What has emerged from this ethically suspect and typical global capitalism practice is the tendency to concoct a disease such as ADHD or Restless Leg Syndrome (RLS) to fit a new pill introduced into the market. Whenever we discuss the posthuman condition, scholars,
teachers, parents, administrators, and policy makers have to ask whose lives are being improved and whose lives are treated as expendable commodities and test sites for the latest prescription drug.

Besides these economic, political, and educational issues surrounding the posthuman condition, there are also aesthetic and philosophical dimensions in defining the posthuman. When one adds the word condition to the posthuman it not only refers to a medical state, it also implies a state of being. Whether the topic of discussion is a prosthetic limb, an over prescribed drug, gene therapy, an organ transplant, or any other example of the posthuman condition the physical body is not the only part of the human being altered. The mind is altered as well. When one enters into the ranks of the posthuman their relationship to the world and themselves changes. For example, Leslie Sharp (2006) in her work with organ recipients, donor families, and donor organizations, firmly establishes that the organ transplant process is only the beginning of the experience. Organ recipients, grateful as they are for having a new opportunity for life, experience bouts of depression and guilt, long term or permanent unemployment because of high insurance costs, and face mounting financial debt and potential bankruptcy. Organ recipients are not only altered physically because of their new heart, lungs, liver, or kidney, their very identity and essence is placed in doubt. In a society such as the United States’ in which one’s sense of self is shaped by independence and employability some organ recipients question who they have become. It is not a mid-life crisis for these people but a second life crisis and the United States is unwilling and unprepared to deal with these identity crises.

In her seminal study *How We Became Posthuman*, N. Katherine Hayles presents another warning against assuming that the notion of improvement implies better. Hayles believes the posthuman condition contains three underlining assumptions.

First, the posthuman view privileges informational pattern over material instantiation, so that embodiment in a biological substrate is seen as an accident of history rather than an inevitability of life. Second, the posthuman view considers consciousness, regarded as the seat of human identity in the Western tradition long before Descartes thought he was a mind thinking, as an epiphenomenon, as an evolutionary upstart trying to claim that it is the whole show when in actuality it is only a minor sideshow. Third, the posthuman view thinks the body as the original prosthesis we all learn to manipulate, so extending or replacing the body with other prostheses becomes a continuation of a process that began before we were born (1999, p. 2–3).

Hayles’ warning against what she calls the posthuman view conjures up immediate thoughts about elective cosmetic surgeries that continue to grow in number. Why are more and more young adults electing to have cosmetic surgeries done and more importantly why are cosmetic surgeons changing their policy and performing these elective surgeries on people under 18? Is it because they view their bodies as the original prostheses that can be “perfected” time and time again until the right exterior shape and look is achieved? Are more and more young adults viewing their bodies as accidents of history, alterable until the course of artificial history corrects what natural history failed to get right in the first place?
These concerns of the posthuman body as a disconnect from one’s essence and as amendable prostheses not only applies to young people but to adults as well. Why are more and more senior citizens getting knee and hip replacements? Is it because it is no longer possible to move around without pain or is it because in the long term a replacement is better and future problems might be avoided? Do more and more people view their bodies as expendable and less dependable? Is the body seen as letting us down therefore it should be replaced, piece-by-piece, before it actually does? The assumption that the body is an original prosthesis and one’s biological and physiological make up is an accident of history runs the risk of objectifying the human body in eerily innovative ways.

If Hayles is correct about the posthuman condition and her assertions do indeed capture the motives of young people and adults, then what is emerging is a revised edition of Mary Shelley’s Frankenstein. Instead of a hideous monster created from spare body parts, today the “perfected” body is created, the ageless rejuvenated body desired. Although the type of human (re)created is different, what remains the same is the response of the creators to these (re)creations. After vainly gloating that people will revere him and remember his name for an eternity, Victor Frankenstein bolted from his make shift laboratory once he glimpsed at his creation. Today, doctors are running from their responsibilities as well. Instead of challenging parents and young people to hold off on any elective cosmetic surgery because of the lack of full anatomical and physiological development, surgeons are ignoring these ethical questions. The same can be said about pediatricians who prescribe drugs to young people as if they were handing out pez candies at a Halloween parade. Where is the ethical reflection on the over prescription of drugs?

If the posthuman view becomes the prevailing mindset will this not further commodify the body? Is Hayles correct in asserting that we are already posthuman and the commodification process has already intensified. When I discuss the impact of the biosciences throughout the world in the next section, I will suggest this indeed is the case for some.

I do not wish to give the reader a false impression. A posthuman state of being is not just experienced as an identity crisis. This state of being is experienced through a radical transformation of our aesthetic sensibilities too. Aesthetically, the posthuman condition is marked by the explosion of the frame and the digitization or dematerialization of the image. Mark Hansen notes “the digital image explodes the frame…it need no longer be so bounded. Regardless of its current surface appearance, digital data is at heart polymorphous: lacking any inherent form or enframing” (2004, p. 35). This polymorphous nature or its untapped potential of the digital image is found in its expansion outside of any frame, and more importantly, how the digital image is about to latch onto the human body as a supplement and demand more creatively and physically from any individual who comes in contact with the digital image. What Hansen is trying to do in tapping into the full potential of the digital image is not to grant more power to a technological device than is necessary. The main effect of the digital image is not technological but the affectivity the digital image has on the body. For Hansen the posthuman age marks the return of the full sensorimotor body morphed with the technological. This morphing, however, demands more from the individual.
If the digital image marks the frameless existence, and if technology supplements the body then what are these new demands and expectations on the body? For Hansen, this question can be understood if we simultaneously reclaim the meaning of the affective found in the work of Henri Bergson and envision the body’s role in the digital image as having a primary framing function. The primary framing function permits individuals to feel the power of technological images, tame the untapped potential of the digital image and create (frame) the meaning of each individual image and its morphed offspring, thereby extending the power of the individual to feel the world beyond their natural means. It is this combination of the feeling human body and digital technologies that marks the posthuman condition.

To demonstrate how the human body works as the primary framing function, Hansen reclaims Bergson’s ideas on perception. Bergson, like Hansen, wished to return the body as the primary source of meaning. The body for Bergson was the center of indetermination. The body as the center of indetermination is how we experience and interact with the world. As Bergson noted “by sight, by hearing, [the body] enters into [a] relation with an ever greater number of things and is subject to more and more distant influences” (1994, p. 32). Each individual through their sensorimotor skills wonders about, interacting with the world, and from this wondering, which is not necessarily indiscriminate and haphazard, is what Bergson called our education. He suggested that “the aim of this education is to harmonize [our] senses with each other, to restore between their data a continuity which has been broken by the discontinuity of the needs of [our] body, in short to reconstruct, as nearly as may be, the whole of the material object or the world” (1994, p. 49).

In the digital age, one cannot educate one’s self, so to speak, without acknowledging the role technology plays in shaping reality and the tremendous impact technology has in extending the sensorimotor potential of each individual to educate oneself in the world. Technology in this sense does not dictate what the meaning of the world is, it merely serves as a means for each individual to educate themselves and create meaning for themselves. If each individual serves as the primary framing function, then the posthuman means that an individual must enter into the world, attached to some kind of technological supplement, encounter an endless flow of frameless and boundless digital images of all potential shapes and styles, create meaning from this information flow and make sense of the world every day and every waking moment. The world literally becomes not only an individual’s educator but also the canvas in which each individual constructs reality. The digital images and the technological supplements may provide the color, shape, texture, and potential to create the world, but it is the individual who determines what the world is.

Our aesthetic sensibilities are shaped in numerous ways through this human and technological interface. First, it implies that an individual cannot have a sense of who one is if one rejects technology. If the posthuman is marked by a morphing of individuals with technology, then to reject the technology that literally helps embody us is to reject who we are. Second, if the primary framing function is the primary function of the human sensorimotor relationship with the world then it is extremely difficult if not impossible to experience the world except through some
form of technological mediation. We all live some form of mediated life, and this mediation shapes reality as we interpret it. It does not shape our interpretation or usurp our primary function to frame reality, but the mode of mediation whether it is the television screen, film frame, painting, photograph, or some other filter, shapes what we refer to as truth.

There is one more important way in which the posthuman condition shapes our sense of identity. The posthuman condition, or as David Wills notes in his study the prosthesis, is an encounter with “difference as radical otherness” (1995, p. 45). The prosthesis is the embodiment of radical otherness because it is not a part of the natural body. It symbolizes an invasion or an intrusion of the body. Yet, as was noted earlier in my definition of the posthuman condition, without this invasion or intrusion into the body of the radical other, many individuals will die or live with lower quality of life expectations as they might have before a disease afflicted or an accident cursed them. The posthuman condition requires each individual to face a radical other, a different image in the mirror. This radical other, like the digital image, is polymorphorous. It can take the form of blood, a DNA sequence, a non-organic mechanical device, an organ, or a computer image. No matter what shape this radical other takes, each individual has to recognize it is often the radical other that makes life possible and bearable.

THE BIOSCIENCES

Before I discuss the politics and cultures of the biosciences I would like to discuss some of the many terms used to describe what I am referring to as the biosciences. I use the term bioscience to capture a wide range of other terms including bioinformatics, biotechnology, and biomedicine. Each of these terms captures a different dimension of the biosciences and I will break down each of these terms to get into the myriad ways in which the biosciences are impacting and transforming the lives of billions of people.

The first term I wish to cover is bioinformatics. Stated, simply, although there is nothing simple about it, bioinformatics is the reading of biological material especially gene sequences. Although I am sure many people who are readers of bioinformatics do not see their newly created profession in the manner that I do, I wish to focus on the idea of reading biological material and what that might mean. Once the word read is connected to any other term, a moment of uncertainty and the dialogical imagination enters into the discussion. To read bioinformation is to open the process to the uncertainty of interpretation. It is to open the biological realm up to the humanistic tradition of hermeneutics. To proclaim bioinformatics as a closed process in which interpretation is forbidden or exiled, is to make a claim that cannot be sustained. In his essay “Plato’s Pharmacy”, Jacques Derrida offers this perspective on the humanity of reading:

A text is not a text unless it hides from the first comer, from the first glance, the laws of its composition and the rules of its game….There is always a surprise in store for the anatomy or physiology of any criticism that might think it had mastered the game, surveyed all the threads at once, deluding itself, too, in
wanting to look at the text without touching it, without laying a hand on the “object,” without risking—which is the only chance of entering into the game, by getting a few fingers caught” (1981, p. 63).

To read a gene sequence, a DNA strand, and, I would add a PET scan or any other textual creation of the human body, is to enter into a hermeneutic relationship with the body in which the meaning of the body or specified parts of the body evade the first comer, the first glance. Those who enter into this physiological form of reading with the assumption that a reading can be mastered is in for an unpleasant surprise as is the person whose body is being read. When the topic is bioinformatics, the idea of mastery reading can lead to numerous fatal medical and biological results. This does not imply that an accurate or persuasive reading cannot be created. I merely wish to acknowledge the process of reading is never closed and always nuanced. The more adept doctors and biologists are at reading the body and the more aware they are of the reading process the more likely they are to enter the game with a better understanding of the human genome and its complexity.

I wish to adopt one more metaphor for understanding the importance and complexity of bioinformatics. When one acknowledges that bioinformatics is a reading, literally a very close reading, one accepts that they enter into the process of iterability. “Iterability,” J. Hillis Miller asserts, “is nothing more, . . . than the possibility for every mark to be repeated and still to function as a meaningful mark in new contexts that are cut off entirely from the original context, the ‘intention to communicate’ of the original maker of the mark” (2001, p. 78). David Wills adds a key word to this process of iteration when he notes that “if an utterance . . . can be grafted onto another context, this means that it had no ‘natural’ place, never did have, and that the relations it forms with subsequent contexts inevitably reinscribe that fall out of naturalness” (1995, p. 45). When a gene sequence or a DNA strand is “grafted” from a human body it not only enters into a medical and bioscientific process, it enters into the literary process of iteration. It is this possibility of iteration that makes bioinformatics and all other dimensions of the biosciences possible. If doctors and scientists could not graft a piece of the human body and place it into a different context in order to reconfigure it into something that now can be read, then there would be no form of biosciences, nor any form of organ transplants, blood transfusions, stem cell research, drug screenings, urine samples, or any other kind of research requiring a part of a human body grafted into another context.

It is Eugene Thacker who shows that this iteration process in the biosciences is unique in that the information grafted from a human body eventually needs to return to a human, sometimes the original human and others a different human. This return to a human makes the biosciences unique to the literary act of iteration since in the humanities the iterated word rarely returns to the author. Thacker points out that there is a three step process in biotech iteration:

(1) a body that can be effectively approached on the level of information [the body must be reduced to information or zeros and ones]; (2) a body that, as information, can be technically manipulated, [read] controlled, and monitored
through information technologies; and most importantly, (3) a body that is viewed as fundamentally information (genetic codes), where its being viewed as information does not exclude its being material [the body as code must return to some body in order for it to have material meaning] (2003, p. 89).

As some part of the body goes through this process it is transformed or as Thacker states it is “the body returning to itself...fundamentally different from itself, because it has been significantly retranslated through genetics, gene therapy, stem cell engineering, and so forth” (2003, p. 89). In the biotech world, iteration is a process of materialization (original body), dematerialization (reduction of body information to binary code and read or “retranslated”), and rematerialized (the body as reinvigorated or reconfigured into a different body). It is the radical other meeting the self all in the same body, transforming the other and the self irreversibly.

If bioinformatics can be viewed as the reading of what Paul Rabinow calls the life sciences, then biotechnology is the filter through which this reading takes place. While the mapping of genetic compositions of humans and non-humans pre-dates the computer age there is no doubt the biosciences and the posthuman condition would not and could not have developed as fast as it has without computers. Technology has created a globalized network through which blood, DNA, stem cells, and other biological matter traverses the world entering a laboratory in Europe, a Pharmaceutical company in India, a stem cell line for research in the United States, an ethicist in Iceland, a policy maker in Argentina, or an organ “bank” in Japan. While biological matter can take a myriad of routes, the globalization of biology is possible because computers are able to reduce matter to a series of dematerialized zeros and ones that the computer can read, store, manipulate, and reconfigure. When the dematerialized matter is needed medical doctors, scientists, pharmaceutical researchers, or transplant teams can enter into a computer network in order to determine how best to rematerialize the genetic material into a marketable pill, the location of an organ, or a reconfigured sequence for gene therapy.

In spite of the power and influence of computer networks in the biosciences, biotechnology cannot be reduced to computers. Technology as it relates to biology can be numerous devices including a kidney dialysis machine, automated genome sequencing machines, or the technology involved In Vitro Fertilization. No matter what technological device is grafted to biology the important point is to recognize biotechnology as yet another example of the merging of life (bio) with the non-human (technology) in order to re-create the meaning of humans.

Biomedicine is yet another term often used to describe the posthuman condition. This term can refer to any device or procedure used in the medical field. The most prominent example of biomedicine is many of the pharmaceutical drugs created in the last 10 or 15 years. The important point about biomedicine and pharmaceutical drugs is it refers to not just any type of drug. The drug must alter the neural or cellular make up of an individual. Certainly Prozax, Praxil, Ritilin, or Adderall alter the neural network of the brain therefore these drugs are part of biomedicine just as some of the newer drugs created to prevent cancer cells from spreading
The key point to remember is the drug has to cause a psychoactive effect within the patient, therefore, aspirin, vitamins, and cold medicine would not be included in any discussion of biomedicine.

One need not limit the meaning of biomedicine to pharmaceutical regimens and can certainly include procedures such as kidney dialysis and organ transplants and preventive medicine such as vaccines as a part of biomedicine. However, pharmaceutical drugs have become a predominant aspect of biomedicine and as a result have created new and important ethical, political, and cultural questions for medicine. Although I will address the issue of pharmaceuticals and health care in chapters four and five, I will present one example here to demonstrate the impact of biomedicine today. If pharmaceutical drugs have become the first line of defense in modern medicine then what are the implications for this shift in medical practice? The first thing to note is to remember a little Greek. The Greek word for pharmacy is pharmakon. Embedded in this word is a reminder of how a pharmaceutical regime for treating medical conditions is problematical. While the word pharmakon means to heal, which is a word we would instinctively associate with medicine, it also means to poison. We have entered into the pharmaceutical, biomedicine era without asking the significant ways this paradigm shift poisons our bodies. Whenever pharmaceutical companies market a drug they usually make it known what the side effects may be to the human system. It is these side effects that are poisoning the body. Too often, however, the complete range of side effects are unknown because the testing of the new drug is flawed or in some cases such as the Vioxx scandal information is withheld from the public. Faith in the effectiveness of psychoactive drug treatment in the United States especially seems to be so universal in the medical community, few have asked what is the impact of all the side effects of a drug. Instead of asking how is the body poisoned the protocol now is to prescribe another drug to counteract the first pharmakon prescribed. This approach reminds me of the protocol in the 1800s when cocaine was seen as a great remedy for opium addiction. There is no doubt we have entered into the age of biomedicine but there is a dire need for society to ask what are the consequences of this pharmaceutical poisoning as we try to heal ourselves.

While bioinformatics, biotechnology, and biomedicine all highlight fascinating dimensions of the posthuman condition, the term that will be used in this book is bioscience. It is a more generic term, but it captures the meaning and implications of all three terms already mentioned. The term bioscience like the other three words implies a interdisciplinarity that marks the posthuman condition. When we discuss the implications of bioinformatics, biotechnology, or biomedicine it implies the merging of biology, or the life sciences, with the independent disciplinary fields of technology and medicine. Biosciences implies these mergers as well but also includes the merger of biology with other natural sciences such as physics and chemistry. Just as the march from premodern to modern times marked the advent of new forms of knowledge such as economics, linguistics, biology, chemistry, sociology and psychology, it is also the case with the emergence of new forms of knowledge in the posthuman age. The term biosciences captures these new forms of knowledge as biophysics and biochemistry mark a new state of knowledge in
which the prefix bio reminds scientists that biology has superseded other fields as the dominant field of knowledge but the merger of biology with other terms reminds one that older disciplines are still vital in understanding the posthuman condition.

THE POLITICS AND CULTURES OF THE POSTHUMAN CONDITION

There are two examples I would like to discuss to highlight the importance of politics and cultures within the posthuman condition. These include the commodification of the body and individual parts and bio-colonialism in the biosciences. In the case of commodification of the body, this is not the first time objectification threatens the humanity of the individual. The biosciences did not invent colonialism or neo-colonialism. What the posthuman condition marks is an intensification of commodification, colonialism, and political control.

Commodification of Body Parts or How Much is My Liver Worth on Ebay?

In 1999 a potential seller placed a kidney on Ebay. By the time Ebay monitors realized what was being sold on their site and removed it, the seller received a high bid of 5.75 million dollars. Much to Ebay’s credit, it has an explicit policy against the selling of bodies or body parts. One would think that there would be no need to have such a policy but the selling and purchasing of body parts is a thriving business throughout the world. The selling of body parts does not stop at kidneys of course. One of my students informed me that she has a nursing student who sold some of her eggs in order to pay for her college tuition. Not to be out done, another student has become a surrogate mother in order to pay for her nursing education. What do such incidences say about the values of a society when students have to sell their eggs or womb in order to pay for an education? Why are two human beings valued more as egg sellers or surrogates than educated people? What conclusions can we draw about a society that frowns upon women working as exotic pole dancers but turn a blind eye to those who sell their eggs or womb?

Neither of these two examples are the most famous case in the commodification of the body. In 1976 John Moore was diagnosed with hairy cell Leukemia, his surgeon, aptly named David Golde, urged Moore to have his Spleen removed (Waldby and Mitchell, 2006). Moore consented to the surgery. Eight years later in 1984, Moore sued Dr. Golde, the University of California Board of Regents, and some pharmaceutical companies. Moore discovered that Golde took his spleen and harvested numerous immortal cell lines of the protein Lymphokines, patented the cell line, and was making hefty profits from his cell lines. Moore originally lost his case in the California state courts, won his appeal, and lost in the California State Supreme Court and eventually in the Federal Supreme Court. What emerged from this case are three important issues: the role of informed consent, the right to commodify body parts, and progress of scientific and medical research.
The precedent most often cited in this case is the importance of informed consent in doing any kind of scientific research. Dr. Golde failed to inform Moore of his intent to “harvest” the cancerous spleen and create immortal cell lines for further research. In terms of informed consent, Golde literally used Moore as a research object similar to the way federal scientists used African Americans in its study of syphilis. This issue, though, is banal compared to the other issues. Every court recognized Golde was negligent in not informing Moore of his role in a research project. As far as Moore was concerned he was simply a patient undergoing treatment for Leukemia. No one doubts that informed consent has to be the protocol for any experiment involving humans. The two controversial aspects of the Moore case are the issue of whether body parts can be owned, sold and purchased, and whether Moore should be compensated for his role in a profit making endeavor.

Golde, the Board of Regents, and the pharmaceutical companies involved argued that Moore was not due any compensation because although the cell line was produced from Moore it was altered in the research process and it was this altering that lead to the creation of the immortal cell line. The courts ruled that body parts could be patented if there was some kind of alteration done to the body, human or animal. They also ruled, however, that Moore, or anyone else, could not own, and therefore profit from their own bodies. Human bodies were beyond economic value unless they were altered and something new was created from them. Along the same lines, the courts ruled that Moore was not due compensation for the profits made from his cell line because such a practice would remove all incentives for pharmaceutical companies, university researchers, and other research companies from partaking in the research process thereby impeding science and medicine. More importantly, to rule in Moore’s favor would create a whole set of new issues. For instance, when doing stem cell research numerous cell lines are used in the research with numerous points of origin. What happens if a ground breaking creation were invented using biological material from a series of donors, but in order for this creation to be successful it took numerous failed attempts using countless other donors. Are all of the donors not due compensation too since in all scientific work failure often aids in the creation of a scientific invention? How would one decide what is just compensation for all the donors involved?

From the Moore case has come two disturbing issues. First it is important to note that according to Priscilla Wald, “Moore, …was asking that his body be commodified, and the problem stemmed [no pun intended I am sure] not from the patenting of the cell line, which was thereby assumed to be property, but from its definition as part of Moore’s body and therefore his property” (2005, p. 210). Moore was not arguing for the sanctity of the body, protected from any capitalistic intrusion and attempt at commodification. He argued that it was his right to own his body not Dr. Golde’s, the University of California system or any pharmaceutical company. As noted, the courts, minus the California Court of Appeals, ruled that Moore could not own his body.

This leads to the second disturbing issue. Why has the history of science, like other dimensions of American history, become a tale of Corporate gain? While the courts ruled that no individual could own their bodies, corporations could profit from these bodies without giving any compensation to the donor. They based
CHAPTER 2

their decision on a specious notion of innovation. While monetary compensation may play a role in the decisions scientists make regarding what type of research they do, it is not the sole or major reason innovative science is done. The drive to invent and discover far out weighs any monetary desire governing the actions of scientists. Even if there were little to no monetary compensation for the scientists much of the innovative work would still be done. Therefore, compensating individuals for their sacrifice and involvement in a scientific or medical experiment would not end scientific invocation. It might discourage the entrepreneur who only has an interest in profits from funneling money to scientific research, but it will not stop the scientist from thinking and doing innovative work. Having stated this, I am not advocating a research model in which donors are compensated for stem cells, organs, or other body parts. What I am trying to do here is find an alternative approach to reducing innovation to monetary motives and compensation. An alternative to the monetary view of innovation can be that when someone donates a part of their or a loved one’s body, it should be standard operating practice of the research university, hospital, or corporation to provide health care coverage to the donor and family for life. This would encourage people to support innovative research and help a struggling democracy overcome a health care crisis of accessibility and affordability.

As it stands now only corporations benefit from the current definition of innovation. This continues an alarming trend in which most major corporations not only avoid any societal responsibility when it comes to taxes, they also are able to profit literally from humanity. While the courts’ focus on promoting an environment of maximum innovation and scientific development is an admirable principle, its rulings are used as a front like a candy store hiding a speakeasy during prohibition to protect corporate profits rather than enhance science and medicine. In this sense, then, it is not only bodies that have been commodified but the whole scientific and medical process. The external and internal world of bodies has become an open market and corporations, universities, and start up companies are the only ones that stand to profit.

Just as the body is commodified, it has been colonialized. There are cases of traditional colonialism, neo-colonialism, and post-colonialism in the biosciences. The very structure of the biosciences throughout the world is based on a neo-colonial notion. Eugene Thacker in his book *Global Genome* notes that the International Human Genome Sequencing Consortium (IHGSC) established to share genetic research and knowledge “is a selectively global endeavor; that is, only developed nations with the technological and economic infrastructure to support bioscience research are included in the membership” (2005, p. 18). If a so-called non-developed nation wishes to offer up a segment of its population to the IHGSC efforts, they are accepted as part of the advancement of science, but apparently, if they wish to develop their own bioscience program or partake in the research they are not qualified.

In his study on *Biocapital: the Constitution of Postgenomic Life*, Kaushik Sunder Rajan (2006) documents how India is exploited as a site of neo-colonial activity. India has a desire to develop its own bioscience program, but they
continue to struggle in this development because they are not treated as an equal nor competent partner in the biosciences. Rajan conducted some of his fieldwork at the Indian Centre [a remnant of previous colonialism] for Biochemical technology in which a scientist relayed this story to him: “We had a person...who works abroad on schizophrenia, and he works with a professor who I think is from South Campus...He came to our lab and...he says ‘whatever you are doing, you give us your samples, we will reproduce the same work abroad and then you will have an easier way of communicating your paper because nobody will accept any of the data that you send from here’” (2006, p. 212).

This example of scientific colonialism and discrimination is not the most outrageous example from India. Rajan notes that pharmaceutical companies flock to India because there is a readily available source of unemployed textile workers willing to earn some money volunteering for clinical trials of new pharmaceutical creations. What makes these clinical “subjects” even more enticing is they reside in a country in which the standards for conducting clinical trials are not as high as in the United States or European Union, therefore the costs of research and development are not as high for pharmaceutical companies. Why is it in one case the research of an Indian scientist is unreliable at the Centre of Biochemical Technology because they are not Western enough but when it comes to skirting regulations and safety protocols India, while enhancing corporate profits, is the perfect site for research? Why is it when American consumers demand their political representatives allow imports from Canada the pharmaceutically bought politicians proclaim there would be no way to ensure the public safety but when pharmaceuticals skirt regulatory protocols and standards in India the testing of these drugs is a reliable source of evidence to warrant FDA approval? These two cases not only demonstrate colonialism in the biosciences but the disregard pharmaceutical companies hold towards indigenous people in India and potential patients in the United States, Europe, Japan, and Canada is alarming. How low will some pharmaceutical companies go to ensure maximum profits? Apparently they are willing to risk the lives of people in India and the health of patients anywhere in the world in order to gain market share.

The colonialism of the biosciences is not limited to India. Andrew Lakoff in *Pharmaceutical Reason* demonstrates that Argentina is a prime site as well. Lakoff notes how a French Biotech company entered into an agreement with an Argentinean hospital in which “Genset would give a hundred thousand dollars to Hospital Romero for structural improvements, and in exchange, doctors there would provide blood samples from two hundred patients diagnosed with bipolar disorder, types I and II” (2005, p. 23). Genset was interested in Argentinean blood for at least two reasons. First, Argentina with strong European immigrant populations possessed similar genetic information that could be translated into cures for bipolar disorders in Europeans and second, Argentina did not have the same standards and regulations of research protocols as the European Union. Argentinean blood was close enough to European to matter in helping find a cure for a psychosis but still not quite European enough thereby alleviating any guilt European scientists and corporate leaders might have in exploiting a people for their own monetary gain.
The body has long been a topic of academic work within curriculum studies conversations. Phenomenology, gay and lesbian studies, post-structuralism, postmodernism, and other theoretical frameworks and traditions have informed curriculum scholars understanding of the relationship between the mind, body, schooling, and society. The one thread missing from this conversation is the bioscientific body and its relationships with/in biotechnology. What has emerged from these embodied conversations within curriculum studies is a theorized body that lacks flesh and blood, flesh that is both natural and synthetic, blood that is tainted and tested. This theorized body lacks DNA, altered genes, chemically altered neurological pathways, and prosthetics. This body lacks a relationship with the biotechnology coursing through it.

In 1988 Madeleine Grumet in “bodyreading” summarized the theoretical state of the body within western traditions when she wrote: “The ‘body subject’ was Merleu-Ponty’s term for human consciousness. He invented it to rescue thought from its exile to the vast, inaccessible reaches of idealism.” The body was a mere tool for, a tag-along with, the mind. The mind no matter if it were embodied or disembodied was the center of all cognitive interactions. The only relationship the mind had with its environment was through thought while the body was the conduit through which the mind interacted with the world. Like Merleau-Ponty, Grumet sought to change this strange mind/world relationship. “In ‘bodyeading,’” Grumet, borrowed Merleau-Ponty’s phenomenology, “to run some errands, to bring what we know to where we live, to bring reading home again. To bring what we know to where we live has not always been the project of curriculum, for schooling, as we have seen, has functioned to repudiate the body, the place where it lives and the people who care for it” (1988, pp. 453–454). Schools were the perfect modern institution to house the disembodied mind. Schools were the place where minds stopped to acquire their meaning and sustenance while the body merely walked these minds to school. It was time to reconnect the mind with the body and schools as a primary site in which the body interacted with its environment in order to nurture itself and the mind. Reading was the disciplinary site Grumet chose for this reunion and it is an important and common one within curriculum studies. For Grumet the body is part of the triad: world, body, and text. “The world we have is the world that rises to meet our intentionality; it coheres around our needs, wishes, possibilities, real and imagined. The coherence of the text, like that of the world, is the possible and actual ground of our action” (Grumet, 1988, p. 465). Schools are sites where individual bodies intersected with the world through texts, among other things. The text educated the body, introducing real and imagined worlds to it, and providing real flesh and bone to the meaning of an education.

Grumet’s body is a phenomenological breath of fresh air, nuanced in its interactions with its environment and other bodies but it is not a material body. It is still a psychoanalytical, figurative, theorized body. It is a body with depth but no DNA. It is a body with flesh but no laboratory tested and implanted tissue. This constructed body interacts with texts but not with technology. How can a body interact with a book but never be influenced by the technology called a text?
This inability or unwillingness to broach the subject of technology denies Grumet’s “body subject” an opportunity to open itself up to the educative possibilities embodied in the technology of the text, she also denies the body any opportunity to interact with its own biotechnological components or the technology within. Grumet is not alone.

Dennis Sumara in Private Readings in Public, like Grumet, introduces the body into the curriculum conversation. Sumara’s body is a bit more sophisticated since his theorized body is skinned. “The skin is a paradox. It must contain a body and, at the same time, allow the body to engage with its environment. Skin reminds us that we are, simultaneously, autonomous and dependent…Therefore, more than any other organ, it is skin that reminds us that all of our interactions in the world are embodied” (Sumara, 1996, p. 88). Schools are not where education begins nor is it with a text. The skin is where education begins. When the surface of the body meets the environment education begins immediately. Skin is the intermediary, the text separating the body from the world. It is the receptor that sends feelers out into the world and receives replies.

Like Grumet, Sumara is influenced by phenomenology and understands the limits of a Western tradition that ignores the body and privileges the disembodied mind. “In the Western world we have not been very successful at understanding the way in which our bodies are ecologically caught up in and with our environment. More specifically, we do not seem to really believe that our body is an environment in itself” (Sumara, 1996. p. 90). With the theoretical assistance of Merleau-Ponty and more importantly Humberto Maturana and Francisco Varela, Sumara suggests curriculum scholars “need to understand not only how we function biologically in the world, but how the biological structure we call our body and the place we call our world co-evolve” (1996, p. 92). Once we begin to look at the body as it functions biologically within the environment and the environment in our bodies, then we can see “that learning always co-emerges with living” (1996, p. 92).

If the most important point to draw from Sumara’s work on embodied action is that “the environment is as much a reflection of the biology of the species as the species is a reflection of the environment,” then in the posthuman world it is essential to ask what happens to the body when the environment is technologically constructed? What happens when the artificial environment merges with the natural body such as when an individual plays a video game, interacts with a simulation, receives an organ transplant, undergoes gene therapy, or elects to have cosmetic surgery performed? The technologically artificial environment is just that an environment that interacts with bodies and alters those bodies in numerous ways. When biotechnology is ignored as an ecological force the curriculum studies body becomes disembodied theory.

David Wills offers an insightful way of understanding biotechnology and curriculum theorists (non)relationship with it. “Technology is the name we give to exteriority” [environment]. Wills believes,

once it is seen to be endowed with a systematicity not of our making…technology has the dorsal form of a shadow, which—having longer legs than us—consistently catches up with us whenever we seek to outrun it.
It catches up with us when we are perplexed by attempts to deal with definitions of life and operations of the cybernetic and biotechnological, and in the more explicitly political context when we struggle to define privacy, individual freedom, and the operations of technologies of information....We are in it as soon as we give ourselves a new sphere, any new theater of operations, as soon as we turn to acknowledge the shadow that was always there” (2008, p. 239).

If technology is an integral and vital part of the environment in and through which we live, then why are curriculum theorists afraid of their own shadow? What is it about something so vital that it can be taken for granted or assumed that it is not present when it is always already there and constantly representing who we are? How can we account for ourselves when such a large portion of what shapes us goes unaccounted?

William Pinar’s work throughout his career has introduced numerous bodies to the curriculum conversation. In *The Gender of Racial Politics and Violence in America*, Pinar introduces us to many of these bodies or scenes of subjection. These bodies are neither pretty nor glamorized. They are “the public spectacles of lynching in which the black (usually male) body was sometimes stripped, tortured, mutilated, dismembered and the less public but still horrific spectacles of prison rape in which often young white male bodies are stripped and assaulted” (Pinar, 2001, p. 41). Pinar’s bodies are racialized, gendered, and sexualized.

Before the traumatic rise of lynchings after the Civil War and during slavery, black bodies were reduced to “their economic as well as sexual value” as “whites erased black suffering as they inflated white pleasure. In doing so, ‘whiteness’ became invisible…and the white male body disappeared into imagined black ones” (Pinar, 2001, p. 42). These imagined black bodies became threats to white women and to the power structures of white men. Once imaginations began to flow through reality again white bodies reappeared in the form of the murderer and innocent virgin while the black bodies reemerged as the lynched victims charged in the court of white racism and machismos and executed with racist justice. Whether in the imagination of white males or in the gruesome reality of lynchings all of the bodies were caricatures of humanity. The “attacker became not just a black man but a ‘ravenous brute, the victim a beautiful, frail young virgin.’ She could not possibly be put on the witness stand to suffer ‘the glare and stare of public curiosity’” (Pinar, 2001, p. 62). The black bodies, one way or another, remained silent, white women were anything but innocent, and the white men were the ravenous brutes.

In prison these racialized, gendered, and sexualized bodies switch roles as white women became silent and imaginary at best while the black body, in many cases of prison rape, the executors of justice and the white body the feminized beauty or bitch. “Prison rape is political revenge in racial terms,” for Pinar (2001, p. 1126). At the psychological level “it is,” Pinar believes, “also an expression of the western male’s unconscious self-structure, a matrifocal structure requiring the repudiation of that symbiotic union with the mother to become something ‘other’—a ‘man.’ Through rape men act out their internalized self-self relations, performing on
women and other men the crimes of gender formation they endured as boys and adolescents in order to become and continue to be ‘men’” (2001, p. 1126). These sexualized bodies are psychologically and physically scarred from a heterosexual normativity that violently forces itself onto the body and the environment that educates these bodies.

Out of these conditions, Pinar urges curriculum scholars to “formulate a curriculum for human survival, one supporting a ‘queering’ of the species.” A queer curriculum I think would reshape the racialized, gendered, and sexualized bodies into something more humane. It would turn them into posthumans. “In schools,” Pinar continues, “we need a queer curriculum that challenges the heterosexual matrix, provides a curricular version of affirmative action for homosexual topics and subjects, including interdisciplinary explorations of conceptually intersecting problems, such as race and gender” (2001, p. 1157). This curriculum could reshape bodies and offer an alternative to the violent pedagogy that pervades our schools and society today. Pinar’s curricular vision offers an opportunity to reconnect with ourselves and others. However, there is a limit to this vision. Even if the worlds we inhabit were queered and misogyny, racism, homophobia, and self-hatred were to retreat, humans would still be alienated because Pinar’s vision lacks any connection to the technological self. The technological self is the skin of the posthuman body that connects to the world. It is the organic part that fits more smoothly than ever with the inorganic life force of technology. It is our shadow.

In a strange twist, given its lack of interaction with technology, the bodies of curriculum studies are phenomenological, hermeneutic, cognitive, racialized, gendered, and sexualized but they are not biological. The curriculum studies body lacks bios, life. It lacks a connection to technology that all bodies come face to interface with everyday. The curriculum studies body is, therefore, isolated from the world; the biotechnological world that mediates and dictates so much of what is (post)human interaction today. I want to now turn to how curriculum studies became alienated from its (bio)technological embodiment.

CURRICULUM THEORY AS REDUCTIVE INSTRUMENTALISM AND STATIC ENFRAMINGS

To discuss the tendency of curriculum theorists to interpret technology instrumentally, I want to focus on the work of Dwayne Huebner and James MacDonald. The warnings and some of the insights Huebner and MacDonald raise in the 1970s and later for Huebner in the 1990s are still relevant. For instance, Huebner maps out a vision in which our young people and public schools are treated in the same luxurious manner as corporate elites. Huebner asks us to “imagine what could be achieved if the expenses of building new corporate headquarters were taxed to help finance the creation of spaces for children and youth” (1999, p. 435). Imagine a democracy where corporations contributed to society and were not parasites and placed the well being of all people ahead of profits. Right now we can only imagine. Who could disagree with such a vision? Yet when it comes to technology Huebner and MacDonald often reduce technology to instrumental purposes.
In his essay “Challenges Bequethed” Huebner returns to curriculum theory and maps out some issues he believes are important to consider. They include the need to move beyond technical foundations and the need to affirm the imagination. “Testing, textbooks, programmed materials, media,” and other aspects of schools are part of the technical foundations of education. These foundations have become the purpose and meaning of schools; benefiting corporations and other entities that control political power. One of those corporate sectors that have benefited from the focus on technical or instrumental foundations of education is the information technology sector. “The information processing industries have become...a powerful group in the political mix,” Huebner insists, “as TV, computer and information highway people seek income and influence by educating children and youth” (Hillis, 1999, p. 435). This is a theme Huebner developed in the 1970s when he proclaimed that educators are lost and “in our lostness are we not imbibing the snake oils and patent medicines—programmed individual computers, TV...hoping that we can cure our maladies?” (Hillis, 1999, p. 231). With the focus on computers, television, and information technology Huebner believes that our imaginations suffer. Dependent on snake oils (today this would be some colored pill marketed by Big PhRMA) and instrumental foundations, “we lack an educational poetry which stirs the imagination and harnesses our power” (Hillis, 1999, p. 234). Without an educational poetry we lack the imagination as a “storehouse of human possibility—ethical, intellectual, political” opportunities are lost to reinvent the world (Hillis, 1999, p. 436). For Huebner what unravels the poetic and imaginative schools is “the educators dependency upon the technical” (Hillis, 1999, p. 436).

Similar thoughts can be found in the work of James MacDonald. Writing in the 1970s MacDonald believed that “[w]e live in a modern society which is fundamentally characterized by technology and bureaucracy with an economically consumer oriented ethic” (1995, p. 111). This extreme instrumentalism MacDonald defines is a “technological rationality” in which “the nature of teaching functions around the idea that there is a large body of educational knowledge which is potentially available to school staffs, but is organized around a hierarchy of experts” (1995, p. 112). This acceptance of technological rationality “leads to prizing optimal growth, or maximum efficiency and effectiveness.” Sadly, the scenarios Huebner and MacDonald construct are alive and too well in contemporary schools. One could easily argue that schools are more geared towards instrumental purposes, efficiency and effectiveness are coveted principles, and schools have lost all hope of ever creating or reclaiming an educational poetry.

The problem with Huebner and MacDonald’s vision of schools is that technology is reduced to a form of instrumentalism. It is not technology that promotes or dictates instrumentalism. It is the lack of an imagination in regards to how technology can be utilized as a supplement to our minds and bodies to create the educational poetry Huebner envisioned. There are ironies in the work of Huebner and MacDonald. By reducing technology to tools of instrumentality they block the very thing they want to nurture in the schools: imagination. Young people find much of their refuge and inspiration from computer generated worlds. Young people use technology as a testing tool or a skills training instrument in schools, but outside of educational realms information technology is their primary
source for creativity. This reduction of technology to instrumental purposes achieves what Huebner and MacDonald accuse technological rationality of doing. It restricts educators from utilizing technology as a form of poetry and creativity. This ability to be poetic via technology is part of the posthuman condition. Indeed, information technology in general can be enlisted for instrumental purposes, but this ignores the creative potential of technology to serve as a springboard and supplement to the imaginative possibilities of all teachers and young people. Huebner and MacDonald made the mistake of assuming that instrumentalism is a natural state of information technology. There is no natural state of information technology. There is only an open question. How will we use information technology and what meaning will we construct out of the technology? If, as curriculum scholars, we do not address this question and maintain its openness we add to the dominance of instrumentality in education.

Where Huebner and MacDonald focused on technological instrumentalism, Ted Aoki is concerned with what I refer to as static enframings. In a famous essay, “Toward Understanding Computer Application,” Aoki asserts that the essence of computer technology “is revealed as an enframing…This enframing reduces man and beings to a sort of ‘standing reserve,’ a stock pile of resources to be at hand and on call for utilitarian ends” (1987, p. 64). Aoki’s reading of Heidegger’s essay “The Question Concerning Technology” depends on a static reading of the word and term enframing and confuses the distinction Heidegger makes between Technē and modern technology. I want to take up the latter point first and then address the issue of static enframings.

In his 1954/1977 essay, Heidegger goes to great lengths to distinguish between Technē and modern technology. Technē is a form of poiesis or a bringing forth that reveals the truth. Technē “is the name not only for the activities and skills of the craftsman, but also for the arts of the mind and the fine arts…it is something poetic” (1954/1977, p. 13). Technē, then, is exactly what Huebner was searching for when he wrote about the need to rediscover an educational poetry. It is the arts of the mind and the fine arts that instrumentalism disconnects from education. Heidegger concludes that “[t]echnology is a mode of revealing. Technology comes to presence in the realm where revealing and unconcealment take place, where aletheia, truth happens” (1954/1977, p. 13). Technology that unconcealed the arts of the mind and fine arts did not concern Heidegger nor lead to the use of human beings as standing reserves. What concerned Heidegger was modern technology. Modern technology “is a revealing,” like Technē, “based on modern physics as an exact science.” Modern technology “is a challenging which puts to nature the unreasonable demand that it supply energy that can be extracted and stored as such” (Heidegger, 1954/1977, p. 14). Certainly we can conclude nuclear energy, hydroelectric dams, and analog computers are part of modern technology. However, can we say the same thing about the biosciences, biotechnology, or the posthuman condition? The answer is it depends. Stem cells, DNA date banks, and blood samples can become standing reserves if they are viewed only from an instrumental perspective, as a means to an end. But this is not a given and it should be our role as curriculum scholars and as citizens of a democracy to insist that parts of humans or the many types of animals in laboratories are not treated as standing reserves.
Aoki misses the difference between Technē and modern technology because he turns Heidegger’s concept of enframing into a static term. It is in dealing with enframings that Samuel Weber’s work is vital. For Weber, Heidegger’s concept of enframing is much more dynamic than what Aoki allows it to be. Weber does not deny that Technē or technics can become modern technology in which the essence of technology is to serve as a standing reserve. Heidegger believed technics was “a way of bringing forth” and “has now become a driving or goading-forth: ex-ploting, ex-tracting, ex-pelling” (1996, p. 69). But Heidegger also believed just as technics could become enframed as a secure, static entity that revealed human beings as standing reserves, it could also become a principle of unsecuring. As Weber noted just as technics is an ordering it is also a movement and this movement or going-on “is a driving force out of which a different kind of topography emerges” (1996, p. 71). Aoki misses this driving forth that creates a new order, a new potential, a new will to art. This driving force within technology makes the posthuman condition a unique moment in time. The biotechnologies can constitute an enframing in which meaning and potential are arrested. But it also can be a driving forth that ushers in a new era of meaning and potentialities. If we depend on static notions of enframings, then it is difficult to see what biotechnologies and biosciences can drive forth. As Weber notes it is important to understand enframing or as he states emplacement “not only as a static state of affairs but as a dynamic process” that “can serve not just to close down but at the same time open up.” To focus only on the former and ignore the latter potential of enframings not only displaces “a poetical ‘bringing forth’” of biotechnology that “breaks ground and opens up ways” of thinking differently, it also limits the potential of human beings (1996, pp. 72–73). When we forget the openings enframings create, we dismiss the power of humans to construct reality and themselves in ways that can lead to new possibilities and reduce humans to instrumental means incapable of creating anything except profits for things we call multinational corporations. In the next section I want to suggest an alternative path that begins with Heidegger, runs through the Hermeneutic philosophies of Don Ihde, and meets up with two important curriculum theorists, Annette and Noel Gough.

MOVING TOWARDS A COMPLICATED POSTHUMAN CONVERSATION

A complicated posthuman conversation within curriculum theory should begin with Heidegger for the reasons I noted in the previous section. Heidegger understood the dangers and promises technology held for humanity. To focus on the dangers is to risk all that is worthwhile in human endeavors such as thought and art but to ignore the dangers is naïve and dehumanizing. There is one more important reason why the conversation should begin with Heidegger: His wishes came true. When he wrote “The Question Concerning Technology” he warned of the dehumanizing abuses of modern technology and called for a return to Technē. The Greeks unconcealed the essence of technology and the potential of humans with/in technology because they saw the instrumental (useful) and artistic potential of technology. This is exactly what occurred with computer technology. Art returned to technology. With the advent of biotechnology, biosciences, and digital imagery
the craftsperson (now referred as the computer programmer or software developer) has been reunited with the artist (the graphic designer, bioinformatics reader, laboratory technician, medical doctor, digital artist, and geneticist). Because of technology, poiesis has returned. We can see poiesis, or what R.L. Rutsky (1999) calls aesthetization of functional form, manifest itself in the artistic technique of the surgeon manipulating fiber optics to perform operations without touching the body, the digital images of the animator, software designer who develops the latest interactive video game, or the cosmetic surgeon who reshapes the body.

Within the field of curriculum studies there are two important theorists we need to explore in order to have the conversation necessary to understand the posthuman condition, Annette and Noel Gough. First, Annette. She is a reluctant posthuman theorist. Although Annette Gough has been writing about posthuman issues for the past 15 years it is her own personal medical struggles that highlight her important contribution to this conversation. Gough’s conversation with the posthuman is not only theoretical, it is also a material reality and as personal as anyone can get. In 2001 she was diagnosed with Paget’s disease of the nipple, underwent a radical mastectomy, and now has a breast implant or, as she refers to it, a “cyberboob.” Through her personal experiences Gough troubles the relationship between the body, medical technology, and the environments that (re)shape one’s identity. She shatters any clean, modernist boundary that might innocently create an artificial line between body and machine or artificial and natural worlds. As Gough notes she was unwillingly dragged into narratives such as cancer stories and anti-war stories. “There was no reason I should get breast cancer,” Gough writes, “I did not want to be in this story. I denied this story” (2003, p. 37). This story was never one easily to overcome either, feeling alienated from her own body. She “felt like an animal living in a comfortable forest who hears the rumbling of machinery and the crashing of trees and wonders what is happening. The binary between human and animal, human/animal and machine was dissolving in me” (Gough, 2003, p. 41).

Annette Gough’s personal accounting of reshaping her body and identity as she becomes posthuman demonstrates a new path for curriculum studies scholars and autobiography. Traditionally, autobiography is seen as the writing of the self, but as we see it is also the grafting, Graafhein, of the self biologically. It is grafting of the self as it is reconstituted through a medical procedure that joins/sutures/ connects this self to a machine, a prosthetic, or scientifically altered biological form. Each person who crosses the modern boundaries of human and machine and enters into the artificially natural realm of the posthuman has their own journey story to tell. Illness stories have become prominent recently in curriculum studies thanks to the work of Delese Wear (1997) and Marla Morris (2008), but the technological dimension has been under represented in these accounts of changing bodies and struggles in recovery.

Autobiography as a grafting of the self biologically works metaphorically too. The posthuman experience is also the rewriting or re-building of the self after a medical procedure. Whether these procedures are performed in order to save a life, as was the case in Annette Gough’s experience, or done in the name of vanity, the body is still re-shaped and the self as a result is also re-formulated. No one who undergoes an evasive or a non-evasive procedure avoids a re-newal of one’s identity.
When someone is grafted to a machine, as a kidney patient or an organ recipient is, their self is re-written and re-shaped by the introduction of a machine into their lives. It is a humbling experience to wake up from a medical procedure and to realize that as a patient you are still alive because inorganic material has been placed into your body or connected to the outside of your body. In a strange ironic twist, the body needs to be re-shaped and the self re-written before the initial writing can begin. In the posthuman condition the graphy comes before the auto and the bio not only refers to the self but to the biological material form of the individual.

In posthuman terms, Noel Gough is our forefather, he is the Robocop (first cyborg in film) and the Philip K. Dick (innovative, visionary SF writer) of curriculum studies. *Laboratories in Fiction* (1993) represents Gough’s vision of a posthuman curriculum and is the foundation for any understanding of a complicated posthuman conversation. In this monograph, Gough’s contention is simple but controversial: if anyone wishes to teach science well or to learn about science they should not consult textbooks but rather comic books, Science Fiction, music, and films. It is within these media students and teachers will find cutting edge science and the posthuman condition. Science in textbooks stops at 1900 when people still believed they lived in a Newtonian world. By 1900 Max Planck confirmed his previous experiments and concluded Newton’s theories did not own the atomic world, another theory had to exist and that was quantum physics. After quantum physics other theories have emerged to explain phenomenon such as Chaos, Complexity, String, and now M. theory. If these theories are broached at all in textbooks they are covered in the last chapter. In the realm of Science Fiction, comic books, music, and films these theories are not treated as sidebars of science but the areas where science is performed.

Scientists in textbooks are objective, value-neutral, and apolitical. They are two dimensional and plastic. In the Science Fiction and comic books, scientists are more real, grappling with social issues and interacting within a culture of science. They are three dimensional and human. In textbooks scientists are “disciplined,” carefully guarding their boundaries from intruders. In Science Fiction and comic books they are interdisciplinary, jumping from biology to chemistry, anthropology to political philosophy, and history to philosophy. The scientists in this world are posthuman and more realistic than in the fictions we call textbooks. In Gough’s *Laboratories of Fiction*, much like Dexter’s animated laboratory, life is ironic. The scientists in the artistic media of film, music, and literature are life like as they struggle with moral and ethical issues surrounding their research, grapple with the politics of funding and laboratory interactions, interact with machines as they improvise in order to conduct experiments. These scientists are posthuman as they merge with machines and animals in order to conduct and expand their fields of knowledge and reinvent the term Renaissance person as the biochemists interact with technicians, computer programmers, politicians, anthropologists, ethicists, animal rights activists, artificial intelligence, neural net computers, philosophers, corporate leaders, entrepreneurs, and historians. In these assemblages of human interaction, we find Gough’s vision of science and education. We find a complicated posthuman conversation.
Where Annette Gough introduces the posthuman to the autobiographical and Noel Gough focuses on the biosciences, the philosopher of science Don Ihde assists us in understanding the relationship between biotechnology and curriculum studies. For Ihde technology is never a mere tool or an object of instrumentalism. Technology is a medium enhancing human perception. It is a phenomenological and hermeneutic mode of seeing, an embodied interaction with the world. Ihde believes there are two worlds and at least two ways of seeing these worlds.

The first world is often referred to as the real world, the world in which our body interacts “naturally” with its environment. This world is where Bergson said we received our education as our sensory modes met the world. The second world is a virtual world where our body interacts with its environment via some form of technological mediation. This mediation can take numerous shapes including eyeglasses, contacts, hearing aids, virtual reality simulators, computer generated economic forecasts, war games, prosthetic limbs connected to nerve endings, altered DNA, donated organs, or some prescription drugs. Just because this world is technologically mediated does not make it less real than the first world. The only difference between the two worlds is how we experience the lifeworld. As Ihde notes, “in a broader, more phenomenological sense, both RL [Real life or world one] and VR [Virtual reality or world two] are part of the lifeworld, and VR is thus both ‘real’ as a positive presence and a part of RL” (2002, p. 13). To reduce technology to a tool or a type of instrumentalism is to reduce curriculum studies’ understanding of life itself. Curriculum scholars prevent themselves from envisioning new worlds since it is through (bio)technologies that new worlds are created and experienced everyday. “In short, new instrumentation [new ways of experiencing the world technologically] gives new perceptions, which, in a Kuhnian context, would minimally be the source of possible new anomalies. But more strongly,” Ihde suggests, “this new and now necessary link of instrumentation between science and technology is itself the extension of scientific vision which becomes a gestalt of an entire new context” (1990, p. 56). This new context is the intersection where the biosciences and biotechnologies meet the posthuman. It is an intersection as culturally important as any other in recent intellectual history. Curriculum scholars will have to decide if they wish to interact on the street corners of this intersection crowded with young people, scientists, entrepreneurs, philosophers, anthropologists, computer programmers, computers, video games, neural nets, and citizens of the world or consciously select some other intersection safely protected from the messiness of the posthuman condition or life in general.