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The Posthuman Curriculum and the Teacher

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by

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(Under the Direction of John Weaver)

ABSTRACT

The intent of this document is to explore education through a posthumanist lens. More specifically, elements of posthumanism will be used to better understand today's teachers, to provide several overarching educational goals and curricular imperatives, and to inform pedagogical practice. Several posthumanist themes in particular will serve to unify this rather broad consideration of education at varying levels. One such theme is that of blurring boundaries, calling into question distinctions that have been the source of declines in the health of our bodies, our species, and the life systems of which we are constitutive parts. Distinctions too often lead to hierarchies, and hence to exploitation. The humanist distinction between man and nature has for example bolstered the idea that man should rightfully rule nature, as well as justified oppression and enslavement of the "less human" or "savage". Another unifying posthumanist theme is that of impermanence or flux. What it means to be human changes as our environment and our technologies change. The roles of teacher and learner are frequently changing and we are always some measure of each, more of one

and less of the other depending on the environment and circumstance. A final

posthumanist theme that permeates this text is that of decentering the human.

Posthumanism is in part a rejection of anthropocentrism, and this rejection

informs much of the following considerations of teachers, curricula, pedagogy,

and education.

INDEX WORDS: Curriculum, Education, Posthuman, Posthumanism, Humanism,

Pedagogy, Ecopedagogy, Culture, Media, Technology

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DEDICATION

For my lovely wife Kirstin, who's love, patience and care made this work

possible, and who directly inspired many of the ideas in it.

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CHAPTER 1

WE ARE POSTHUMAN

Introduction

The following pages will serve as an exploration of the intersection of the posthuman, curriculum theory, and the teaching profession. What sort of curriculum should be prescribed for posthumans? What does it mean to teach a posthuman, and how should one go about it? -These questions will drive my inquiry. The primary goals of this work will be to make the case for and sketch out the foundations of a posthuman curriculum and pedagogy. I intend to begin this dissertation by exploring an iteration of *posthumanism*, endeavoring both to outline its boundaries and to alter them here and there. Though posthumanism means different things to different people, I will adopt and elaborate on two particular conceptions of the term. The first conception includes a rejection of certain assumptions of Renaissance humanism, including the primacy of the individual human over groups of humans, and the primacy of the human species over other species and entities. Also rejected is the idea that the human should endeavor to distance herself from the "brutish" through the study of communicative arts, in which Rennaisance humanists included rhetoric, poetry, moral philosophy, and others. This conception of posthumanism does not necessarily find fault in scholasticism or in developing facility with human language, but rather rejects Western conceptions of human that marginalize those that fail to meet Eurocentric ideals, or that oppose humans and nature to

one another. Instead of opposing nature and the humanities, this conception of posthumanism would seek to bring them in concert with one another.

To espouse posthumanism is to reject or in some ways to seek to move past humanism. Such a proposition is compounded by the struggles of marginalized peoples who have fought and died to be recognized as human, and to enjoy the privileges accorded to those deemed sufficiently human. Many African Americans, members of the LGBT community and others have been inspired by humanist sentiments such as the idea that all men are created equal. Any work to move beyond humanism must keep in mind that distinctions of race, sex, sexual preference, gender and others continue to be used as markers for a hierarchy with those deemed "most human" at the top, and that the Enlightenment ideal of the human was one of European descent, white, straight, male, and "educated". Legal, educational, economic and political structures, among others, all have and continue to reinforce this notion of the superiority of this Enlightenment ideal. Essentially the effort to move beyond humanism must be recognized in part as an effort to dismantle the harmful hierarchy that has accompanied it, with white men at the top, "lesser humans" further down, and the natural world at the bottom. It is not enough for those in privileged positions to tell everyone else to stop trying to climb the ladder, to stop trying to be part of the "human club". Rather, the ladder must itself be dismantled. This is urgent work, it must be noted, as we see the legacy of humanism in, for one (pressing) example, the disproportionate number of blacks incarcerated, killed, beaten, and harassed by police in America today.

Another conception of posthumanism to be explored in this work argues that the boundaries of what constitutes "human" have become increasingly blurry. The disembodiment of information accompanying the computer revolution has, as Katherine Hayles has pointed out, made the human body seem almost superfluous, like a rather uninteresting shell for the mind. Further, instead of using the functionalities our bodies provide to obtain what we need, today we increasingly turn to technological prostheses. The tools we use to make our way through the world (whether of bodily origin or not) contribute greatly to our sense of identity. Today, software is one such tool, though it is one that changes more rapidly than we are accustomed to our tools changing. As the tools we use begin to change more rapidly, maintaining a stable identity becomes less feasible. We increasingly face the world with a digital self that often bears little relation to our body. Douglas Kellner (1995) writes, "Identity today…becomes a freely chosen game, a theatrical presentation of the self, in which one is able to present oneself in a variety of roles, images, and activities…" (p. 246). If we ever were the autonomous individuals Rennaisance humanists had in mind when they called us "human", it seems that we have sufficiently deviated from that "ideal" to warrant a new moniker: posthuman.

This chapter will serve as an exploration of the idea of the posthuman as a mixture of animal and machine, and to argue for this animal/machine hybrid as a worthy and necessary replacement of the human in its historical role as theoretical focal point. Like hermit crabs, three quarters of the world's [post]human population now carry around semi-permanent appendages that

fundamentally inform how we interact with the world. Importantly, this chapter will attempt to shake the foundations of individuality, as the legacies of individual freedom and individual thought have historically been most hazardous to life systems. In addition to breaking down the boundaries of the human, this chapter will posit the humanimal/computer hybrid, or posthuman, as a potential replacement for the human as both theoretical focal point and subject to be educated. Perhaps the biggest theoretical implication of this shift of focus is the decentering of the individual by the group. The posthuman, I will argue, is and must recognize itself as a biotic component of greater (as in larger) entities. In place of the ideal of absolute human autonomy put forth by humanism, a posthuman has obligations to the entities of which it is a part.

Having outlined a particular articulation of posthumanism, chapter two will describe the posthuman teacher. The common conception of the teacher, and focal point for much educational debate, is that of the teacher as an autonomous individual human. This conception and the debates surrounding it will be problematized here. Conceptions of the teacher as cyborg and as components of cybernetic systems will be posited as replacement focal points in education. Component parts that help constitute the cyborg teacher will be examined, including language, the written word, desks, the school building, the computer and others. An important suggestion of this chapter is that the cyborg teacher's constitutive technologies contribute to a vicious circle of influence that leads to a conservatism of practice. Teacher technologies including such seemingly mundane elements as desks and desk layouts, chalkboards or projector screens,

textbooks, etc., grant teachers a measure of authority while they limit methods of educational inquiry.

Chapter three will serve as an exploration of the American child's competing curricula. Since the proliferation of cell phones, I will argue, curricular imperatives have shifted at a foundational level. A life lived increasingly through screens brings challenges to the health of bodies and ecosystems. The tangible world, including the body, can become seemingly less important. Also, where information once was scarce, today it is abundant. Today's youth commonly "switch channels" between flows of information, such as from the teacher's voice to their Twitter feed to conversations via text message. Children are inevitably exposed to a number of competing curricula through these and other outlets, including those furnished by the state (and shaped by teachers), the market, friends and loved ones, and strangers. Of central importance in this chapter are notions of identity and embodiment.

Curriculum theory must continually evolve along with the learner's environment. Chapter four will seek to provide a framework for a curriculum for our young that is informed by our present milieu. As we are posthuman, both animal and machine, curricular imperatives lie both in the tangible and cyberspace realms. Such curricula, I argue, could be built from five curricular imperatives. The first of these is critical media literacy, which involves learning the languages of today's media, in part through creating within those media. An education in critical media literacy should involve training and practice in interpreting and creating in the realms of audiovisual media, social networking,

advertising, and others. A second curricular imperative is what James Gee
(2013) has termed "mining skills", or the ability to obtain the information we need,
when we need it, often from the Internet (Chapter 22, Section 3, para. 14). The
Internet Telecommunication Union (2015) estimates that about forty percent of
the world's population is connected to the Internet, and that this fraction is rapidly
rising, with many of the biggest gains in the developing world. As communities
become more connected, mining skills stand to positively influence the social,
political, and economic spheres of our lives. A third curricular imperative, critical
cultural studies, seeks to fix the cultural blind spots young people face as a result
of technology-facilitated segregation. Our tools today allow us, perhaps more
than any other time in our existence, to serve as gatekeepers deciding whom we
will grant interpersonal access to. This affordance has had the undesirable effect
of the proliferation of self-same groups. Rather than interact with those whose
views challenge our own, we all too often retreat to friend and acquaintance
groups that largely mirror ourselves in appearance, opinion, culture, etc. Giving
students the tools they need to foster and maintain healthy bodies is the fourth
curricular imperative. As we rely less on our bodies, tending to view them as
afterthoughts, we increasingly fail to tend to them. Further, the ubiquitousness of
cheap, unhealthy foods (and advertising for same) makes proper habits of diet
even more difficult to engender. Humanists often forget the reflexive relationship
between mind and body, tending instead to place the mind on a pedestal.
Posthumanism serves as a corrective here, recognizing that the body exerts
influence over the mind. A final curricular imperative for posthumans is the

engendering of biophilia, or affection for all life systems. There are parallels here between disregard for the body and disregard for the environment. When disembodied information takes precedence, both body and environment become neglected. Just as body and mind have a reflexive relationship, so posthumans have a reflexive relationship with the life systems they encompass and the ones that encompass them. That our tools allow us to take from the environment, without regard for, or knowledge of, the effects of our taking, makes the engendering of biophilia all the more important. Such an education, it is hoped, might serve as a corrective to the blind spots raised by our technologies. Though different from one another, these five curricular imperatives share a focus on *selective permeability*. Each, in some form, seeks to educate the posthuman in what she might take in or absorb, and produce or excrete.

The final chapter will explore the teacher's role in the 21st Century. As competitors to the school curricula have never been more numerous, nor more ready to hand (quite literally, since the advent of cell phones), the teacher no longer appears to command the center. Still, there remain roles for teachers no less vital than those of teachers past. That said, teachers must relinquish their self-identification as "the ones who impart information". As curricula for most classes are now furnished by the state, and as "accountability" measures increasingly tie teachers (and students) to these curricula, teacher agency is undoubtedly constrained. The teacher, however, is still capable of *framing* the state's curriculum, as well as providing the light through which it is gleaned. The foundational pillars above can, separately or in concert, serve to "frame" the

state-prescribed curricula. A key endeavor in this chapter will be to give specific examples of this framing, using actual state-mandated curricula.

What's In A Name?

What's in a name? that which we call a rose

By any other name would smell as sweet;

Shakespeare, *Romeo & Juliet*

When is a name change in order? To name something is to ascribe permanence to it, in the mind if not in reality. We often confuse the permanence of names with the things they name, especially in the cases of things that change slowly. I look much the same from yesterday to today, and tend to forget that my body changes. We often become alarmed when we are presented with evidence of our changing bodies, like gray hair, sagging skin, wrinkles, etc. We like to name things, and we take comfort in the illusion of permanence. Many people reject the theory of evolution, perhaps in part because they are uncomfortable with the constant flux it implies. As with the appearance of gray hair, when we consult the fossil record we are faced with impermanence. There are no fixed lines between Homo habilis and Homo erectus, nor between Homo erectus and Homo sapien. These names refer to points, but in between these points is a blur.

Homo habilis is a place marker, and can be distinguished from Homo erectus; another place marker. Homo erectus had measurably larger brains and smaller teeth than Homo habilis. This illustrates the convenience if not the

primary function of names, which is to *denote* difference-to distinguish one from another. To say, "Watch out, a mouse!" is different from saying, "Watch out, a lion!" Names here display a function that seems likely to have an evolutionary origin, as they allow us to convey precise information that can impact subsequent decisions and survival. Crows have vocalizations for raising alarms that can be distinguished from their other calls, and many other animals have evolved methods of communication.

A name provides a snapshot of that to which it refers, freezing it in time. We call zebras zebras, but given enough time what was once referred to as *zebra* will have changed. The zebra might one day lose its stripes in the course of evolutionary adaptation. It is doubtful, should that day come, that it would still be referred to as a zebra. Just as there is resistance to the idea that humans once were something different, so there is (perhaps even more) resistance to the idea that humans will *become* something different in the future. Indeed, we may now be something sufficiently different already to warrant another name than "human". We might be like the yet unnamed creature of the future, descended from the zebra but free of the stripes we (today) associate so closely with zebra-hood. Ultimately, it should be acknowledged, the name itself is, in a sense, trivial. As long as we recognize something for what it is, what we call it doesn't matter-to paraphrase Shakespeare. Ultimately, whether a name is changed or not is much less important than that which compels the name change, which is to say how we are different from what we once were. As long as we are humans, human institutions have a chance of working. To recognize that we are no longer the

humans we once were is a prerequisite for acknowledging the need to revise our institutions and our aims. Much as we are guilty of clinging to our antiquated conceptions of "human", so we too often adhere to conventional notions of curriculum and pedagogy.

I seek, in the pages that follow, to illustrate the ways in which we have recently changed, and to suggest that a name change could be in order. We are, I argue, *posthuman*, and it is important to recognize how we are substantively different even from the humans of a hundred years ago. These differences are not the result of an evolution of body, which is to say that we might still be called *homo sapiens*. Instead, the differences lie in our means of interacting with the world. Most definitions of "human" include tool use, and herein lies perhaps the best case for a name change, as *homo sapiens* of today are less tool users and more *tool-used*. As our smart technologies become smarter, posthumans come more and more to resemble symbionts.

Technology's One-Way Conversation

Humans are descended from social creatures that lived and hunted in groups. Like all living things, we are equipped with *nature's tools*, developed through evolution. Foraging humans used their hands and teeth to take from nature, and their feet and legs to move through her, and their ears to hear her, etc. The use of each and all of our natural capabilities can be said to constitute our part of a conversation between the natural world and ourselves. Technology use, whether natural or technologically facilitated, is always a conversation.

Norbert Weiner (1954) writes, "The commands through which we exercise our control over our environment are a kind of information which we impart to it" (p. 17). The communication of nature's various and varied technologies is what directs the evolutionary process. Successful hunts lead to faster, more intelligent, and/or more aware prey. A reflexivity of influence occurs both between nature's creatures, and between levels of biological organization, as natural selection moves eventually, albeit slowly and with occasional (and sometimes disastrous) detours, towards equilibrium.

Now consider the use of primitive tools such as spears, bows and arrows. These technologies communicate also, but their communication is much more one-way. Using a spear to catch fish in shallow water is a great leap forward in efficiency from attempting the same task with one's "natural tools" only (eyes, hands, legs to move, etc.). The fish, through ongoing communication with the natural world, evolved sophisticated technologies for survival. Humans suddenly developed a technique that greatly enhanced their own survival to the detriment of the fish. Instead of the incremental give and take of natural selection, which leads to the continued enhancement of both parties, humans found a "short cut". This communication is one that is less reflexive, and less open to a "response" by the earth. There is more "take" and less "give", more speaking and less hearing. Such unreflexive communications occur in other beings as well, it must be admitted (as with invasive species, for example). Also, humans sometimes find themselves in positions in which the tables have been turned, where they are subjected to some short cut or other against which they cannot successfully

contend; think of pandemics like the black plague. Indeed, every communication in the natural world involves one party taking more than it gives for a time. The natural world is never perfectly "in" equilibrium so much as it always eventually moves towards it. I may take more today, only to find I must give more tomorrow. The advantage of the cheetahs today is the antelopes' advantage tomorrow, having evolved greater speed in tandem with the cheetahs (their slower relatives having died off in the exchange). This is the story of life. However, the brain size/tool development feedback loop allowed for technology development by humans at a rate for which natural selection was unprepared.

Humans now develop new technologies in a process separate from and much faster than natural selection. As such, it is not technology itself that is the problem, as nature's own arms races have occurred as long as life has existed on this planet. Instead, the human rate of technological advance has given us the capacity (at least for now) to dominate many of the life systems with which we come in direct contact, and further, to hijack the larger systems of which we are constituent parts. As tools began to become more sophisticated, human communication with the world became less and less reflexive. The communication became increasingly one-way, with humans talking but not listening, with more taking and less giving. As invasive species, humans are akin to influenza, a virus capable of sudden reassortments that vastly change its properties. When the old pesticides no longer work, we develop new ones. This, certainly, helps to explain the length of our dominion. We cannot cure the flu, because the flu rapidly mutates. Just so, nature has not yet come up with a cure

for the human, as our technologies mutate at a rate that far exceeds that of natural selection.

Animality and the Oppressed

The concept of human has been from the beginning set in opposition to nature, and has also been (and continues to be) used to justify enslavement, exploitation, and oppression over those considered less human, or "savage". Plato (trans. 1888), a father of humanism, noted that, "Even in good men there is…an irregular wild-beast nature, which peers out in sleep" (Book IX, para. 1). Plato posited that we are all born beastly, and that through education and contemplation we might *become* human. To transition from beast to human was to become more god-like such that one could walk the path from beast→human→god. Having, through good breeding and education, finally mastered our beastly natures, we might then (like God) be fit to rule. Many years after Plato, noted humanist Francis Bacon (1620) wrote that it was "wholesome" and "noble" for a man to "endeavor to establish and extend the power and dominion of the human race…over the universe" (p. 63). Western thinkers thus provided a philosophical basis for colonialism, enslavement, patriarchy (notice Plato and Bacon both specifically refer to men), exploitation of the environment, etc. Everything not fitting with the (European, male, white, straight, "educated") notions of what constituted human was fated to be ruled by those more "civilized". This helps explain the alarm felt when entities considered less human display more human qualities. Pettman (2011), for example notes that, "an

animal that mimics a human to perfection is intolerable" (Chapter 1, section 4, para. 7).

Donna Haraway (1991) argues convincingly that the human/animal boundary was "thoroughly breached" by the late 20th century (p. 274). Many capabilities once thought to be uniquely human have been discovered in other life forms. These include language, tool use, emotions, logic and others. Humans might have a more advanced system of language than any other species on earth, and more advanced tools, etc., but the possession even of primitive forms of these capabilities serves to problematize the human/animal boundary. Most iterations of posthumanism stress the unavoidable animality of (post)humans. No measure of whiteness or maleness or education can rid us of our beastly natures, nor should it. A potential aim of posthumanism is a (re)union with nature, the removal of boundaries, and even to, as Haraway advocates, "take pleasure in the confusion of [such] boundaries" (p. 272). A potential aim of posthumanism, then, might be to seek homeostasis rather than dominion, and to muddle boundaries rather than strictly police and enforce them.

Cells

As more focus in the life sciences is granted to the cell, and less to the body, the human moniker becomes increasingly problematized. A number of issues are at play here. Most obviously, if not most importantly, the very recognition that we are composed of distinct biotic components is a challenge to the notion of the autonomous human. That we are made up of organs which are

in turn made up of cells implies that we ourselves are component parts to larger entities: populations, communities, ecosystems, etc. We are not simply life forms, but are ourselves collections of life forms, as Morton (2013) notes, "life forms do not simply live alongside us: they are within us, so much so that on many levels the host–parasite distinction collapses" (Part 2, section 2, para. 16). We so often think of ourselves as separate from nature, though we draw all manner of sustenance from it. Study of cells reveals a trait common among biotic components, which is that they not only take from their environments, but tend also to benefit them. The (post)human, through the study of the cell, discovers principles of how to comport herself in her milieu. Cells, organs, species, etc. do not seek "freedom" or "happiness" as ends in themselves, but rather an existence that is beneficial not just to them, but to their environment also. Specialized cells serve vital functions in organs, which serve vital functions in bodies, etc., each working towards a state of homeostasis.

Other aspects of the cell that challenge ideas of the human include hybridity and plasticity. Hybridity can be said to involve the ability of cells to combine with other cells, while plasticity refers to the ability of cells to change, adapt and survive. Evidence suggests that many organelles were once themselves cells, suggesting that many cells today resulted from the combining of primitive cells. It has also been theorized that the double wall of many cells could be the result of combination and symbiosis between cells. The semi-permeable wall of the cell allows foreign elements in that can change the cell's constitution and function in surprising ways. Haraway (2008) writes on hybridity

within cells that, "human genomes can be found in only 10 percent of all the cells that occupy the mundane space I call my body; the other 90 percent are filled with the genomes of bacteria, fungi, protists and such, some of which play in a symphony necessary to my being alive at all…To be one is to always *become with* many" (p. 3).

Researchers have successfully removed cells from bodies, and today farm cultures of them in laboratories. Hannah Landecker (2007) points out that when cells of different species are placed in the same place, they do not necessarily recognize one another as foreign, noting an absence of, "intracellular mechanisms for recognizing incompatibility between individuals or species"(p. 184). Might humans be analogous to cells in some ways? If so, surely the joining of humans and intelligent machines resembles the hybridization of cells. As hybridity and symbiosis between cells has led to new forms of life, so it seems that the hybridity of humans and computers has led to the posthuman.

Machines

So far we have explored several challenges to the notion of an autonomous human from the realms of the animal and the microscopic. The urge to distinguish human from animal, it has been argued, is so prevalent in Western thought because it helps justify oppression (by those who deem themselves human) of those deemed less human and exploitation of the natural world. Cells challenge notions of human autonomy by revealing life to be analogous to a series of Russian nesting dolls, of which the human body is one of the dolls in the

middle. This, in turn, challenges notions of human exceptionalism at the same time as it reminds us of our connections with forms of life that exceed our ability to directly observe them. In the paragraphs that follow, I hope to challenge the human by exposing the (growing) fault lines in the human/machine distinction.

In 1748 La Mettrie, in *Man a Machine*, notes the machine-like nature of the body's functions: "Is it not by mechanical means that the pores of the skin close in winter so that the cold cannot penetrate to the interior of the blood vessels, and that the stomach vomits when it is irritated by poison…? That the heart, the arteries and the muscles contract in sleep as well as in waking hours, that the lungs serve as bellows continually in exercise? Is it not the case that the sphincters of the rectum and bladder act mechanically" (p. 46)? In much the same way, humans themselves might be conceived as fulfilling machine-like functions for the larger systems of which we are parts. Those who object that machines cannot be of flesh and blood might be alarmed at the work presently being done in the fields of biotechnology, genetics and others, in which life is being bent to ever more elaborate ends. As Landecker (2007) notes, an, "assumption of living matter as technological matter is constitutive of life today…" (p. 2).

In the past, bodily integrity has maintained the illusion of separateness from the technologies we have employed. This perceived integrity is breaking down, however, as modern technologies are increasingly attached to, inserted in, and morphing our bodies. The hermit crab carries around its shell at all times, and typical depictions of the creature include the shell. We see the hermit crab

with its shell as a singular entity. By this logic we might well begin to think of the human with their smart phone as a distinct entity. Any alien scientist worth her salt would surely note the attachment of humans to their phones. Pacemakers, artificial limbs and organs, and many others actually breach the bodily integrity we believe to separate us from machines in a meaningful way. Wearable technology, though still in its infancy, could obliterate the human/machine boundary once and for all, as computers become attached to our wrists, eyes, brains, etc. There is no body that possesses an impermeable shell. Our bodies and the cells in our bodies can be entered, and we like all things change as our constitution changes. In 1991 Donna Haraway declared, "…we are cyborgs", and we have only become more entangled with machines since those words were written (p. 150).

Consciousness

There is a tendency to emphasize consciousness as a defining marker of the human. Consciousness is believed to grant us the capacity for rational thought, and is thereby used to justify anthropocentrism. It provides us with the illusion that our minds are distinct from our bodies. As such, a critique of consciousness is not out of place here, where we have already problematized the human/animal and human/machine distinctions. As Hayles (1999) notes, "the posthuman view considers consciousness, regarded as the seat of human identity in the Western tradition…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" (p. 2). The illusion of a mind/body distinction has led to a hierarchy of mind *over* body, from which follows the anthropocentric notion that the human mind should rightfully rule over all bodies, and that the natural world (including one's own body) is inferior to the mind.

It is a common belief that information is funneled through our senses to our minds, where we are at liberty to consider all of the evidence and make rational decisions. Even if our bodies are restrained, we often feel as though our minds are free, often in an absolute sense. We believe that we are capable of seeing the world clearly, and thinking what we wish to think. Neuroscience over the last several decades, however, suggests that this view of consciousness may be misleading. Neuroscientist Stanislas Dehaene (2014) writes that, "the course of human actions is driven by a broad array of mechanisms that are inaccessible to introspection, from sensorimotor reflexes to unaware motives and hidden desires" (Chapter 2, section 2, para. 4). Consciousness, according to this view, often takes a back seat in the direction of behavior. This is not the only challenge to conventional notions of consciousness, however. It is now generally accepted that our brains process much more information than ever reaches the level of consciousness. Dehaene suggests that the mind is like a bureaucracy with an army of statisticians in the lower levels crunching numbers and composing briefs, some limited number of which make it to the executives (consciousness) at the top, from which some decisions are then made. Education, proclivities, inclinations, etc. can influence what rises to the level of consciousness and what does not. Overhearing a conversation in Mandarin, I am not conscious of the

meaning of the speech. A career musician is surely conscious of elements of music that go unnoticed by me. We often have more difficulty distinguishing faces of people of another race from one another than people of our own race. We each have our own lens through which we view the world, a lens that obscures some things and distorts others. Thanks to the plasticity of our brains, we can alter the lens through which we view the world and we can strive for a "clear" picture, but there will always be information left out from and/or distorted prior to reaching consciousness.

The idea that consciousness receives heavily filtered information from the brain challenges the possibility of objective thought. Much as the human cannot ultimately separate herself from nature, neither can one's consciousness separate itself from the mind it springs from. We overestimate the significance of consciousness to our behavior and decisions possibly because it is the only aspect of the function of our minds of which we are immediately aware. This is analogous to a person who mistakenly ascribes more power to the president than they have in reality because of the president's relatively prominent visibility. The other branches of government and the remainder of the executive branch are sometimes discounted because they are less visible. Not detecting consciousness (at least of the sort possessed by humans) in other life forms, we often (mis)take our uniqueness for superiority. Our capability of rational thought, born of consciousness, is centered as our bodies are marginalized. Exactly as the human/nature distinction has been used to oppress marginalized peoples and exploit nature, the mind/body distinction has been used to oppress the body.

To satiate the desires of the body, we are told, is to submit to one's baser, animal nature.

Computers

Our bodies, including our brains, shape our consciousness. The mind cannot be removed from the body, nor can our minds and bodies be separated from nature. But this is not all. In addition to recent efforts by neuroscientists that have had some success in knocking consciousness from its pedestal, 21st century technologies call into question the notion of consciousness at the individual level. By 21st century technology I refer chiefly to the globe spanning and rapidly growing network of computers and sensory devices. The degree to which these technologies allow our behavior to be coordinated and our thoughts to be interconnected renders consciousness a more communal affair. Of this technology Hansen (2015) notes that, "humans become implicated within larger causal and technical networks in relation to which they can no longer claim any kind of transcendence. What is crucial about such implication is the way it expands agency beyond the subject-centered perspective of any delimited entity or society, thus rendering it a function of the total environment involved in any given social event" (Chapter 1, section 6, para. 4). By this view, technology challenges ideas of autonomy as it weaves us into networks of machines, people, and nature. In some ways this effect of technology is a reversal, as our tools are what originally gave us the illusion of autonomy to begin with. Tools

made us believe that we were masters of the natural world, but of late certain of our tools are increasingly allowing us to hear what the world has to say.

Katherine Hayles (1999) defines the posthuman as the union of humans and intelligent machines (p. 3). These machines increasingly inform our behavior, our aims, and our means of understanding the world. Hansen distinguishes 21st century media from earlier media based on their orientation towards informing future behavior. Where a movie or book allows its creator to crystallize a moment from the past and share it with someone in the future, today's media allow the sharing of moments from the present or recent past. Hansen (2015) writes, "Encompassing everything from social media and data-mining to passive sensing and environmental microsensors, twenty-first-century media designate media following their shift from a past-directed recording platform to a data-driven anticipation of the future" (Introduction, section 2, para. 1). This view ties present day technology more closely in function to our bodies and bodily senses. The human eye, for example, works in a feed-forward way much like social media, as both take in massive amounts of information, shape it (through retinal processing in the former and algorithms in the latter), and feed a tailored selection of the information to consciousness. As our technology becomes increasingly designed for feed-forward functions such as this, and thus comes more to resemble additional sense organs, it becomes more vital that we take a new account of who and what we are, what we are capable of, and how we should comport ourselves given the affordances of our technologies.

Humanism, Christianity, and Posthumanism

"*Humanitas* was the opposite of *divinitas*. The humanities were put in opposition to theology and theological interest."

-John Dewey, *The Later Works, 1925-1953: 1929-1930*, What Humanism Means to Me, p. 265

While the rise of Humanist thought during the Renaissance was in part a rejection of Christianity (see Dewey above), humanism retains the same foundation as Christianity. Both proceed from a mind/matter dualism and both emphasize human happiness. In the case of Christianity, a soul exists that is separate from the body. While the soul is immortal, the body is a temporary shell. Bodily desires in Christianity are to be tempered if not rejected, as the goal is to become less beastlike and more godlike. Humans alone are in a position to reject worldly ways for the divine. God may be communicated with through silent prayer. Those who walk the path will receive a place in heaven after their death, a place of eternal joy and immense wealth (with streets of gold, gates of pearl, etc.). Isaiah illustrates a heaven in which residents engage in productive labor for themselves, and in which there is no longer a natural hierarchy. He writes that the people in heaven, "shall not build and another inhabit; they shall not plant and another eat…" (Isaiah 65:22, English Standard Version) and that in heaven, "The wolf and the lamb shall graze together; the lion shall eat straw like the ox…" (Isaiah 65:25, English Standard Version). Here, as elsewhere, Christianity taps into a desire to be free from oppression both from other humans (in heaven one is no longer compelled to do work for others) and from nature. Humanism seeks

to indulge these desires also, though while Christianity offers hope of fulfilling these wishes after death, humanism offers their possibility during life.

There is, both in humanism and Christianity, a turn away from the natural and embodied, which springs from the mind/body dualism at the core of each belief system. Though humanism has been influenced by naturalism, it remains preoccupied with rationality. For Aristotle, Plato, and other forerunners of humanism, there was the idea that the best of humanity should set themselves apart from nature, manual labor, socializing, etc., for a life filled with solitary contemplation, which might from time to time be shared with the [lesser] masses. Plato even advocated rule by philosopher king. For Christians, prayer is the analogue to the humanist's contemplation, and the soul is analogous to the mind. The most pious avoid bodily temptations, with nuns, monks, priests, etc., vowing to abstain from sex. The worldly is subordinated to the heavenly, and one is expected to reject the worldly in life so that one might enjoy the heavenly in afterlife.

In all major religions, there is some variant on the golden rule, and this rule is very much in keeping with humanist thought as well. But, "Do unto others as you would have them do unto you" is too often assumed, both among Christians and humanists, to be limited to humanity. "Others" is taken to mean "other *humans*". There is a disregard for other life systems in both beliefs, which is much in need of rectification. Whether faith is placed in God or rationality, there is danger. Faith itself is hazardous, as it allows the believer to ignore or repress new information. Some Christians are insensitive to environmental concerns,

believing that God intended that all life on earth be subordinate to human life. Some even dismiss concerns over global warming with the belief that the rapture will take believers before things "get too bad". Humanists, though generally recognizing that humans are of nature, often seek advances in human welfare without consideration of the welfare of other life. Humans are considered, in both beliefs, to be at the apex of all life. Both, in short, are dangerously anthropocentric. Humanism at its worst is to the natural world as colonialism is to the human race.

The similarities in function between religion and humanism are not coincidental. Lewontin (1991) classes both religion and science as "institutions of social legitimation" (p. 6). For Lewontin, both function to forestall revolution by convincing oppressed groups that the current social order is natural and just. Where Christianity and science diverged was in the scope of focus for agency. Prior to industrialization and the rise of capitalism, the group was of greater cultural import than the individual. Lewontin notes that Christianity helped preserve the hierarchy between groups in a number of ways, including granting the king rule by divine grace. In this context, the Golden Rule can also be seen to serve the function of preserving the status quo, as one cannot simultaneously follow it and engage in a revolution. Industrialization and capitalism imposed a shift in focus from the group to the individual, which challenged Christianity's primacy and led to science rising to take its place. Lewontin writes, "With the change in social organization that was wrought by developing industrial capitalism, a whole new view of society has arisen, one in which the individual is

primary and independent, a kind of autonomous social atom that can move from place to place and role to role" (p. 11). Following these changes, science came to be thought of as a process of understanding something by breaking it up into smaller parts and examining the parts. In this manner biology came to focus on cells and genes more so than organisms and ecosystems, and economics became preoccupied with individual actions (Adam Smith's invisible hand comes to mind). This shift in focus from the group to the individual helps also to explain the rise in humanism, which similarly focuses on individual agency with a tunnel vision that blinds people to their unavoidable connections to other life systems.

Posthumanism differentiates itself from humanism chiefly through de-centering the human. Though frequently posited as a rejection of humanism, posthumanism might also be thought of as a radical extension of it. Latour (2004) writes, "To limit the discussion to humans, their interests, their subjectivities, and their rights, will appear as strange a few years from now as having denied the right to vote of slaves, poor people, or women" (Chapter 2, section 3, para. 14). Instead of seeking to advance the common good of humans, posthumanism seeks the common good of all life systems. Posthumanism is a call to listen to the non-human, and to try to understand what non-humans say and take it into account, and finally to recognize that we ourselves are not human.

Posthumanism seeks to provide a system of thought that avoids a major pitfall inherent in both humanism and Christianity: the quest for unbridled freedom. Both Christianity and humanism seek freedom for freedom's sake, and tend to view freedom as something to be had in an absolute sense. The

happiness striven for by humanists for humans is the happiness of a slave master, with nature serving as the slave. Some articulations of posthumanism recognize that nothing is ever free in an absolute sense. We are all life systems nested in life systems, beholden to other forms of life as they are to us. We have obligations that we should not ignore, both within our bodies and in the larger ecosystems we inhabit. Posthumanism benefits from the words of Bersani and Phillips (2008), who identify what, "may be the most profound mistake inherent in being human: that of preferring our opposition to the world we live in over our correspondence, our friendly accord, with it" (p. 127). Similarly, posthumanism might benefit from drawing on Buddhism and other eastern religions in a focus on *balance* as opposed to the freedom and happiness sought after by Christians and humanists. Further, emphases on impermanence, interconnectedness, and suffering are all central to Buddhist faith, and could help clarify beliefs associated with posthumanism.

Macroeconomic theory posits a short-run aggregate supply and demand that hover around a long-run aggregate supply. The short-run equilibrium might be above, below, or (rarely) precisely coinciding with long-run equilibrium. Classical economists argue against fiscal or monetary interventions on the grounds that the economy will always eventually right itself. By this view, elements of the economy may temporarily move out of homeostasis, but must eventually move back towards a long-run equilibrium. While the truth of this maxim in macroeconomics might be in doubt, an analogy of it always holds in the natural world. Long-run aggregate supply is roughly analogous here to the

environment; it is the point around which organisms "hover" evolutionarily, constantly adjusting in search of harmonious existence. In neither case does flux cease once homeostasis between macro and micro is achieved. Evolutionary biologists have a variety of terms for the minute evolutionary changes occurring in organisms as they constantly adjust and re-adjust to the environment; some refer to it as "wobbling" and others as "jittering", for two examples. "If they weren't jittering," Jonathan Weiner (1994) writes, "that would suggest that the processes that brought them here had finished, that the creation was over, just as the universe would be moribund or dead if there were no motions to be found in its atoms" (p. 112). This hovering illustrates a sort of meta-teleology of life, that of constantly seeking harmony. It is not evolutionarily profitable for organisms to depart from this meta-teleology, as those that do tend to go extinct. By focusing on (short-term) happiness and/or "freedom" at the expense of a sustainable equilibrium, we endanger ourselves and other life systems.

An Articulation of Posthumanism

There are nearly as many posthumanisms as there are posthumanists, and because this dissertation seeks to explore the implications of posthumanism for curriculum and teachers, it is necessary to detail a number of common themes in posthumanist texts. These common themes, somewhat shaped and amended by my own thoughts, will serve as the lens through which we view the plight of American education, students, and teachers in the following pages.

Further, I hope here to outline some conceptions of posthumanism that differ from the one I am using, so as to avoid confusion.

One clear tenet of critical posthumanism common among theorists in the field is that of interconnectivity and the blurring of boundaries. As I have attempted to show in the previous pages, there are no distinct boundaries delineating the human from nature, nor are there clear boundaries between mind and body, or human and machine. We are all unavoidably both animal and cyborg, and we cannot escape from nature. These sentiments share much in common with, and owe much to, naturalism. However, posthumanism is distinct from naturalism in welcoming inanimate things, technology and/or machines into the fold. As Norbert Wiener (1954) notes, "Now that certain analogies of behavior are being observed between the machine and the living organism, the problem as to whether the machine is alive or not is, for our purposes, semantic" (p. 32). Wiener's cybernetics, it should be noted, have heavily influenced posthumanist thought.

All of this boundary confusion understandably has and will continue to be the source of much fear and anxiety. The posthumanist movement generally follows Haraway's thought that we should learn to take pleasure in boundary confusion. Along these lines, Bersani and Phillips advocate "impersonal intimacy", which Pettman (2011) describes as "a 'new relational mode' that does not hate or fear otherness and that does not take difference personally" (Chapter 2, section 6, para. 1). At the same time, this need not require the exercise of absolute hospitality as described by Derrida (2000), a hospitality in which, "I open

up my home and that I…[give place] to the absolute, unknown, anonymous other…" (p. 25). Instead of welcoming the unknown other in to our bodies and minds without question, we might look to the cell wall that exhibits *selective permeability*. It is not necessary that we relinquish all agency when confronted with the other, only that when we encounter the unknown *we do not immediately fear or reject it*.

Having explored notions of impermanence, interconnection, and constant change, in which it appears posthumanism owes no small debt to Buddhism, consider another recurrent theme in posthumanism that also shares a clear analogue with Buddhist teaching, the relinquishment of the self. "Life is suffering" the Buddha said, and this suffering follows directly from impermanence. Only by giving up self-hood and recognizing one's implication in and connection with the universe can one end their suffering. We cling to our agency and identity, suffering at the thought of our death. So much of what we qualify as happiness is tied to the accumulation of power-over nature, machines, and other humans. Instead of happiness then, posthumanism might substitute *homeostasis* as the overriding goal of the posthuman. Posthumanism is steadfastly critical of anthropocentrism, in part because it places humans in disequilibrium with the natural world. This anthropocentrism has led to widespread environmental degradation, species extinctions, climate change, ocean acidification, and others. Latour (Bijker and Law, eds., 1992) writes, "What our ancestors, the founders of sociology, did a century ago to house the human masses in the fabric of social

theory, we should do now to find a place in a new social theory for the non-human masses that beg us for understanding" (p. 227).

There is so much that we do not understand about the nature of being, and the privileging of humans over nature has thus far endangered both non-human objects and ourselves in ways that we still do not fully grasp. This is the fundamental precept of a movement related to posthumanism called object-oriented ontology. Timothy Morton (2013), a leading theorist in this movement, refers to objects as, "sparkling realities withdrawn from access" (Part 2, section 3, para. 48). Because we cannot ever truly understand them, we should not assume superiority but instead should seek harmony. Latour (2004) advocates community building of a sort, in which humans form a collective with non-humans. He notes that, "lab coats have invented speech prostheses that allow nonhumans to participate in the discussions of humans" (Chapter 2, section 3, para. 9). Scientists here would function as translators, helping humans understand the non-humans.

A number of theorists whose views coincide with posthumanism warn of erring in the other direction, which is to say placing Nature up on the same pedestal Human is being knocked off of. Pettman (2011) advocates "communicating with natures rather than communing with Nature" (Chapter 2, section 6, para. 18). He takes issue with the idea of "communing with Nature" because it implies subsuming oneself, relinquishing all capacity to act. Just as the assumption of absolute freedom is faulty, so to is a dogma of determinism. Morton (2013) warns of "overmining", which he describes as, "when one reduces

a thing 'upward' into an effect of some supervenient system (such as Gaia or consciousness). Since bigger things are more real than smaller things, incremental steps will never accomplish anything" (Part 2, section 2, para. 59). We are less cogs in a machine than we are neurons in a brain. Neuronal plasticity describes individual neurons that are "free" to make new connections and sever old ones, effectively re-wiring the circuits in our brain. The individual neuron thus is not a mere functionary of the brain, but enjoys a reflexivity of brain/neuron influence. The act of learning, it should be noted, takes place via the exercise of such neuronal "agency". In a manner analogous to that of neurons and brains, humans and human society too possess a reflexivity of influence. Political and economic structures guide human behavior, and vice versa.

What agency we have comes with responsibility, and it is a "freedom for" rather than "Freedom, period". There is thus a measure of asceticism in Posthumanism, but only a measure. We should use our agency to reject indulgences that place us in disequilibrium with the life systems we inhabit and/or our bodies. As Kant (1788) writes, "…the concept of morality and duty [has] to precede before all regard to this feeling of satisfaction…" (p. 35). Duty must come before happiness, in other words, and herein perhaps lies the strongest bond between posthumanism and education, because this sense of duty (unlike happiness) must be *learned*. At the same time, homeostasis need not rule out happiness. Indeed, finding harmony with the life systems to which one is connected brings a happiness of its own.

Embodiment

Posthumanism is often conflated with transhumanism, a movement that advocates the improvement of the species through advances in technology. Such improvements include but are not limited to bodily augmentation to achieve things like increased intellectual capacity, longer life spans, better disease resistance, and others. Transhumanism often serves as an extension of humanism by using technology as the lever by which to privilege the human over nature. In contrast, the posthumanism I am seeking to articulate, sometimes called critical posthumanism, has an entirely different and in many ways contrary aim. Where transhumanists dive headlong into the possibilities afforded by cutting edge technology, abandoning, augmenting or supplementing the body whenever it helps achieve their goals, posthumanism seeks to inform and critique the present. Posthumanism recognizes a body that is part machine, but it also seeks to de-center the mind from its privileged position in the mind/body duality. Just because our bodies are no longer as distinct from machines as we might have once thought they were does not mean that we should remake our bodies as we choose. Just as Latour argues that we should cultivate methods of listening to and understanding non-human objects, so should we learn to listen to and understand our bodies. This task is made more difficult today due to the existence of technology that provides the illusion of separating us from nature. Weaver (2010) puts the matter bluntly, asking, "in the post human world it is essential to ask what happens to the body when the environment is

technologically constructed" (p. 25)? Posthumanism reminds us of our inescapable connection to our bodies at a time when we are most likely to forget. Baudrillard (1988) writes that, "...as soon as behavior is crystallized on certain screens and operational terminals, what's left appears only as a large useless body, deserted and condemned" (p. 4). We live in climate controlled dwellings and our lives are increasingly screen mediated. These and other conditions are far from the ones our bodies are evolved to cope with.

In this screen-mediated age when our bodies seem less useful than ever, posthumanism's preoccupation with embodiment deserves some explanation. Most of us can meet our subsistence requirements without taxing the body as much as people from earlier times. This, combined with the mental demands of our information economy, makes a compelling case for the body's marginalization. The main fault in this logic is that it insists on two entities, mind and body, when in actuality there is only one. If we must use the terms mind and body, as seems almost unavoidable, let us consider them as poles at either end of a spectrum. Further, it is important to note a reflexive relationship at work in which each is always influencing the other. In the paragraphs on consciousness above it was suggested that the embodied brain only presents heavily limited and augmented information to conscious awareness. Thus the needs of the body, as well as the always-changing physical structure of the brain (in terms of neuronal synapses), inform our conscious awareness.

Catherine Bateson (1972) argues for the importance of embodiment when she writes, "Each person is his own central metaphor" (p. 285). Here Bateson

suggests that our bodies provide the central metaphor by which we come to understand the world. Hayles (1999) provides a helpful example, noting that, "if we had bodies with significantly different physiological structures, for example exoskeletons rather than endoskeletons or unilateral rather than bilateral symmetries, the schema underlying pervasive metaphoric networks would also be radically altered" (p. 206). Perhaps because it is proper to stand upright, we think up is more proper than down, and thus that higher is better than lower. I assume that the bodily processes that occur when I become angry or depressed or excited occur in a comparable way in other entities when they feel those emotions. Listening to my body in this and other ways fosters empathy for other entities. To neglect the body in this context is to neglect our first and most valuable teacher, and to pass up opportunities to learn.

Screen mediated experiences require screens, just as software requires hardware and the mind requires the body. To this we must add that the body requires the earth, or at least a reasonable facsimile of it. In this vein, Morton (2013) argues of the need to, "unground the human [from it's technologically constructed environment] by forcing it back onto the ground, which is to say, standing on a gigantic object called Earth inside a gigantic entity called biosphere" (Introduction, para. 35). Remembering and tending to our bodies is a first step towards remembering and tending to the earth, itself a body of which we are a constituent part. Morton's words imply the need for a renewed *contact* between body and earth. James Gee (2013) writes, "Early humans lived right up against the world. There were harsh and possibly dire consequences when

people did not listen to the world's responses or respond to them intelligently"
(Chapter 2, para. 19). While such contact occurred in early humans without
technological mediation, present technology allows us to listen to the world in
ways that both build on our bodily senses and establish new forms of
communication. Hansen (2015) claims that twenty-first-century media make
possible a greatly "expanded sensory contact with the world" (Introduction,
section 2, para. 4). In the wake of the Industrial Revolution we were often unable
to detect the effect of the growth of industry on the environment. While our
present awareness of these effects today is still lacking, it has greatly increased.
The worldwide electronic network of satellites, sensors of various sorts (that
greatly exceed in breadth and depth our own bodily senses), computers to
interpret the data, etc., serve as new forms of contact between (post)human and
earth. We see carbon dioxide levels rising over time, and ice caps melting away,
and temperatures rising. We are able to sample the water, the air, and the soil for
toxins. The expansion and capabilities of our sensing technologies are beginning
for the first time to catch up with those of our taking technologies. Hansen (2015)
views this turn as a positive one, noting that these technologies "operate to
reground the human on the basis of a non-anthropocentric account of the world
and of the environmental dimension that is at issue in any and every event,
including events involving humans" (Introduction, section 8, para. 7). Note that
Hansen here, like Morton at the beginning of this paragraph, uses "ground" as a
verb. Ground, or reground, is something that we should *do*. This is a common
posthumanist view, and can be restated as a call for the pendulum to swing both

from the mind back towards the body, and from the human back towards the earth. In many ways, to renew contact with the body *is* to renew contact with the earth.

Technocracy

We inhabit a technologically constructed environment that like the natural world is often harsh and oppressive. Marx (trans. 1955) notes that while, "In handicrafts and manufacture, the worker makes use of a tool; in the factory, the machine makes use of him" (p. 548). Increasingly, the entire world is coming to resemble a factory and our use by machines less avoidable. Technology thus is to "humans" what it is to "nature", a conversant that increasingly talks without listening and takes without giving. We are part of nature, and therefore should not be surprised at this development. Indeed, the use of technology to take from humans is as old as its use to take from nature. Stone axes, spear tips and arrowheads were used for tribal and interpersonal conflicts as well as for hunting.

Andrew Feenberg (1999) uses the analogy of a system of laws to better understand technological development. There are just and unjust laws, it must be admitted, and the powerful are sometimes (if not often or constantly) able to influence legislation to their benefit and at the cost of society as a whole and the natural world. Once a law is firmly established, it often comes to be accepted as a given. The best time to resist an unjust law, therefore, is at its introduction. Laws are neither in themselves neutral nor is their creation autonomous. In all of these ways technology has a corollary. Technologies can in themselves be just

or unjust. Ivan Illich (1973) identifies examples of just technologies (which he refers to as "convivial tools") including Mexican markets, telephones, and the postal service, which all have the potential to maximize liberty. Technologies can likewise be unjust in themselves, much as Apartheid law in itself is unjust. Such technologies might include weapons and chemicals harmful to the environment. Again, like laws, technologies prescribe certain behavior and can therefore in themselves be just or unjust. As with law, the powerful are frequently able to direct the development of technologies towards their ends of short-term gains, as the technocrats are generally on their payrolls. Finally, as with law, meaningful resistance can be effective, and the best opportunities for resistance frequently arise early in a new technology's introduction.

Regarding technological development, Feenberg (1999) advocates, "a view to constructive change rather than romantic retreat" (p. 179). This is a very posthumanist idea, and a break from the numerous theorists and philosophers who see no hope except for (a probably impossible) withdrawal from the technological environment. However, as in the legal system, resistance faces numerous obstacles. Perhaps the most formidable of these obstacles to resistance is complacency resulting from the illusion of choice. Marcuse (1964) writes of a pervasive "Happy Consciousness" which he defines as, "the belief that the real is rational and that the system delivers the goods—[and] reflects the new conformism…" (p. 79). People take pleasure in stability, and come to believe that the present reality is the right way. We often fail to recognize our oppression as we focus with tunnel vision on the agency we still retain. Free to choose the color

of the smartphone, channel on the TV, and toppings on the burger, we fail to see

our loss of agency in other areas. Illich notes that we lack the freedom to build

our own shelters, grow our own food, and provide our own healthcare. Our

freedom in our present environment requires consumption and production within

the market system, which in itself comes at a huge cost of freedom.

A possible silver lining of the increasing rapidity of technological change is

that the lack of stability offers new and powerful paths of resistance. Though

established forms of domination through technology are exceedingly difficult to

change, fighting for justice in the introduction and application of new technologies

can reap significant rewards. A current front on which such resistance is taking

place is in the use of drones. Since the drone industry has not become such a

behemoth as to render all resistance moot, governments at all levels are listening

to citizens and even passing legislation limiting the use of these new

technologies.

Kahn (2010) argues that an imperative raised by our technological

environment is "technoliteracy" (p. 9). We must know about the new technology

in order to know if it is just or not, and in order to better facilitate, adopt, resist, or

avoid it. Surveillance is control, as Foucalt has argued, and today's technology

allows a degree of surveillance unprecedented in human history. Our locations,

purchases, Internet browsing activity, communication, family status, and others

are all subject to some form of surveillance, often in real time. Algorithms are

used to process the massive amounts of data such surveillance gathers, and the

information often informs advertisements tailor-made for each of us.

Technoliteracy and media literacy can help us become more aware of the tools of surveillance, and make us more aware of attempts at manipulation. These literacies can also offer paths of resistance that might escape our awareness otherwise.

Finally, even in arenas where a technology has become firmly established, resistance need not cease. In the face of such an established technocratic order, De Certeau (1980) writes: "A thousand ways of playing/ outplaying the other's game, that is to say, the space others have instituted, characterize the subtle, tenacious, resistant activity of groups which, for lack of a base, must maneuver in a network of established forces and representations" (p. 59). Instead of direct resistance in such a situation, De Certeau argues for the use of tactics that subvert the technocratic order from within, often without arousing suspicion. Just as nature increasingly demands to be heard, and insists on having a say in the face of technology, so too will the (post)human resist.

Concluding Remarks

The preceding pages are intended as a foundation from which educational and curricular considerations will follow. I have intended to outline a conception of posthumanism that emphasizes interconnectivity and blurred boundaries (between humans and animals, humans and machines, minds and bodies, cells and bodies, etc.). This view of posthumanism rejects both unlimited individual autonomy as well as determinism, instead finding a place between these two poles. Human agency exists and matters, but we do not possess freedom for

freedom's sake. Instead, our freedom must be tempered with the responsibility that comes from our interconnections with other life systems. Posthumanism as it is envisioned here reminds us of how we are inseparable from our bodies, and how this embodiment ties us to the tangible earth.

The emphasis on interconnectivity in posthumanism provides a link to the idea of the *posthuman*, a hybrid entity of humans and intelligent machines. Rejecting humanist ideas of human dominion over nature and mind/body dualism, and reflecting on the educational implications of the posthumanist tenets above, a number of educational aims, curricular imperatives, and pedagogical considerations arise. Prior to exploring these, however, the next chapter will consider the teacher as a posthuman entity. Before outlining what should be taught and how, it will be helpful to have a nuanced understanding of the teacher today. Like other posthumans, teachers are hybrids of humans, animals and machines, and are parts of a technocratic order. They have unique technologies at their disposal that impact the nature and force of the messages they impart to students. In the classroom and the school, they are part of a series of interconnected cybernetic systems in which there is a reflexivity of influence between teacher and system. These considerations, it is hoped, will provide justification for the educational, curricular, and pedagogical suggestions that will follow.

CHAPTER 2

THE POSTHUMAN TEACHER

Just as educational goals, curricula, and pedagogy must take the environment into account, so too must they be informed by the capabilities, talents, and proclivities of the teacher. Where chapter one sketched out a view of our milieu, the following pages are a consideration of the teacher within this milieu. I argue here that the teacher today is posthuman-a merging of the human and the intelligent machine. This chapter will consider the posthuman teacher from a number of different angles, such as teacher as cyborg, zombie (puppet to the machine), and animal. Also, the influence of humanism on the teaching profession will be considered, as its legacy continues to have a significant impact on teaching. A model, developed by cyberneticist Gregory Bateson for explaining interactions between cultures in close proximity to one another, will be used to shed light on the relationship between teachers and computer technologies, and allow for some conservative predictions. A description of posthuman teachers who are not affiliated with schools will conclude this chapter, as such teachers stand to greatly inform the practices of schoolteachers over the coming years. It is intended that these various ways of conceiving today's teachers will inform the posthumanist-guided educational aims, curricula, and pedagogy to be explored in the final three chapters.

Cyborg Teachers

The defining trait of the cyborg is its hybridity. When one communicates with a cyborg, one addresses and is addressed by a mixture of human and machine. To conceive the teacher as a cyborg is to recognize that her message is not free of technological imperatives nor of mediation that shape her message in important ways. Teachers are distinguished from other cyborgs chiefly by the technology through which they converse and/or exercise control. Following Wiener (1954), I have "classed communication and control together". He writes, "When I control the actions of another person, I communicate a message to him, and although this message is in the imperative mood, the technique of communication does not differ from that of a message of fact" (p. 16-17). This conflation of communication and control is in some ways typified by the teacher, whose communication is designed to impact student experience to influence subsequent student thought and action. In this light, the cyborg teacher's communication machinery is also and at the same time machinery of control.

Popular conceptions of the teacher today often retain a humanistic bent. The teacher is a human seeking the betterment of all of her human students, by this view. Just as humanism's focal point is the individual human, much education theory focuses on the individual human teacher. As in the case of humanism, theoretical focus on the teacher often ignores the technologies to which they are attached and through which they communicate. These technologies do more than change the nature of the conversation-they amend the messages transmitted. In American education, teachers are compelled to

teach state mandated curricula, but these curricula often fail to acknowledge or account for the communication/control technologies through which the curricula will be mediated. Recognizing the teacher as a cyborg and her message as technologically mediated reveals different, otherwise hidden messages. Here McLuhan's (1964) maxim, "…the medium is the message" (p. 7) must be acknowledged. My goal in the next few paragraphs is to, through a consideration of the cyborg teacher's machine parts, reveal some of these hidden messages.

The spoken word is perhaps the first technology employed by the teacher, and remains of significant importance today. Dewey (1958) refers to language as "the tool of tools" for its ability to facilitate the creation of other tools (Chapter 5, para. 4). Though oral instruction does not require machinery (except insofar as bodily organs qualify as machinery), as a medium it sends messages apart from the "content" of the speech. Orality privileges the aural over the other senses, and this privileging continues to inform human interactions today. In addition, language privileges that which can be communicated through (human) language over that which cannot. The natural world communicates with and controls us (and we it) in other ways than through human language. Notably, the *lack* of language as "sophisticated" as that of humans in animals is used as evidence of human superiority over animals. Any lack of eloquence in humans, when observed, is often thought to make them less human and therefore inferior. The privileging of human language over other means of communication and, more generally, the privileging of all human forms of communication over other means of communication, are exhibitions of anthropocentrism.

Clothing limits direct physical contact with the outside world, and was first worn long after humans began to speak. Might the distaste with which people view public physical contact be informed by our dependence on (colonization by) the spoken word? Could our orality be linked with disdain for other senses, such that we often seek to avoid touching or smelling other bodies in general? We observe the marginalization of smell and touch, and of anything that cannot be communicated through language, institutionalized in the school. School rules generally prohibit most physical contact. Teachers are often held accountable for the smell of their classrooms, as students and visitors generally object to any smell at all, with the exception of a limited measure of air freshener. I personally have witnessed a student being ejected from a public high school classroom by his teacher because of his objectionable (due to being admittedly strong) body odor.

McLuhan (1964) writes that the adoption of a medium constitutes *autoamputation*, whereby we effectively amputate part of our body when we use the medium (Chapter 4). The privileging of speech and language over other forms of communication serves to disembody its users. It un-grounds us from our tangible bodies and the tangible earth, giving the illusion that the mind is separate from the body. The body then becomes something to be mastered, to do the mind's bidding, and often to go unnoticed and neglected. In the classroom, bodies generally are fixed in space and covered in clothes (with dress codes ensuring sufficient coverage). Bodies should not have an extreme smell, nor should they have more than fleeting contact with other bodies, and each

body has a specified location depending on the time of day. Other than prison, where does the body have less agency than in the public school?

Another machinic aspect of the cyborg teacher includes the technology of the written word. Socrates, among the first people who taught as their chief vocation, was wary of this new machinery and never wrote anything down. His student Plato (Jowett trans. 1871), however, recorded some of Socrates' objections to it, including that it "...will create forgetfulness in the learners' souls, because they will not use their memories; they will trust to the external written characters and not remember of themselves. The specific which you have discovered is an aid not to memory, but to reminiscence, and you give your disciples not truth, but only the semblance of truth; they will be hearers of many things and will have learned nothing; they will appear to be omniscient and will generally know nothing; they will be tiresome company, having the show of wisdom without the reality" (275). Here we detect McLuhan's autoamputation at work again, this time taking away memory by functioning in place of memory. Writing also serves as an example of Derrida's (1981) *pharmakon*, the poison that is its own remedy, for the written word takes our memory at the same time as it serves as a memory aid (p. 98).

Today, the written word remains the primary medium of American education. We find its use in textbooks, notebooks, chalkboards, PowerPoint presentations, handouts, tests, and others. McLuhan (1964) identifies three "typographic principles" as follows: "uniformity, continuity and lineality" (p. 14). These principles, according to McLuhan, tend to embed themselves in societies

that adopt the medium. As a tool of control, the written word conveys the rules both teachers and students are to follow. In addition to being detrimental to memory, the written word serves to further disembody the user. Its immutable quality limits argument, and thus the interpersonal interactions that accompany debate. Where speech requires (apart from telephones and comparable devices) close bodily proximity of discussants, writing requires neither that the writer be in the same place nor the same time as the reader. Where speech invites each conversant to gaze at the other, the written word requires that one look at the text (preferably in silent solitude). In most cases, student assessments and their responses are both in written form. An underlying message here is that if it cannot be written down, it is not worth knowing. From the word "scholar" (as in learned person) we get the term scholarship, generally taken to consist of reading, writing, and silent contemplation. Some view serious scholarship as requiring that the body be walled off from nature and other people, and that sensory disturbances excepting the study of the text should be minimized.

Before exploring more recent additions to the machinery of the cyborg teacher, it is necessary to explore the present conservatism of practice within the teaching profession. Collins and Halverson (2009) summarize Larry Cuban's research as follows: "…the choices available to teachers and leaders are constrained in terms of 1) school and classroom structures, and 2) a culture of teaching that arises in response to the stability of structures. These work together…to restrict the range of innovations realistically open to schools" (p. 33). Teachers, administrations, textbooks, assessments and divisions of subjects are

pieces of a jigsaw puzzle, interlocking components that make for a stable structure. Textbook publishers consult state curricula, and mold their products accordingly. Teachers frequently specialize in teaching within specific content areas, and derive authority in the classroom from their knowledge of the textbook. For these reasons and others, textbooks, teachers, curricula and assessments are all oriented towards strict subject area distinctions/divisions. Similarly, the school is oriented towards dividing students by age group (as opposed to ability level), requiring the physical presence of students in the classroom, and teacher-led didactic instruction. Also, the reliance on textbooks leads to a focus on memorization and recall of information, and generally precludes training in finding or assessing the reliability and/or usefulness of information.

Teachers often see in computers their own obsolescence. "Computers," Collins and Halverson (2009) note, "act to dilute the authority that teachers have in classrooms- especially the authority over what constitutes legitimate knowledge" (p. 41). A teacher's traditional educational technologies can seem to pale in comparison with computers, both in terms of entertainment value and in learning potential. While the classroom structure, of which the teacher is part, remains stable, students increasingly escape this structure through their smartphones. They can tune out from the day's lessons and focus on sharing with their peers through social networking applications, playing games, or pursuing other interests. Also, the teacher feels threatened at the prospect of losing her monopoly on knowledge, as students have access to much of her

knowledge and more at their fingertips. As Collins and Halverson put it, "To the degree that students are getting their knowledge from computer learning environments rather than from the teacher, it takes away from the respect and authority that teachers would gain from sharing their expertise with students" (p. 41). As such, teachers frequently enforce rules restricting cell phone and computer use during class.

Though networked computers have been the source of immeasurable changes in industry and private life, their incorporation by the cyborg teacher has occurred chiefly by molding the new technology to fit in the place of the old. Thus, the computer replaces the teacher's grade book, roster, calendar, lesson book, and others. Used with projector, screen, and the dreaded PowerPoint, the computer replaces the chalk board as a means of displaying text. Presently, schools are beginning to adopt electronic personal response devices for students to use to enter answers on quizzes and tests, replacing pencil and paper, and/or Scantron answer sheets. In all of these cases, though, the computer is used to replace an existing function. The abundance of additional functionalities offered by computers are generally disregarded or discouraged, as they often threaten the entrenched stability of the classroom structure. The cyborg teacher typically uses advanced teaching prostheses only when they are molded to resemble and function like the old. As a result, a time traveler from fifty years ago would recognize little difference in the workings of the typical classroom. Instead of a teacher writing on the board, they are seen writing on a pad that is displayed on a screen. What Friere (1970) termed the banking model remains in place, in

which, "the teacher issues communiques and makes deposits which the students patiently receive, memorize, and repeat" (p. 58).

Like all (post)humans, teachers are cyborgs. Though the machine appendages of cyborg teachers are generally not (yet) *surgically* attached to the teacher's body, flesh and machine are nonetheless firmly attached. The teacher positions herself near the board, or else has an electronic device in hand for communicating with the computer/projector/screen. She spends long hours at the computer grading assignments, entering grades, and composing lessons and assessments. She is a constituent part of the school building, a highly complex machine in its own right. State-mandated curricula and increased teacher accountability measures function to make her perform like a cog in a machine. Opportunities for creativity are severely hampered in this context.

Karl Polanyi (1944) distinguishes between "good" and "bad" freedoms, of which the latter includes the freedom to harm others, for example (p. 262). The cyborg teacher is part of a machine that limits many of her good freedoms. Her ability to craft curricula is hampered by state mandated curricula and accountability measures. She has little freedom to develop certain vital skills like Gee's (2013) mining skills (which includes the ability to locate relevant information in cyberspace) or the skill of self–directed learning. At the same time, she possesses the bad freedom to pass on information from the textbook in a didactic manner, and without encroaching on other subject areas. Her constituent technologies, like all technologies, come with what Donald Norman (1988) refers to as affordances, defined as "relationship[s] between the properties of an object

and the capabilities of the agent that determine just how the object could possibly be used" (p. 11). The affordances of the machinery attached to the cyborg teacher allow for certain behaviors while restricting other behaviors. These affordances are evidence that technology in itself is not neutral. A combination of stability in classroom structures and development of educational technology by powerful interests work together to shape education and influence teacher action. The tools teachers use impart information to students aside from the "content" of the lesson. A central problem of many common teacher technologies is that they greatly diminish the range of acceptable student responses. As with the historical use of technology in encountering the natural world, these tools permit the teacher to speak without hearing, and to take without giving. The PowerPoint, projector, computer, traditional desk alignment, immutable textbook information, and others all facilitate a one-way flow of information.

Asked to draw a picture of a teacher, how would you proceed? A sketch of a person in front of a chalkboard could quickly be identified as depicting a teacher, much as a person on a tractor would be identified as a farmer or a person in a police car a policeman or a crustacean in a shell a hermit crab. All are combinations of the animate and inanimate, living and non-living. The popular conception of the teacher as autonomous human has recently led to teachers being blamed for the country's educational troubles. This makes about as much sense as blaming farmers for a lackluster harvest. Teachers and farmers do what they are able with the technologies at their disposal. In both cases, it should be noted, the technologies can damage the environments in

which they're used. Looking at the technologies that constitute (and thus are employed by) the cyborg teacher, affordances are revealed that suggest room for critique and revision. This path will surely be more fruitful than simply blaming teachers.

A Legacy of Humanism in the Teaching Profession

"But when a man's pulse beats temperately; and he has supped on a feast of reason and come to a knowledge of himself before going to rest, and has satisfied his desires just enough to prevent their perturbing his reason, which remains clear and luminous, and when he is free from quarrel and heat,—the visions which he has on his bed are least irregular and abnormal. Even in good men there is such an irregular wild-beast nature, which peers out in sleep" (Plato, Republic, Book IX, para. 1).

Humanism advocates the betterment of humanity, but this betterment is often assumed to occur in opposition to nature. Humans are better than nature by virtue of the *ability* to rule nature, this line of thinking goes. However, as Socrates notes, the beast is always within us, peering out. Vigilance and effort are required, and so is education, for through these we can sup on Socrates' "feast of reason". Many teachers subscribe to this general humanist notion of a human/nature dichotomy. Believing their role to include tamping down natural instincts and desires, they take on the task of cultivating humans. As such,

teachers can serve to perpetuate and strengthen the human/nature dichotomy (to the detriment of society), insofar as students adopt this perspective. Teachers take on this task in a number of ways, many of which are covert (occasionally even to the teacher). Students who do not fit the Eurocentric normative ideal of the human, which is to say those that are not white and/or of European descent, can appear to their teachers as being more savage and less human than their white peers, and thus more in need of "correction". Such marginalized students find themselves punished more often and more severely for their behavior, appearance, and speech.

In addition to marginalization on the basis of race and/or sex, teachers and schools marginalize the body in general. This can be viewed in the requirement that students remain seated indoors for most of the day, that they only eat at approved times, and that they go long periods without conversing with others. Displays or messages of a sexual nature are generally forbidden, as are instances of physical conflict. During the school day the teacher and student bodies are generally allowed only fleeting contact with the world outside of the school building, and sometimes none at all. All of these policies conflict with the general needs of the body, and can and do have negative effects. Barton and Pretty (2010) have found that exposure to green environments, especially those near bodies of water, improves both self-esteem and mood. Sunshine also entails health benefits, including facilitating the production of vitamin D. The body was not evolved to sit quietly and immobile in a technologically-constructed environment for the better part of the day. More generally, placing someone in a

technology-constructed environment helps to strengthen and perpetuate a human/nature dichotomy. People fear what they do not know, and the natural world remains a stranger to so many, young and old.

Teacher Embodiment And Animality

Teachers are concerned with bodies. First, they are concerned with their own, which undergo intense scrutiny. As an oppressed group, students use what tools of resistance they have at their disposal, including critiquing teachers' appearances. Such scrutiny is directly proportional to the degree to which lessons are teacher-centered. Judith Butler (1993) writes of a "heterosexual matrix" of power that establishes the "she" through, "an exclusive position as penetrated" (p. 50). Subjected to the role of the penetrated, the female teacher (along with other females in society) faces more penetrative critique in regards to bodily appearance, including attire, hair, makeup, weight, etc. The standard for what attire is appropriate for female teachers is less clear than it is for males, mirroring society in general. Many teachers (regardless of gender) dress in as nondescript a manner as possible, so as to avoid becoming a topic of conversation and to promote focus on the lesson. Any abnormality in appearance not related to attire is similarly at risk of student critique, including those over which the teacher has no control. Some teachers take shelter behind a podium to hide their bodies. An undersung benefit of the teaching profession is the ability (if not the requirement) of teachers to be on their feet for most of the day. In this manner teachers are largely able to avoid the negative health effects of

remaining seated for long periods. Often, the needs of the teacher's body are met in areas separately from those of the students. Faculty typically have their own restrooms and eating areas. This separation seems to exist for little other reason than to enforce a hierarchy in which teachers are the power holders. Teacher restrooms are usually nicer, more private and cleaner, and the teacher's lounge often includes amenities not available to students in the cafeteria. For the same reason that teachers are conscious of their appearances, they also police their movements. The way one's body moves or doesn't move can influence the message transmitted, apart from the message's content. Great teachers, and great communicators, use their body language to enforce their words.

More than in most professions, animality in teachers is repressed or hidden from view. The teacher is expected to be the human ideal toward which the "less human" students aspire. Teachers are often complicit participants in this narrative, reproaching students for animalistic displays, which is to say actions resulting from natural bodily desires. These might include bodily movements, "inappropriate" vocalizations, consuming food, bodily contact and others. It is noteworthy that the presence of non-human animals in the classroom is generally forbidden. Any expression of a sexual nature by students or teachers is unacceptable in the classroom. As the teacher enforces these restrictions on animality, it is no wonder that she must serve as a model for appropriate behavior. Penalties for teachers who do not sufficiently meet the humanist ideal are often more severe than for students. A single uncouth outburst by a teacher could result in dismissal. To be more human and less bestial in this context

seems to be synonymous with being more machine-like. Teachers are part of the machine and are expected to function as such.

Teachers are concerned with student bodies in a number of ways. As Foucault (1975) observes, "The body now serves as an instrument or intermediary: if one intervenes upon it to imprison it, or to make it work, it is in order to deprive the individual of a liberty that is regarded both as a right and as property. The body…is caught up in a system of constraints and privations, obligations and prohibitions. Physical pain…is no longer the constituent element of the penalty. From being an art of unbearable sensations punishment has become an economy of suspended rights" (p. 11). With corporal punishment a distant memory, Foucault's economy of suspended rights is as much a part of today's schools as it is to our prisons. Attendance must be taken every day, and all bodies accounted for. Teachers have control, which they frequently exercise, over where students should locate their bodies. Seats may be assigned, or a troublesome student could be asked to change desks. Student clothing must adhere to dress code, and teachers thus often critique student attire. The teacher may feel threatened, in awe of, attracted to, or repulsed by students' bodies. However, the teacher generally is not in a position to acknowledge in any way how any student's body makes her feel. At the same time, teachers are in a position to tend to the bodies of students in a variety of ways. They provide Band-Aids, hand sanitizer, and Kleenex. They are the first to administer aid in the event of an injury, and at their discretion can send students to the nurse. They can grant permission for students to obtain water from the fountain. In some

schools, teachers can take their classes outdoors, though generally students must stay together and on school grounds. Teachers typically have some position with regards to food in the classroom, whether they permit it, permit it with qualifications, or don't permit it. Many teachers offer food as a reward or incentive.

Thus, the teacher is in a precarious position with regards to student bodies. In some ways these bodies are to be fastidiously ignored while in others they are to be precisely monitored, controlled and attended to. Such control is never administered through physical force, but through structural properties of the educational system itself a la Bentham's panopticon. The teacher's body is subject to panoptic control as well, through mechanisms such as unannounced and graded observations by administrators, administrator walkthroughs, grade book inspections, long halls (from which administrators can observe multiple classrooms), and others.

Bad Freedoms

The machinery of the school facilitates action by teachers that is harmful to other life systems, including their students. A number of "bad freedoms" are granted through the technological aspect of the posthuman teacher. Teachers are often free (and usually bound) to critique student clothing, according to dress codes that can be sexist. They are free to restrict student movement and speech beyond a morally acceptable level. They are free to teach via lecture, textbook, pencil, and paper, but often find their freedom limited to teach via apprenticeship

and/or more hands-on activities. They are free to teach to the test (and are often even encouraged to do so) but often find their freedom to teach for greater depth of understanding limited. A long list of "standards" must all be "covered" before year-end testing.

Areas of teacher expertise often go untapped and unnoticed in this school machine of which they are constituent parts. Even when teachers are able to tap into areas of passion during instructional time, these moments are often fleeting. A skilled poet works as an English teacher, but can only devote a small portion of her instructional day to poetry. A teacher with an encyclopedic knowledge of and unparalleled passion for the Civil War can spend no more than a week on the topic. An economics teacher who has a nuanced understanding of the events leading up to the Great Recession finds no place in the curriculum to share this knowledge. The technology of the posthuman teacher is oriented towards breadth of instructional content rather than depth. I continue to be surprised at the skills and knowledge of teachers that schools manage to hide or suppress. A co-worker gives me a painting as a present and I suddenly realize her talent. I discover the depth of knowledge a peer has on a topic after a chance conversation. Without some of the technology, structures, and machinery of the school, the teacher can be likened to a beautiful tree. In the classroom, however, the tree has been converted into lumber, molded into means towards ends which are not necessarily her own, and diminishing both her beauty and her ability to function as a beneficial component of the life systems to which she is connected.

A diatribe against all teacher and school technologies is not the intent of this exploration. Rather, the goal is to outline the dominant teaching and school technologies, and describe their affordances. Some of these technologies are unambiguously immoral, such as sexist dress codes. Others are not necessarily problematic in themselves, but can be used in harmful ways. The combination of textbook, pencil, paper, board, desk, and lectern can be used for ill or for good. In excess these technologies serve to pull students away from the natural world. On the other hand, these technologies can tap into the power of language and the written word as a means to convey and record information.

Posthuman teachers face a number of challenges. They must question and take responsibility for the technologies they use, with regards to the effects these technologies have on students and the outside world. Also, they must question and take some measure of responsibility for the technologies to which they are subjected and which impact their actions. They might protest the sexist student dress code, resist its implementation, and/or neglect to enforce it. Debate and the exploration of opposing views can accompany the canonical text. As a posthuman part of the larger school entity, the teacher is not without influence. Like all posthumans, they must be *aware* of the effects of their technology use on other life systems, and exercise *restraint* when such usage has harmful effects.

Zombie Teachers

Technology can take the place of conscious deliberation as well as physical activity. Say I decide to make a cup of tea, so I step out to gather wood,

build a fire, and set the kettle over it. I am conscious, at different points, and at

varying degrees, of the source of the heat, maintaining the heat, and minding the

kettle. If I use an electric stove, I am not conscious of the source of the heat nor

of maintaining it. The machine applies a constant amount of heat without my

attention. All I have to do is mind the kettle until the water boils. Now suppose I

use a microwave. In this case I run water into my cup and place it in the

microwave for a minute, at which point it will be boiling. In this circumstance I am

least conscious of my actions. The microwave is doing things I don't really

understand or give much thought to. I don't even have to keep track of the time,

as the microwave will turn off automatically and inform me when it does so.

Perhaps during the minute that the cup sits in the microwave, I play a game on

my cell phone. Focused intently on my game, I become less conscious of my

environment. I look a bit like a zombie, mouth hanging open. As Haraway (1991)

writes, "Our machines are disturbingly lively, and we ourselves frighteningly inert"

(p. 86).

Teacher technologies can have analogous effects. The textbook and

PowerPoint make me less conscious of the words I use, as the students and I

merely have to read what is written. My classroom makes me less conscious of

the outside world. Multiple-choice assessments make me less conscious of forms

of understanding that cannot be measured with such assessments. Zombie

teachers are those who become subsumed in educational technologies to the

extent that they are effectively more machine than human. They occupy the

students with handouts and worksheets, and invariably teach to the test. They

teach the same content every year, in the same way, using the same technologies. They have ready answers to most questions and enforce school rules without question. They generally fail to show signs of life until they have left the school. Finally, like other zombies, zombie teachers can have a deleterious effect on the brains of those with whom they come in contact. The zombie teacher is closer to the machine end of the animal-machine spectrum, and like Obi Wan Kenobi says of Darth Vader, "He's more machine now than man, twisted and evil" (Return of the Jedi, 1986).

A Cybernetic View of the Teacher

Posthumanism and cybernetics could help shed light on the nature of the interaction between teachers and technology, as well as offer paths towards equilibrium between the systems. Gregory Bateson (1972) notes that when two cultures make sustained contact, this "must theoretically result in one or the other of the following patterns:

(a) the complete fusion of the originally different groups

(b) the elimination of one or both groups

(c) the persistence of both groups in dynamic equilibrium within one major community" (p. 65).

Though he declines to provide specific examples, clear instances of each pattern exist today. The cultures of Americans of European descent have to a great extent fused in the manner of pattern "a", as members of these groups today are more likely to identify as "white" than as Irish, German, etc. The genocide of

Native Americans in the New World is a clear example of pattern "b". Switzerland makes for a good example of pattern "c", as a number of major linguistic and cultural groups, including speakers of Italian, French, and German, live together in homeostasis (more or less) as one nation while retaining their distinct cultural and linguistic characteristics. While clear examples of each pattern can be identified, it must also be said that these examples are few. Equilibrium is not a state in which forms become permanently locked in upon reaching it. Instead, it is a condition that all systems must eventually move towards, after having been thrown into disequilibria. Upon reaching equilibrium, forces (external or internal) will eventually nudge a system into disequilibrium, from which it will eventually work its way back to (a possibly new and different) homeostasis. Bateson's three patterns, then, are snapshots in time rather than final endpoints.

These patterns can be glimpsed not just at the meetings of cultures, but also at the meeting of humans and technology. Particular jobs can be viewed as resembling or moving towards one of Bateson's patterns. Structural unemployment frequently occurs as a result of some new technology rendering another job obsolete. This resembles pattern "b" and there are countless examples of people whose jobs have been eliminated, including blacksmiths, elevator operators, typewriter repairmen, etc. Pattern "c" (persistence of both groups in dynamic equilibrium) might be glimpsed in the hairstylist profession, in which computers are used chiefly in billing and scheduling appointments, while the hairstylist himself does not find his job threatened, as the computer remains peripheral to the service rendered (at least as of this writing). Today soldiers

seem headed for either pattern "a" or "b". Already, soldiers frequently seem joined to their technologies in cyborgian ways, what with helmet mounted electronic displays, speakers, microphones, "smart" weapons and vehicles, etc. However, unmanned aerial vehicles, aka drones, are taking the place of conventionally piloted military aircraft, and ground vehicles are getting similar treatment.

As with other professions, teachers and educational technologies can be fruitfully examined through the framework of Bateson's patterns. This is partly because technological systems are like cultural groups and other life systems in that they can change adaptively on the basis of feedback. Chalkboard, textbook, desk, classroom and teacher can be said (at least until recently) to fit Bateson's pattern "c" in which groups persist in dynamic equilibrium with one another. Each element has a distinct and essential function, and no one element is getting squeezed out by the others. Collins and Halverson (2009) note, "Innovations that threaten the ways that curricula govern the yearly teaching plan or the tacit agreements between teachers and students in classrooms face a long, uphill battle for implementation. This is because when complex systems are in equilibrium, changing one part of the system usually results in other parts pushing back to restore the initial balance" (p. 34). When new technologies seek entrance into this established community, they are frequently denied, or else admitted but molded in the shape of the technologies they replace. For several decades, the popular response by educators to the intrusion of computers has been to use them merely as substitutes for the existing technologies, such that

computer + projector replaces chalkboard, and web page replaces textbook. When technologies are assimilated into classrooms in this way, teacher and student roles remain unchanged.

While the prevalent instructional system has managed to maintain an equilibrium resembling pattern "c" for many years, computers continue to pose new threats. Unable to change the educational system, computers went on to change the world instead, as well as the humans in it. Hayles (1999) writes that technology, "…has become so entwined with the production of identity that it can no longer meaningfully be separated from the human subject" (prologue, para. 6). The meeting of humans and intelligent machines has by this view resulted in a fusion as described in Bateson's pattern "a" (complete fusion), and the birth of the posthuman. While the established ways of teaching children may have once "worked" in terms of the needs of society in the past, their efficacy today is steadily declining in a world that has moved on. The rise of intelligent machines seems to have brought the established system of education into disequilibrium, and it remains unclear where these changes will take us. Bateson (1972) writes, "The laws of gravity cannot conveniently be studied by observation of houses collapsing in an earthquake" (p. 65). Likewise, making sense of which new equilibrium education is headed towards, and understanding the degree to which we can influence this course, is made difficult by the speed of the changes taking place. We can, however, attempt to sketch out an outcome fitting each of Bateson's patterns from above. I believe that upon hypothetical exploration of each of Bateson's patterns as a potential eventuality, we can identify scenarios

that are more likely, and also possibly realize opportunities for influencing the changes presently occurring.

Teachers are frequently fearful of the disequilibria resultant from the Computer Revolution. Part of this fear lies in the uncertainty regarding where the teaching profession is headed. Some teachers fear an outcome resembling pattern "a", in which teachers and computers will undergo what Bateson calls "complete fusion". Such a result would change what it means to be a teacher, as the cyborg thinks, acts, and perceives the world differently than the human. Alternately, teachers may also fear an outcome along the lines of pattern "b" in which computers make the teacher's job obsolete, like so many others of late. Already, with sufficient will and a computer, one can learn nearly anything without the benefit of direct interaction with a human teacher. Also, as we increasingly turn to the web for things like information and calculation, the need to learn these things "in one's head" seems lessened. If one always has a calculator at their side, why learn multiplication tables? If one has access to Wikipedia, why memorize names and dates from history? Teachers increasingly see the perceived, if not actual, value of their services on the decline. What's worse, as the world continues to change around us and the educational system remains woefully static, new educational imperatives often go unaddressed. The system often constrains teachers to teach the same old things in the same old ways.

While they fear the prospect of patterns "a" and "b", some teachers may hope for pattern "c", in which teacher and technology co-exist and perform clearly delineated and separate roles. This, after all, is the pattern encountered by most

teachers presently, and the one with which many are most comfortable. In this pattern the teacher's role remains essentially unchanged by the computer revolution. This pattern can be glimpsed in how teachers have chosen to bring computers in the classroom. Computers are used by many teachers primarily as replacements for existing technologies, while the unique affordances of them often go ignored. For example, the computer comes to replace the grade book and the roster, and PowerPoint software and projectors allow the computer to replace the chalkboard. The overall experience of the lesson, however, remains much the same, with didactic instruction and text on a flat surface at the front of the room, etc. As Collins and Halverson (2009) note, "Technology makes life more difficult for teachers. It requires new skills that teachers often have not learned in their professional development. Further, the lockstep model of most classrooms undercuts the power of the new technologies to individualize learning" (p. 6). Of Bateson's patterns, "c" seems to be the most unlikely end result, however. There are so few Switzerlands out there, so few occasions where multiple systems form one community and yet remain distinct from one another. That teachers are already being replaced by computers gives pattern "b" some credence, and the fact that we are all increasingly resembling cyborgs (as outlined in chapter 1) makes pattern "a" a possibility as well.

The urge of many teachers to remain in pattern "c" (in which each group remains distinct from the other) potentially reflects a rejection of the reality of impermanence, as well as a humanistic urge to retain individual human autonomy. Further, direct resistance to present technologies (for example

attempting to keep computers out of education) is not likely to yield success. Perhaps, then, teachers should strive for pattern "a", fusion. Those teachers who best understand and make use of the affordances of computers are the most likely to retain their jobs *and* provide meaningful education to their students. The cyborg is not wholly human, but neither is it wholly machine. As a stable entity, it does not seek the destruction of either its machine nor its biological elements. In many ways and like much of the rest of society, teachers are already posthuman. We just need to get past the denial stage.

Posthuman Teachers Outside of the Classroom

My wife Kirstin is one of those people who always has a project going, generally of the gardening or home remodeling sort. She spends most of her discretionary time engaged in these hobbies. She uses her cell phone frequently during these projects, through which she acts alternatingly as teacher and learner. She checks apps like Pinterest for ideas for the garden, and posts pictures of her own completed work. Upon deciding to re-tile the kitchen floor, instructional videos on YouTube were consulted. When she has a question for which she cannot locate an answer, she sometimes posts her query in a Facebook group tailored to the activity in which she is engaged. Others consult her posts for ideas and guidance, and sometimes ask her questions directly.

Kirstin is another iteration of the posthuman teacher, unique among those referenced thus far in that she does not work in a school. This version of the teacher is also unique in that she is alternatingly (if not simultaneously) teacher

and learner. Her constituent technologies enable her to teach and be taught by countless numbers of people from her affinity spaces. As Gee (2013) outlines in "The Anti Education Era", affinity spaces like Pinterest, YouTube, Facebook groups and others are designated areas (often but not always in cyberspace) that allow people with some specific shared affinity to voluntarily exchange knowledge regarding it. These spaces inform what it means to be posthuman. Gee writes that, "the space itself [is] a form of emergent intelligence. The sum is more than its parts; the collective is smarter than the smartest person in it" (Ch 20, para 13). In these spaces intelligence is less individual than it is collective. The focus is on what is produced, rather than who is producing it.

Both Kirstin's teaching and learning frequently seem superior to that typically available in school. She teaches those who voluntarily come to her for knowledge, and who are usually admirers of her work specifically. As such, "discipline problems" are exceedingly rare. Failure, rather than being a signal of inferiority, is a vital part of the learning process. When failure occurs, it functions as vital feedback guiding future work. Failure in this context is effectively a co-teacher. Kirstin *expects* to fail in the early stages of complicated projects, and makes a point to try to limit the degree to which future failure will be a setback to the project as a whole. Installing lights in panels, she picks the smallest, least expensive panel first, so that if she damages it the replacement cost will be lower.

Active in her affinity spaces, Kirstin frequently spends nontrivial amounts of time documenting the phases of her work via text, images, and video. She is

generally thrilled to receive and answer questions. Sharing knowledge regarding her hobbies seems to bring her pleasure comparable to that of engaging in those hobbies directly. She is a teacher who doesn't grade. Or, rather, it might be more apt to acknowledge that while she grades others' work, at the same time *everyone grades each other*. In these spaces, grading consists of some marker of respect such as "likes", gaining or losing followers, "upvotes" or "downvotes", etc.

In contrast with the rigidly fixed state-mandated curricula of schools, affinity space curricula are always in flux. The unorthodox is never off the table but is always poking its way in to the conversation, and sometimes leading to reassessment, readjustment, and incorporation. At the same time, the established "tried and true" ways are to some extent institutionalized. Like established scientific theories, they require much documentation and prolonged effort to dethrone. These curricula are vibrant, beautiful living things, changing in appearance through space and time, and beckoning to those who might hear their calls. The typical school curriculum, in contrast, is a dead thing chained to the student, weighing them down.

In his *Analects*, Confucius (Waley trans. 1938) writes, "I do not open up the truth to one who is not eager to get knowledge, nor help out any one who is not anxious to explain himself. When I have presented one corner of a subject to any one, and he cannot from it learn the other three, I do not repeat my lesson" (Book 7, Chapter 8). School teachers generally must abide by a near-opposite of those sentiments. As teacher evaluations are increasingly tied to student

performance on standardized tests, teachers are often compelled to bring all four "corners" of a subject to the students. Student eagerness to obtain knowledge in the classroom context is a rarity, at least when said knowledge is tied to state curricula. In contrast, the posthuman teacher of the affinity space seems to occupy something of a middle ground between these two extremes. Affinity space members, like Confucius, do not force their knowledge on anyone, but share with those who seek them out. Unlike Confucius, however, these posthuman teachers are not always unwilling to repeat their lessons. Indeed, they might bring all four corners to the eager student.

Pedagogy in affinity spaces is peculiar. It seems impossible to pinpoint precisely where education occurs in these contexts. The learner is taught alternatingly by peers (with an emphasis on the plural), herself, her tools, her environment *and* the task, making this a *distributed pedagogy*. The form of this pedagogy changes with each instantiation, and the degree to which each element contributes also varies. Finding the task itself to be a poor teacher, the learner might frequently consult her affinity groups for aid. But in another case, the reverse could be just as true. The method of this pedagogy seems always to be determined by the learner herself, who disregards instruction that she does not deem useful. At all times the learner runs the risk of failure as a result of the pedagogical decisions she has made. Choices regarding the task itself (such as its difficulty, the learner's aptitude for the task, etc.), the peers from whom she seeks knowledge, and the degree to which she listens to her own instincts all inform the effectiveness of this pedagogy.

Conclusions

The humanist emphasis on the individual seems more and more misguided in respect to the teacher, as teachers become increasingly joined to computer technologies. Indeed, individuals, it should be clear, only make up part of an educational environment, and the entire environment functions as the teacher. This is not to say that the teacher is no longer an important part of this environment, but that educational considerations, as Dewey has emphasized, must take the environment into account. Technology can serve as an amplifier for intentions, both for teachers and learners, but intentions and passion are still essential to education as well. The zombie teacher all too often fosters zombie students. Finally, the rise of computer mediated teaching and learning outside of the school setting warrants close consideration, as motivated teacher-learners increasingly gather in virtual affinity spaces for their education. The posthuman teachers of these spaces represent an ideal towards which school teachers might aspire.

CHAPTER 3

AIMS OF A POSTHUMAN EDUCATION

Having put forth a conception of posthumanism and examined the

posthuman teacher, this chapter is an effort to explore how posthumanism might

inform the aims of education today. Prior to this, however, will be an overview of

John Dewey's humanist leanings, and how they informed his conception of the

proper aims of education. Dewey, a prominent humanist, is also one of the titans

of the philosophy of education. It is hoped that by getting a sense of how his

humanism influenced his thoughts on education, we can then contrast his

humanist education with a proposed posthumanist education. Following this

analysis of Dewey's work, the idea of technology as "blinders" will be proposed

and explored. Technology frequently blinds us from awareness of the effects of

our taking, production, and waste. We see what we can take using technology,

but not what we (or our children) must eventually give. The two topics explored

thus far, humanism and technology use, will inform the posthuman educational

goals to follow. It will be proposed that in an unnatural environment, or an

environment for which we are not evolutionarily predisposed, "unnatural" actions

(actions that run counter to our evolutionary programming) are necessary to

restore our bodies and other life systems to equilibrium. We are evolutionarily

programmed to consume massive amounts of high sugar and high fat foods

when they become available to us, but we must *learn* to reject this programming

when faced with constant access to such foods. Similarly, learning to live in

homeostasis with the life systems to which we are connected requires that we

learn restraint in the use of our tools, a restraint towards which we are not naturally disposed. This imperative of restraint is accompanied by a need for education, because we each must *learn* to act counter to our instincts.

From the premise that "unnatural action in response to an unnatural environment can restore natural equilibrium", three educational goals arise. First, education should be oriented towards engendering *lifelong learners.* As our technological environment is rapidly changing, our ability to exercise responsible agency within it depends on our understanding of it. Also, as automation and computerization continue to encroach on traditional careers, many will find it necessary to (continually) learn new skills, even late in life. In addition to seeking to foster lifelong learning, a posthuman education seeks the goal of increasing *awareness* with regards to the impacts of technology use. Because of technology's blinders, it is imperative for education to illustrate how our technology use, and the technology use we benefit from, impacts the life systems to which we are connected. A third and final educational goal is that of habituating learners to exercise *restraint* in their technology use. Once they are aware of a harmful impact certain technology use is having on other life systems, people should seek to restrain such usage, either through abstention or seeking alternative, less harmful means to the ends in question. These posthumanist educational goals, lifelong learning, awareness, and restraint, will in the closing chapters serve as the guiding principles behind proposed posthuman pedagogical methods and curricula.

Dewey Re-grounded Philosophy

The great American philosopher and educational reformer John Dewey was an avowed humanist who helped popularize the movement in the 1900's by, among other things, writing the essay "What Humanism Means to Me", and signing the first Humanist Manifesto. Humanist ideals permeate his writings, both on education and in his other work. As this author hopes to explore the implications for posthumanism on education, curriculum and teachers, a review of humanism in Dewey's work could be enlightening. This, it is hoped, will illustrate points both of convergence and divergence between humanism and posthumanism, and at the same time will help to clarify the outlines of each. Further, a close study of humanism reveals that it was a necessary predecessor to posthumanism, and further, that posthumanism is in some ways an extension of humanist ideals. Also, let us not forget that humanism has recently provided leverage in the fight for social justice, and if only for this reason should not be rejected wholesale.

More than many philosophers, Dewey neglected the consideration of metaphysics and epistemology in his work. For him, philosophy was about human interaction, the (tangible) natural world, and the betterment of humanity. He writes, "The task of future philosophy is to clarify men's ideas as to the social and moral strifes of their own day. Its aim is to become, so far as is humanly possible, an organ for dealing with these conflicts…" (1920, p. 26). He lamented

that, "direct preoccupation with contemporary difficulties is left to literature and politics" rather than philosophy (1917, p. 4). He sought to bring philosophy down to earth, to humans and their concerns. For example, Dewey wrote at length on the topic of democracy, his treatment of which culminated in what is perhaps his greatest work, "Democracy and Education".

Posthumanist theorist Timothy Morton's argument for the importance of "re-grounding" the human in the earth finds a fine ally in Dewey, for in Dewey's work one finds a consistent merging of mind with body and body with earth. His writings on education emphasize the importance of the environment in learning. The typical classroom, rows of desks shut off from the world, was far from the ideal learning environment for Dewey. His utopian school has gardens, libraries, laboratories, museums, open space and workshops in ample measure, and such places serve as the primary locus for education (1933). Learning through the actual practice of useful occupations was advocated in place of book learning. He writes, "…the central problem of an education based upon experience is to select the kind of present experiences that live fruitfully and creatively in subsequent experiences" (1938, Chapter 2, para. 4). Experience, for Dewey, allows the learner to peer into nature. His ideal teacher is connected with the community and cognizant of the issues of the day. Opposed to teaching solely via canonical texts, he argues, "the mistake of making the records and remains of the past the main material of education is that it cuts the vital connection of present and past, and tends to make the past a rival of the present and the present a more or less futile imitation of the past" (1916, p. 61). Instead, he

believed educators should strive to make the past relevant by tying it to the living present, to inform the actions that will impact the future. Issues of present concern thus must be consulted *along with* the canon.

Dewey, Distinctions And Synthesis

Why might distinction sometimes be necessary? Why do we desire it so? There is often a clear progression from distinction to choice and from choice to action. Distinctions allow us to decide and to get things done. Mental distinctions are sometimes a matter of life or death insofar as they lead to decisions: here or there, poisonous or non-poisonous. The corpus of human knowledge is in large part composed of distinctions. Taxonomy and chemistry, for just two examples, are largely occupied with matters of distinction. The ability to distinguish is a prerequisite for morality; otherwise there would be no way to discern right from wrong. Language provides the ability to communicate distinctions, and also reveals a reflexivity between distinction and action. Just as distinction informs action, so action informs distinction. On the learning of language, Dewey (1916) writes, "The sound h-a-t would remain as meaningless as a sound in Choctaw, a seemingly inarticulate grunt, if it were not uttered in connection with an action which is participated in by a number of people" (p. 12). We see the influence of action on distinction in other ways as well. I must sometimes taste different flavors of ice cream to distinguish between them, for example.

Despite the affordances of distinction, and in a rather posthumanist fashion, Dewey regularly seeks to problematize distinctions. At his most broad he

writes, "Distinction is genuine and for some purpose necessary. But it is not a distinction of kinds or degrees of reality. Space here is joined to space there, and events then are joined to events now; the reality is as much in the joining as in the distinction" (1925, Chapter 3, para. 41). Dewey viewed the very purpose of education as being the merging of the child with the social consciousness, removing the distinctions that keep them apart. Also, he argued at various times against divisions of subject matter from social context, of school from community, of disciplines from each other, of social groups and classes from each other, and more. Of women he writes, "Think of them as human individuals for a while, dropping out the sex qualification, and you won't be so sure of some of your generalizations about what they should and shouldn't do" (Boydston, 1975, p. 446). Gender and class distinctions, he recognizes, have been the impetus for discrimination and oppression. Dewey was an advocate of internationalism, and saw doctrines of national sovereignty as impediments to this goal.

Some of Dewey's greatest works involve detailed consideration of two opposing camps, along with his recognizing the necessary qualities each party brings to the table, and finding a middle ground. In many ways this resembles and was a precursor to Derrida's deconstruction. This tactic was used to great effect in *Experience and Education* in which he argues for the necessity of a mixture of traditional and progressive educational methods. While traditional education focuses too exclusively on the past, progressive education can err by ignoring the past completely. Writing of progressive education, but using words that might also apply to posthumanism, he notes, "There is always the danger in

a new movement that in rejecting the aims and methods of that which it would

supplant, it may develop its principles negatively rather than positively and

constructively" (1938, Chapter 1, para. 7).

Dewey, Freedom And Technology

As with the need to balance education between matters of past and future,

Dewey sought a middle ground between individual freedom and social control.

We all feel some measure of social constraint on our behavior, and yet many of

us still feel free. Children at recess voluntarily give up some freedom to engage

in joint activities, for as Dewey (1938) notes, "Without rules there is no game"

(Chapter 4, para. 4). Freedom is not something to be had in any absolute sense,

and the restriction of it is not necessarily bad. One might, for example, willingly

relinquish certain freedoms for the greater good of society. Dewey is worth

quoting at length here:

> "The only freedom that is of enduring importance is freedom of
>
> intelligence, that is to say, freedom of observation and of judgment
>
> exercised in behalf of purposes that are intrinsically worth while. The
>
> commonest mistake made about freedom is, I think, to identify it with
>
> freedom of movement, or with the external or physical side of activity.
>
> Now, this external and physical side of activity cannot be separated from
>
> the internal side of activity; from freedom of thought, desire, and purpose.
>
> The limitation that was put upon outward action by the fixed arrangements

of the typical traditional schoolroom, with its fixed rows of desks and its military regimen of pupils who were permitted to move only at certain fixed signals, put a great restriction upon intellectual and moral freedom. Straitjacket and chain-gang procedures had to be done away with if there was to be a chance for growth of individuals in the intellectual springs of freedom without which there is no assurance of genuine and continued normal growth. But the fact still remains that an increased measure of freedom of outer movement is a means, not an end" (1938, Chapter 5, para. 1).

When people use the word "cost", it is generally understood to mean cost *in terms of dollars.* Cost has become shorthand for the longer, more specific phrase, because society accept money's role as a standard of value. Similarly, when one uses the word "freedom" they mean "freedom from" or "freedom of". One is never "free" in any absolute sense, except perhaps in death. As long as we are alive we face constraints to our freedom. Gravity restricts my freedom to fly. Hunger restricts my freedom to fast indefinitely. Laws restrict my freedom to kill and steal. Unavoidable contact with that which I observe restricts my freedom to consider objects objectively. Absolute freedom from societal constraints, on a mass scale, is anarchy. Absolute freedom from physical constraints is entropy. As Dewey notes, it is indisputable that certain restrictions on freedom can rightly be considered oppressive or otherwise injurious. At the same time, though, it is also true that the *possession* of certain freedoms allows for oppressing and/or

injuring others. The freedom to purchase and drive an automobile contributes to climate change. The freedom to eat meat contributes to the hunger of others, as several pounds of grain are required for each pound of meat consumed.

Under the watchword of "freedom" neoliberals have made headway since the 80s in increasing the freedom of powerful interests at the expense of the freedoms of everyone else. Dewey's assertion that freedom is a means rather than an end holds not just in education, but in the world as a whole. We are evolved with certain tools providing us the freedom to engage in certain actions but not in others. Foraging humans were free to gather certain kinds of food, to move through their environments in certain ways, to interact with one another in certain ways, etc. Organisms are typically evolved possessing freedoms that allow for both their own benefit and that of their environment. This is true for the cell, the organ, the body (including that of foraging humans), and on up through the ecological hierarchy. Freedom is never absolute nor is it all encompassing, but is always a means to some end. Dewey (1938) writes, "The ideal aim of education is creation of power of self-control" (Chapter 5, para. 5). Self-control in this case can be thought of as the restriction of one's own freedom. It is to adapt oneself to function as a beneficial part of society. Had he advocated self-control as a means of existing in equilibrium with the natural world, instead of just human society, his sentiments might have been more in line with those of posthumanism.

Technology has provided the illusion of absolute freedom, even as technological advances have both increased certain freedoms and diminished

others. Think of a suit of armor. This piece of technology allows one to withstand certain attacks, and perhaps to best one's enemies, but at the same time it limits range of movement and bodily senses. The technologically constructed environment in which we live is analogous to this suit of armor, with the natural world as our foe. Just as the suit of armor is useful primarily for battle, so to this point in history technology has largely been oriented towards mastery of nature. We have been so caught up in the whirlwind of technological advance that we have come to view freedom as an end goal, rather than a means to other goals. Dewey (1900) writes, "With tremendous increase in our control of nature, in our ability to utilize nature for human use and satisfaction, we find the actual realization of ends, the enjoyment of values, growing unassured and precarious. At times it seems as though we were caught in a contradiction; the more we multiply means the less certain and general is the use we are able to make of them" (p. 119). Aside from his connection of technology to mastery of nature, this passage is noteworthy for it's second sentence, which summarizes life in a technologically constructed environment. We are now enveloped by our tools, our "means" as Dewey refers to them, and yet we are in some important ways less certain of our proper role on earth than ever. Though we are able to do "more" with our tools, they do not inform (and in fact serve to confuse) what we *should* do.

Areas of Discord Between Dewey And Posthumanism

While some of Dewey's work can inform posthumanism, and indeed is sometimes in line with posthumanist theory, there are areas of clear departure. Though possessing of a wonderful intellect, he was a man of his time. That he was able to see so far and so clearly, without the benefit of the hindsight we possess in critiquing his work, should be of primary focus. That he stumbled here and there is less notable than the great progress he made. Still, the areas in which Dewey seems to lie in opposition with a posthumanist account are of importance, if only for the fact that many still subscribe to some of these views. Many, for example, continue to believe that scientific advance will solve global environmental concerns, and that no mass change in mindset or behavior are called for. Further, a study of areas of discord between humanism and posthumanism could reveal weaknesses not just in the former, but in the latter as well.

One such area of discord lies in Dewey's thoughts on "the savage". For Dewey, the savage was notable primarily for his lack of ability to mold the environment to his own ends. For this "deficiency" he ruled the savage to be inferior to civilized man. He writes,

> "A savage tribe manages to live on a desert plain. It adapts itself. But its adaptation involves a maximum of accepting, tolerating, putting up with things as they are, a maximum of passive acquiescence, and a minimum of active control, of subjection to use. A civilized people enters upon the scene. It also adapts itself. It introduces irrigation; it searches the world for

plants and animals that will flourish under such conditions; it improves, by careful selection, those which are growing there. As a consequence, the wilderness blossoms as a rose. The savage is merely habituated; the civilized man has habits which transform the environment" (1916, p. 39).

Here Dewey falls prey to a trap he has spent much of his career warning against; that of the false dualism. He poses two scenarios in opposition to one another, and argues for the superiority of the one absolute over the other. In this case, mastery of nature is posed against influence by nature, with a distinction made between society and nature.

The dualisms of savage/civilized and nature/society seem to have become less clear for Dewey in the years following "Democracy and Education". Fascinatingly, in "What Humanism Means to Me" (1984), Dewey explicitly breaks with the popular conception of a humanism that is opposed to nature. Of this strain of humanism he writes, "The significance it gives the 'human' can be understood only in antithesis to the view it holds of nature. …It holds to a complete gulf between nature and man in his true being" (p. 263). Contra this false dualism, Dewey (1925) explicitly notes the inseparability of humans and nature, writing that man "must in some measure adapt himself as one part of nature to other parts" (Chapter 10, para. 29). Here Dewey's writing comes most closely aligned with that of posthumanist theorists. For example, Timothy Morton (2013) argues against the use of terms like "nature" and "world", writing, "The ultimate environmentalist argument would be to drop the concepts Nature and world, to cease identifying with them, to swear allegiance to coexistence with

nonhumans without a world, without some nihilistic Noah's Ark" (Part 2, Section 1, para. 4). For Morton terms like "nature" and "world" are a way for humans to objectify that which they name. Nature is falsely perceived to be an object separate from humans, an ark in which we reside. Latour (2004) similarly argues for the need for a, "Political ecology [that] does not shift attention from the human pole to the pole of nature; it shifts from certainty about the production of risk-free objects (with their clear separation between things and people) to uncertainty about the relations whose unintended consequences threaten to disrupt all orderings, all plans, all impacts" (Chapter 1, Section 2, para. 12). Both Morton and Latour object to the term "nature" insofar as it is used as a means of creating a distinction that leaves humans excluded from the rest. Dewey's belated recognition that humans are themselves "one part of nature" would thus seem to herald a rather posthumanist shift in his thinking.

A common theme of Dewey's writings (especially his later work) on education is a suggestion to bring humans into closer contact with the natural world. Experience for Dewey is a means of knowing nature more clearly, and is a vital component of education. His ideal school has gardens and open space, and he acknowledges that prior to and outside of school, the natural world is our primary educator. Still, he never completely broke with a conception of the rightness of human mastery over nature. Here is his concluding sentence to the essay "What Humanism Means to Me": "At all events, what Humanism means to me is an expansion, not a contraction, of human life, an expansion in which *nature and the science of nature are made the willing servants of human good"*

(1984, p. 266). For the older Dewey, nature was to serve humanity *willingly*. Given his change of tone, perhaps had he lived a few more decades he might have eventually recognized that humanity must serve nature willingly as well.

<div align="center">Technology's Blinders</div>

Dewey (1925) notes that Greek philosophers belonged, "…by status to a leisure class relieved from the urgent necessity of dealing with [external] conditions" (p. 33). Like those philosophers, the socioeconomically privileged are free to contemplate the "finer" things of life only because they benefit from their positions in the dominance hierarchy. Many people in developed countries enjoy a lifestyle in which their necessities and many of their wants are easily met, and the suffering of others is hidden. If temperatures are one or two degrees higher this year on average, they are less likely to notice from their climate-controlled dwellings. That their clothes are generally made by people further down on the dominance hierarchy, with much fewer options in life, is not generally considered, because the clothes are bought in nice stores (or online), far from the factories that produced them. That the pound of beef they consume each week takes ten pounds of corn (to be fed to the cow) does not likely cross their minds, nor do the starving people that could have been fed from the grain used to fatten the cow. Privileged groups are often oblivious to their roles in perpetuating oppressive systems, thanks to a combination of reluctance to face up to the truth, and by the extent to which technology separates them from their less fortunate neighbors

(including the rest of the natural world). It is past time to remove the blinders from their eyes.

Technology gives people "blinders" such that in the course of their daily habits they fail to see the damage they cause to others and nature. Technology is frequently a means of obtaining, and technological development is often driven by the imperative of efficiency, or the need to find a better shortcut to this obtainment. My ecological awareness is inversely correlated with how separated I am from the sources of my consumption and the fate of my waste. Extreme specialization, driven by technological development, often leaves the masses clueless as to the methods by which their food, for just one example, is acquired. One who catches their fish from the stream is often more ecologically aware than one who works on cars all day and then buys their fish from the store. The tools for extending our reach, in other words, extend beyond our ability to sense, and so we do harm without realizing it.

Tikopia And The Need To Act Unnaturally In Unnatural Environments

Dominance hierarchies are common in nature, as is the tendency to unquestionably use available means to ascend those hierarchies. The plant takes as much sunlight, water and nutrients from the soil as it can to maximize reproductive capabilities. However, the plant's taking is limited by external forces, including other plant life and animals. As our overpopulation and activities meet the coping limits of the natural world, our own taking is beginning to face such limits. The human ascension of the global dominance hierarchy is coming to an

end, and humanity's future depends on how we adjust to losing our (imagined)

status as the alpha life system of planet earth. The people of the Pacific island of

Tikopia are an example of a sustainable society, and one of the steps they took

to become so is of particular import. Sometime in the 1600s, the people of

Tikopia (by their own volition) slaughtered every pig on the island. Jared

Diamond (2005) writes, "According to Tikopians' accounts, their ancestors had

made that decision because pigs raided and rooted up gardens, competed with

humans for food, were an inefficient means to feed humans…and had become a

luxury food for the chiefs" (p. 292). Seeing nature's limits ahead, the Tikopians

took proactive steps to institute limits themselves. In this course of action and

others, they subordinated themselves to the system of which they were a

constituent part, the island's ecosystem. They willingly sacrificed a measure of

their freedom, knowing that if they did not, nature was going to limit their freedom

herself.

      Humanity as a whole can take steps like the Tikopians to make facing

natural limits less devastating. This will not be easy, though, and goes against

human nature. Once again, it is natural for creatures to use all available

technologies to ascend the ranks of the dominance hierarchies of which they are

a part. Our technological ability to make short-term gains at long-term costs is

often falsely perceived as the ability to make gains without costs. We have

trouble comprehending future costs, and often discount them too much but,

thankfully, we are able sometimes to compensate for these deficiencies. For

example, the ease of attaining food in developed countries has led to an obesity

epidemic that affects many. Programmed via evolution to take all we can get when we can get it, we struggle to adapt to a world of abundance. Many humans facing this issue, though, have trained themselves into food consumption behaviors that allow for a healthy body. They decide at the personal or household level to abstain from fried food, ice cream and candy bars. Much of this abstention is the result of an (often painful) period of habituation, whereby neural pathways are re-wired, not unlike the brains of recovering drug addicts. Taking steps to lessen our proximity to unhealthy foods also helps, as it is much more difficult to resist the food when it is close by. Developing habits of exercise, too, is an "unnatural" process many have undertaken in the face of abundance. For early humans, daily physical activity for the purposes of survival, play, etc., obviated the need for spin classes or cross fit.

Those who have developed sustainable healthy habits of diet and exercise are often quick to note their increased satisfaction in life. By imposing limits on their own agency, by denying their own (often powerful) natural urges, they become happier than they were when they indulged. Privileged humans are faced with an unnatural situation of being in a state of disequilibrium with nature whereby technology renders life's necessities in abundance. They then counter this unnatural situation by engaging in a rather unnatural task: self-imposing healthy diet and exercise habits. Upon becoming habituated to these impositions, they have returned their bodies to inner equilibrium. An unnatural external world (our technological environment), which is to say one for which we were not evolved to cope, is countered by unnatural actions (exercise for its own sake) to

return the body to a sustainable state. When the individual fails to adopt healthy habits of exercise and diet, she condemn herself to a shorter, less satisfying life. Her unwillingness to relinquish short-term pleasure causes more long-term harm.

The possibility of acquiring habits of restraint and self-control at the individual level illustrates the possibility of acquiring them at the global level. Recognizing our global state of disequilibria with nature, developed countries must willingly curb resource consumption (both renewable and non) and develop alternative energy sources. These endeavors are unnatural to society just as self-imposing limits on food consumption is unnatural to the individual. Such actions would require that societies make choices causing them short-term pain for long-term health. This pain would likely include higher prices for necessities, and until alternative energy infrastructure becomes established (something that will take years), pain will persist. Taking our analogy further, the human race today is most akin to an obese individual. Doctors have warned her that she is on the verge of a heart attack, just as scientists warn us of runaway global warming. Family members are hurt by her gluttony, just as life systems of the earth are in decline as a result of our gluttony as a race. Perhaps this overweight person is in some denial as to her condition and/or, seeing the mess she's made, fears that she is incapable of fixing things. She might worry that she is already "too far gone". All of these sentiments can be found in society, as many reject the findings of scientists, and convince themselves that things can keep going on as they were. Our individual might turn to religion, hoping for a better life after this one, and become increasingly vested in that belief as a means of avoiding her

bodily troubles. This too, appears to be a response of many in our race to the damage we are causing to the biosphere. But! There is a part of our overweight individual that knows that her doctors are telling her the truth. Also, she loves her family dearly, and it hurts her to see them in pain. She knows that, despite her rampant indulgence, she is not happy. Our obese person is not a lost cause yet, and the louder the angel on her shoulder gets the more likely she will be to begin and continue her journey towards restoring her bodily equilibrium. Those who recognize the dangers caused by humanity need to be the angels on humanity's shoulder. We need to appeal to the better part of our species. We will not win skeptics over by mocking them, nor by coddling them. We must be firm but loving, consistent but not boring

Just as individuals have self-imposed unnatural restraints on their short-term desires, so have larger communities of people. A group of scientists, environmentalists, volunteers and others founded the Oyster Recovery Partnership in 1993, after years of overharvesting threatened the survival of oysters in the Chesapeake Bay. Partially in response to pressure from that grassroots organization, the state of Maryland passed the Oyster Restoration and Aquaculture Development Plan in 2010, which cordoned off one quarter of the viable oyster habitat in the bay. This coalition of ecologically-minded citizens and the state government are making slow but clear progress in rebuilding the oyster beds. A sizeable contingent of oystermen protested the restriction of harvesting in those areas, as it had an immediate and direct negative effect on their livelihoods. This illustrates the "tragedy of the commons" whereby if a

resource is commonly available, consumers of that resource will often race to get as much of it as they can. They do this despite the knowledge that their actions are unsustainable in the long run because they reason (often correctly) that if they don't take it, their competitors will. Despite having harvested the Chesapeake's oysters nearly to extinction, and directly harmed their own well being, many opposed any state intervention that would break their cycle of plundering what remained of the oyster beds. The urge to get what one can while one can and to resist externally imposed limits on actions to satisfy this urge— are both natural and understandable within nature's creatures. It is worth noting here that greed in humans came long before Capitalism. Note the extinction of so much of the earth's megafauna shortly after humans began using tools. Our enhanced *ability* to take more led almost immediately to our taking of more.

Like our obese woman's ability (through the benefit of technology) to obtain food, the technologies of oystermen (boats, dredges) gave them an edge over nature. It was only when the situation became most dire that people were able to self-impose unnatural limits on their actions, and even then there was still fierce resistance in some quarters. The end goal, and one that appears feasible at least from the local level, is for oyster harvesting to one day resume, with properly enforced government regulations that ensure oyster bed sustainability. Should that day come, oystermen will enjoy harvests much higher than what they now obtain. Further, they can rest easy knowing that their long-term livelihood is secure. They will no longer have to worry about working themselves out of a job.

We have all either witnessed or experienced the countering of unnatural affordances of technology with unnatural self-imposed action to restore a natural equilibrium to the human body, via exercise and diet. We have just noted an analogous self-imposition on short-term aims for long-term equilibrium via the Chesapeake Bay oyster population. We can even widen our scope to the national level for more examples of a similar nature. For example, both Germany and Japan have undertaken massive, government-led, top-down forest management initiatives that decreased and then reversed deforestation nationwide. Success of this initiative in Japan is striking, as approximately 80% of the land is covered by forest, despite the island nation having the highest population density of any first world country.

In drawing analogies between individual, community, and nation, several similarities arise that can inform the action to be taken at the global level. First, the success of initiatives varying so widely in scope, and at all levels of population size, lends hope to the idea of the global initiatives needed to address problems that have outgrown the local. If the individual, community, and nation can do it, why not humanity as a whole? Next, the analogy hinges on unnatural affordances of technology being countered by unnatural (and often painful) self-imposed limits or rules, which allows for a return to a natural equilibrium for the life system (be it body, oyster bed, forest, etc.). Often, action is not taken until hope is all but lost. It took the near death/elimination of the body/oyster beds/forests before action was taken. This is likely the result of how unnatural such action is to our evolutionary programming, which is oriented towards taking

all we can get. Only when the direness of the situation becomes immanent are we spurred to take action, and even then such action faces protest. There is no reason to expect that action at the global level will be different. However, the greater danger is that climate change could result in a chain of events that is irreversible, such that our resolve to take action could come too late.

A final commonality between each of the examples is that they all required rules or laws, and authorities willing and empowered to enforce them. An obese woman self-imposes a diet with certain rules and restrictions regarding caloric intake, servings of vegetables, etc., and sets certain goals for exercise, such as daily walks. In our other examples, state and national governments enacted legislation that drew and enforced their own lines in the sand. The coordination of governments, likely via supranational organizations, will be required for global action. This is not to discount or discourage the efforts of concerned citizens for, as in Maryland, bottom-up protest can lead to top-down government action. In other words, for an effective global initiative to be enacted, governments around the world will need to face pressure from concerned individuals and groups. In all three cases, unnatural limits were self-imposed. Finally, all three examples involve the trading off of short-term gain for long-term health, and restoration of natural equilibrium to the life system. The very plasticity of our brains that allows us to cheat nature (by developing technology) is the only thing that can save us, as it allows us to counter our technology use by developing sustainable habits. That we have not sufficiently developed these habits yet does not mean we are

unable to, as we have witnessed successes ranging from the individual to the national levels.

A sustainable human existence in the face of technology-induced disequilibrium with nature requires a major shift in the aims of education. The Greeks saw education as an opportunity for a certain class of people, sitting at the top of the dominance hierarchies of both humans and all of nature, to aspire to a life of the mind superior to that of the flesh. The Industrial Revolution and capitalism expanded the scope of education to the masses, but this factory model of education is largely concerned with turning new generations into more efficient producers and consumers. Both of these aims of education are harmful in their own ways. The Greeks were complicit with slavery, and their philosophers argued that slavery was necessary to free up the superior people (i.e. themselves) for consideration of the metaphysical realm. Dewey (1925) notes that, "…the Greek community was marked by a sharp separation of servile workers and free men of leisure, which meant a division between acquaintance with matters of fact and contemplative appreciation, between unintelligent practice and unpractical intelligence, between affairs of change and efficiency— or instrumentality—and of rest and enclosure—finality" (Chapter 3, para. 22). In contrast to the Greek model of education for the elite, the factory model provides universal education, but it is an education for enslavement. The school's function in this model is to produce efficient workers.

It bears repeating that dominance hierarchies are common in nature, and that organisms unquestioningly use the technologies available to them to ascend

these hierarchies as far as they are able. All creatures are in some measure both oppressed and oppressor. This is a lesson taught by life, and one that schooling is not necessary to learn. However, the challenges of the day bring a true need for a posthuman education. Such an education should have two aims. First, we should be made to see more clearly the effects our technology use has on other people and the natural world. It is only after a realization of unsustainability that calls for sustainability gain credence. Second, we should learn restraint in our technology use. This is akin to Marcuse' (1968) Great Refusal, which he phrases as "…the protest against that which is" (Ch.3, para. 19). This protest requires education because refusal is an unnatural act, in that it runs counter to our evolutionary programming. We need to learn restraint in using technology to take from nature. Just because we are able to take from her in the moment does not mean that it is wise to do so. Limiting our ability to plunder via regulations and other legislation is vital, and raises an educational imperative all by itself. At any point before, during, and after such rules are enacted, however, educators of all stripes can help illustrate alternate paths. It is not enough to prohibit the obese person from eating junk food; she must be made familiar with healthy alternatives. When ecologically minded groups and the government accomplish their legislative goals, educators need to be at the ready with sustainable options. When the governments close doors, educators need to be there, holding other doors open.

What is needed, then, is an education of restraint. Again, restraint does not come naturally, hence the need for education. This is an education of living

within one's means. Ironically, considering free markets contributed to our present difficulties, one can look to personal finance curricula for guidance. Its aims are generally the same as that of this new education: living sustainably. In a typical personal finance course, students are taught the dangers of accumulating debt. So many people find the lure of plastic irresistible (a perfectly natural urge, as is hopefully clear), and run up credit card debt without fully *grasping* the long-term effects of their spending sprees. The curricula for these courses often involves exercises that illustrate the amount of time necessary to pay off such debt at such-and-such and interest rate, at the minimum monthly payment. In these exercises and others, students learn about the nature of compound interest, and get to see how the interest paid often exceeds even the amount of the purchases. In these and other ways students are warned of the long-term costs of their spending sprees. In the same courses, they are taught the proper habits for sustainable personal finance, to include budgeting, advice for prudent investing, and others. So, these courses teach by *showing* the potential harm of unsustainable living and *prescribing* ways to avoid poor finance choices. This is the new imperative of education, and as such should be the guiding focus of curricula in general: Humans must learn such restraint, in terms of their impacts on other life systems, through becoming familiar with the costs of continued indulgence, and learning a few tools and tricks for abstaining from continued indulgence.

Proposed Primary Goals of a Posthuman Education

The goal of education is not mastery of subject matter, but of one's person. Subject matter is simply the tool. Much as one would use a hammer and chisel to carve a block of marble, one uses ideas and knowledge to forge one's own personhood.

-David Orr, *What is Education For?*, p. 55

In light of the challenges above, three educational goals seem appropriate, and it is from these that a posthumanism-informed pedagogy and curriculum (to be explored in the following chapters), will spring. The first goal is to create *lifelong learners* due to rapid and accelerating environmental (both our natural environment and our technological, built environment) change. Lifelong learners are able to find dignity outside of the market system, which is essential due to the dwindling opportunities to find self-worth in that system. The second educational goal is to engender *awareness* in regards to technology use. As our technologies allow us to take without regard for the life systems we are taking from, and without knowledge of how our taking affects them, awareness is vital to a continued sustainable existence. Developing *restraint* in technology use is the third educational goal. Knowing that our actions are harmful is not enough. We must also act (or refrain from acting) based on that knowledge. The following paragraphs will elaborate further on these goals and make a case for their primacy in future educational endeavors.

Most schools today are oriented towards "just in case" learning, in which massive amounts of information are conveyed to students who are expected to

memorize it all, just in case that information is one day useful. This orientation made more sense fifty years ago, when being a student and having a career were fairly distinct from one another. Today, however, there is significant overlap between learning and working. Collins and Halverson (2009) write, "Schools are designed to teach us everything we might need to know in later life. But perhaps this is a fool's errand, given the knowledge explosion our society has enjoyed in recent years" (p. 48). Disruptive technologies and changing environments have left few careers unaffected, and our jobs and ways of interacting with the world are changing at an increasing pace. At the same time, memorizing information has become less and less useful, as we have near instant access to most information through our computers and smart phones. Young people feel this keenly, as an anecdote from my own experience may help illustrate. Teaching introductory macroeconomics to high school seniors involves tasking them with some basic math problems involving multiplication, division, and reducing ratios. Though frequently students grasp economic concepts well enough, they seem to struggle inordinately with the basic math. Since calculators are banned on the AP exam, their use is prohibited in class. Is the ability to do basic math in your head really that important anymore now that our smartphones do it for us? Regardless of where one stands on this question is perhaps less relevant than the fact that students seem to be becoming less capable at those tasks. I remember my times-tables because I was in my twenties before I began carrying a computer around in my pocket, and had occasion to call on that knowledge enough that the neural connections became firmly established beforehand. If most young people

use their smartphone calculators whenever they encounter a task demanding

basic math, then whatever mental space they allocated to that knowledge in

grade school will likely be taken over eventually by some other knowledge.

Knowledge of basic math seems doomed to the same fate as other forms

of knowledge that became obsolete as a result of technological advances.

Agricultural improvements led to a decline in knowledge of edible food in the wild.

This knowledge was once essential to the survival of foraging groups, and was

shared by all members. Nicholas Carr (2010) notes the effects paper maps had

on knowledge, writing, "Our ancestors' navigational skills were amplified

enormously by the cartographer's art. …But their native ability to comprehend a

landscape, to create a richly detailed mental map of their surroundings,

weakened" (p. 207). Similarly, cabbies once had to memorize the map of their

city including, amazingly, all of the street names. This knowledge is not essential

anymore since the advent of GPS-equipped smartphones. One need not always

chalk up the loss of some form of knowledge to technological advance; changes

in the environment, culture, location, etc. of a people can each render formerly

important knowledge trivial. When people migrated to the snow covered tundra of

the north, much prior knowledge was no longer useful, and much new knowledge

had to be developed. Like those travelers, we are in an environment significantly

different from the one our knowledge is meant to cope with. Unlike them,

however, we have not left one environment for some other specific place, but

rather have become *nomads*. Our environment is now changing constantly, and

we need not only new knowledge, but also a new pedagogy, a new method of acquiring knowledge.

"Just in case" learning is worthwhile only if there remains a notable likelihood that such a case will arise, or if the case in question is of great importance. Undoubtedly, there are examples of this. The phrase "stop, drop, and roll" is a particularly good example of "just in case" knowledge that is worthwhile. We are entering an epoch, however, which more frequently demands "just in time" learning, or continuously learning new things as we face new demands. For Gregory Bateson, (1972) learning to learn is a habit of thought we all should acquire: "We have got to be like those few artists and scientists who work with this urgent sort of inspiration, the urgency that comes from feeling that great discovery, the answer to all our problems…is always only just beyond our reach" (p. 176). The educational goal, then, is to engender and nurture a passion for discovery.

As the list of jobs computers and robots cannot do continues to shrink, a major source of dignity for many (post)humans will be taken away. Identity and pride have long been associated with vocation, and income has long functioned as a measure of self-worth under capitalism. Even in jobs that have not been replaced by robots, the skill demanded of human workers is declining as a result of automation. Autopilot greatly reduces the mental effort required to fly a plane. "Autoland" functionality is built into most new commercial planes now, allowing the plane to land without pilot involvement. Though generally used when weather severely limits visibility, autoland will likely become more widely used in the

future, further reducing the skills demanded of pilots. In "Super Crunchers" (2007) Ian Ayres notes a trend of algorithms outperforming experts. Statistical analysis in baseball (sabermetrics) thus increasingly came to be favored over the knowledge of the scout. Wine experts have found their expertise challenged by mathematical formulas that predict the quality of wine without tasting it, and before it is even produced. Examples such as these are both numerous and quickly growing. These developments suggest that we must increasingly seek our dignity outside of the commodity space. Pierre Levy (1997) writes, "A society that explicitly acknowledges the principles of an *economy of human qualities* will recognize, encourage, and maintain those qualities…In this way it would enable those without employment to construct an identity for themselves through interaction with the community" (p. 35). Levy's economy of human qualities could in this way function as a replacement of functions previously served by the market. The goal must be to show learners paths to self-worth that are not bound to vocation or income. Instead, we must learn to find our self-worth through knowledge-based and creative endeavors.

In addition to making lifelong learners, education today must foster a combination of awareness and restraint. Dewey (1938) is blunt on this matter, writing, "The ideal aim of education is creation of power of self-control" (Ch. 5, para. 5). We are the products of millions of years of evolution oriented towards preparing us for lives in an environment that is quite foreign from the ones most of us inhabit today. Urges and proclivities that benefitted early humans are in some cases liabilities today. Acting on violent urges today can result in much

more harm, what with the availability of guns and other weapons. The desire to eat more sweets than is prudent was once advantageous to our species, as high-sugar foods promoted fat storage, which was actually an asset in a time when food security was low. I use the term restraint here to denote any rejection of behavior that is the result of evolutionary predisposition. Such restraint is a necessary component of life in our technological environment, in which acting on our "natural" urges using the means at our disposal often is deleterious to our bodies, other life systems, or both. Our technologies are frequently of the taking sort, means towards the attainment of ends. Thus, they facilitate taking from the natural world and our less technologically-endowed, (post)human peers. As a result, some people have taken too much, without giving much of benefit back. We are the primary (if not sole) agents of a natural disequilibrium at the planetary scale. Breaking from humanist notions of the savage, we must recognize that, rather than our animalistic proclivities, it is our technology use that must be tempered. Prior to the Stone Age, the tools used for taking were all bodily tools; brains, nails, teeth, fists, etc. The damage we were capable of accomplishing was limited. A military tank functions as a synecdoche for technology as a whole, in that it holds both great destructive power and provides a mostly impervious cocoon for the people inside. It allows for the taking of life without giving life, and separates those inside from the outside world.

Gun rights advocates use slogans like, "Blame the bad, not their tools" and of course, "Guns don't kill people. People kill people." Thoughts like these are commonly applied to other technologies as well, as many view technology as

being inherently neutral. In stark contrast to this view, Latour (1992) notes, "Prescription is the moral and ethical dimension of mechanisms. In spite of the constant weeping of moralists, no human is as relentlessly moral as a machine…" (p. 157). Our technologies *prescribe* certain actions and/or ways of acting, and as such they impose a certain morality. Marshall McLuhan (1964) perhaps presented the best refutation of the neutrality of technology argument, applying this faulty logic to other products to reveal its absurdity: "Apple pie is in itself neither good nor bad; it is the way it is used that determines its value" (p. 11).

Because of the value-laden nature of technologies, and the taking power they frequently afford us, we must develop habits of mindfulness and restraint in their use. Such habits do not come naturally, and thus are an essential goal of education, which should focus on the impact of technology use on life systems. This should include learning where their consumer goods ultimately come from, the environmental impacts of production and waste disposal, and the effects their purchases have on other people. As typical consumption patterns are problematized, more sustainable alternatives should be introduced. Awareness is in this manner coupled with restraint, and should be aimed at impacting a wide range of aspects of life, including choices regarding transportation, food, shelter, clothing, electronics and others.

From Aims to Curricula

The consideration of Dewey in the preceding pages underscores the dangers in positing humans as separate from nature. This human/nature distinction led directly to the premise that humans are meant to rule nature, and the exercise of this rule has been the source of much suffering and destruction of life. Further, global effects of human technology use are threatening not just other species, but our own existence as well. Technology frequently blinds us to the effects of what we take from and give to the life systems with which we are in contact, and reinforces our humanist ideas of a human/nature distinction. From these considerations, three primary aims of education have been posited. First, that we must become lifelong learners, for our tools have begun to be developed more rapidly. Understanding how our tools function helps us to remove technology's blinders, so that we might better understanding the effect of their use. This removal of blinders is represented in the second educational aim of *awareness*. Finally, as we become more aware of the effects of our technology use on other life systems (as well as on our bodies), it is vital to learn habits of restraint. Evolutionarily predisposed to seek comfort, we use our tools to maximize comfort and the satisfaction of bodily urges, often with consequences disastrous to life systems. Learning restraint is *unnatural* in that it runs counter to our instincts, and yet this unnatural response is vital in our unnatural (as in far removed from the environment for which we were evolved) milieu. These aims of lifelong learning, awareness and restraint will be used in the following chapter as the foundation for a number of posthumanist curricular imperatives.

CHAPTER 4

FOUR CURRICULAR IMPERATIVES

From the posthumanist tenets of interconnectivity, responsible agency,

and embodiment, three educational goals have been outlined. They are *lifelong*

learning, *awareness* of how technology use affects other entities (and how we

are affected by its use on us), and *restraint* in technologically facilitated action. In

this chapter, four curricular imperatives are posited that align with these goals.

The first of these is *critical media literacy*, which involves learning the languages

of today's media, in part through acts of creation using those media. An

education in media literacy should involve training and practice in interpreting

and creating within the realms of audiovisual media, social networking,

advertising, and others. It should also include the development of what James

Gee (2013) has termed "mining skills", or the ability to obtain the information we

need, when we need it, from the Internet and/or databases (Chapter 22, Section

3, para. 14). In today's knowledge-based economy, such skills are increasingly

vital. A second curricular imperative, *critical cultural studies*, seeks to remove the

cultural blind spots young people face as a result of technology-facilitated

segregation. Our tools today allow us, perhaps more than at any other time in our

existence, to serve as gatekeepers deciding whom we will grant interpersonal

access to. This affordance has had the undesirable effect of the proliferation of

self-same groups. Rather than interact with those whose views challenge our

own, we all too often retreat to friend and acquaintance groups that largely mirror

ourselves in appearance, opinion, culture, etc. Giving students an education

oriented to fostering and maintaining *healthy bodies* is the third curricular imperative. As we rely less on our bodies, tending to view them as afterthoughts, we increasingly fail to tend to them. Further, the ubiquitousness of cheap, unhealthy foods (and advertising for same) makes proper habits of diet even more difficult to engender. Humanists often forget the reflexive relationship between mind and body, tending instead to place the mind on a pedestal. Posthumanism serves as a corrective here, recognizing that the body and the mind influence each other. A final curricular imperative for posthumans is *ecopedagogy*. There are parallels here between disregard for the body and disregard for the environment. When disembodied information takes precedence, both body and environment become neglected. Just as body and mind have a reflexive relationship, so posthumans have a reflexive relationship with the life systems they encompass and the ones that encompass them. That our tools allow us to take from the environment, without regard for or knowledge of the impacts of our taking, makes ecopedagogy all the more important. Though different from one another, these imperatives share a focus on *selective permeability*, or letting the Other in without becoming subsumed. Each, in some form, seeks to educate the posthuman in what she might take in or absorb, and produce or excrete.

Curricula Today

Through 21st century media (though not limited to them), business interests teach a curriculum of consumption. The goal of this curriculum's authors is to engender within us what Marcuse has termed "false needs" (1964, p. 4). Like other curricula, this one establishes a path and provides encouragement to the learner to progress along it. Giroux (1999) writes, "corporations hold an excessive amount of power in shaping children's culture as a largely commercial endeavor, using their various media technologies as teaching machines" (Introduction, para. 19). Today advertisements target individuals through a bevy of data including search and purchase histories, and demographic information. Further, as cell phone usage becomes a more integral part of our lives, ads become ever present. The market was once a physical place to be traveled to, but we are now always in it. Fifty years ago, when it was time to get work done a person could just put the newspaper (with its ads) aside, and turn off the television. Today, though, most people are always connected. "Fear of missing out" often prevents them from shutting off their phones, which ring or vibrate, beckoning us with the arrival of new things. Though the curriculum of consumption may not have changed much since the advent of 21st century media, the lessons now last all day (and into the night).

We are born with tools of nature that enable us to detect and transmit sights and sounds. Through the use of these bodily tools and with guidance from school, family, and peers, our abilities of communication grow. Today, an increasing amount of interpersonal communication occurs through cyberspace.

Dana Boyd (2014) sums up the new landscape of interpersonal communication thusly: "Unlike me and the other early adopters who avoided our local community by hanging out in chat-rooms and bulletin boards, most teenagers now go online to connect to the people in their community. Their online participation is not eccentric; it is entirely normal, even expected." (p. 4). The functionalities of cyberspace tools change regularly, unlike mouths and ears that work much the same way at the age of forty as they do at four. One's peers are most frequently the instructors of this social media curriculum, as education from family or school is often markedly absent in this arena. The path of this curriculum, as with other curricula, leads towards mastery in its content area. The rewards of such mastery include status, feelings of pride and satisfaction, influence, and others—the same as developing any other interpersonal skills. This curriculum, often viewed with suspicion if not outright hostility by educators, is not without merit. Mastery in the domain of social media requires creativity, both in the written word and the visual realm, among others. As in conversation, it requires the development of a keen sense of timing. It requires sensitivity to context and knowledge of one's audience. Further, developing skills in social media use will almost certainly be of benefit to the learner, as such media continue to increasingly colonize interpersonal communication.

The school curricula, though marginalized of late, retain some influence in the education of the young. These curricula now are mandated by the state, and are often composed through some combination of subject area specialists, textbook publishers, "experts" in education, and other political and business

interests. This centrally planned construction of curricula carries certain disadvantages. First, it fails to address regional and local differences, and thus can serve to impede student engagement. Also, this method of composing curricula typically leads to the omission of the controversial, and so important topics become stricken from the curriculum lest some people become offended. In addition, these curricula make no distinctions of culture, socioeconomic level, etc. As such, students in vastly different contexts, with sometimes vastly different needs, are taught the same curricula. Finally, and perhaps most importantly, school curricula are tied to a model of education that is becoming increasingly obsolete. Subjects are typically distinct from one another. Memory remains a big focus of these curricula, as students are expected to recall names, dates, formulas, rules, etc. The school curriculum continues to fade in stature as teachers, students, and the community increasingly recognize its obsolescence. Collins and Halverson (2009) note that as we move "toward a situation where people choose for themselves what kind of education they will obtain, standards will serve as a constraint on the range of what counts as legitimate learning" (Chapter 6, para. 8). Importantly, this is not to imply that there is no longer any useful place for schools in society. Rather, it is the curriculum, over which the teacher has little control, which is in desperate need of reform.

In the following paragraphs, an attempt will be made to outline the foundations of a posthuman curriculum, by which I mean both a curriculum for posthumans *and* a curriculum that is posthuman-*ist*. Such a curriculum seeks to address a posthuman entity that is neither distinct from nature nor from artificial

prostheses, an entity that shares deep connections with other humans, living

creatures, life systems, machines, and entities that we do not necessarily

recognize as living. At the same time, this curriculum would seek to serve as a

corrective to humanist notions of human superiority over the natural world, while

at the same time radically extending humanist notions of equality among humans

to all life systems. Finally, this curriculum will not present the humanities as a

path away from a "lesser", "baser" nature, but instead make fostering

connections with nature a focus of the humanities.

Critical Media Literacy

In the face of certain posthumanist tenets and proposed primary

educational goals, media literacy rises as a clear curricular imperative. Kellner

(1995) defines a media literate person as someone who is, "…skillful in analyzing

media codes and conventions, able to criticize stereotypes, values, and

ideologies, and competent to interpret the multiple meanings and messages

generated by media texts. Thus, media literacy helps people to use media

intelligently, to discriminate and evaluate media content, to critically dissect

media forms, and to investigate media effects and uses" (p. 73). The

posthumanism outlined in these pages, in contrast to the feelings of many

transhumanists and techno-utopians, rejects the proposition that technology is

neutral. Both the forces driving technological advance and the resultant

technologies are instilled with the values of engineers, programmers, investors

and other technocrats. Posthumanism acknowledges that we are unavoidably

embedded in a technological environment, but does not advocate an unquestioning embrace of the technologies with which we are in contact. Haraway (1991) writes that we should take "pleasure in the confusion of boundaries", for instance between ourselves and machines, but at the same time that we have to take "responsibility for their [the boundaries] construction" (p. 272). Though we are all cyborgs, more or less, this does not imply that we have to give up all agency. Instead, we must exercise the posthumanist tenet of *responsible agency*. Three forms of media literacy seem particularly crucial to this end, and they are critical media literacy, navigation literacy, and network literacy. Each will be explored in brief below.

As our screens mediate more and more of our engagement with the world, it is possible that these media can take more than they give. Hansen (2015) sums up many of the dangers thusly: "…contemporary advertising aims to capture our attention without our awareness, to manipulate us subliminally and outside of our control; and today's digital networks possess the capacity to gather and to exploit all kinds of data without us having any knowledge, and, to a great extent, any possibility for knowledge, of such activity" (Chapter 1, section 8, para. 4). Our minds are mined for information as a mountain is mined for coal, and this information is then used on us to spur consumption and to accept (or remain unaware of) our own subjugation. Our purchasing patterns, Internet searches, streamed movies, news articles read, and other Internet usage are gathered and fed into algorithms that recommend changes in what we subsequently view on line. Ads are individually targeted, and news stories and Facebook feeds are

molded to show what we are each predicted to respond to the most. In these ways and others our machines threaten to take over our thoughts and bodies. Following Haraway's argument that we must take responsibility for our own agency, the need to resist our subsumption into our tech seems clear. This need to exercise responsible agency in our interactions with technologies, however, cannot occur without media literacy. For Kellner (1995), critical media literacy "teaches students to be critical of media representations and discourses, as it stresses the importance of learning to use media technologies as modes of self-expression and social activism wherever appropriate" (p. 73). Critical media literacy, then, allows us both to be critical of what is presented to us, and competent in how we present ourselves to others.

The term "digital native" is in many ways a misnomer. Though smart phones are becoming increasingly ubiquitous among young people and tablets are being used to pacify even small children, the use of these devices is generally limited to escapism and/or social networking. The programming, statistical, and even many of the creative functionalities of these devices often remain unexplored. Danah Boyd (2015) writes, "Just because teens are comfortable using social media to hang out does not mean that they're fluent in or with technology. Many teens are not nearly as digitally adept as the often-used assumption that they are 'digital natives' would suggest. The teens I met knew how to get to Google but had little understanding about how to construct a query to get quality information from the popular search engine" (p. 22). Without media literacy, media use tends towards escapist disengagement with the external

world, and commodification by technocrats. Though the digital divide is shrinking in terms of access, a media literacy divide remains. People with more wealth are more likely to be media literate, and therefore to pass this knowledge on to their children. Because media literacy is generally not taught in schools, poor children are less likely to gain that literacy. This can contribute to the persistence and widening of educational and income gaps between white and black and/or rich and poor.

21st century media frames the outside world for us, and a primary task of media literacy is to investigate the nature of this frame. Why does it show us what it does, and what does it leave out? What is it trying to make us think, and what if we purposefully think in contrary ways? Being able to answer these questions constitutes what Kellner (1995) refers to as critical media literacy. He argues, "Learning how to read, criticize, and resist media manipulation can help individuals empower themselves in relation to dominant media and culture. It can enhance individual sovereignty vis-à-vis media culture and give individuals more power over their cultural environment and the necessary literacy to produce new forms of culture" (p. 2). Of a number of media literacies to be considered here, *critical* media literacy is most oriented towards critically examining the media to which we are exposed. We must learn to resist being overwhelmed by spectacle, or drawn into unthinking escapism or consumerism.

In order to develop critical media literacy, one might look to posthumanist theory for guidance. Where posthumanists argue for acceptance of the reality of a technologically mediated existence, they warn against becoming subsumed

into the technology. One effective means of resistance to the onslaught of marketing and commodification through media is to become a producer of such media instead of only a consumer. All forms of media in which one is a frequent consumer should be forms in which one also creates. For American youth today, these forms should include movies, songs, commercials and other forms of advertisements, music videos, video games, and others. Creating in these realms help to make us more aware of the ways they frame what we see, and hence to be more likely to view media more critically. For McLuhan (1964), "The serious artist is the only person able to encounter technology with impunity, just because he is an expert aware of the changes in sense perception" (p. 18). The task of turning media consumers into media producers is greatly facilitated by the same technologies through which so much consumption takes place; smart phones double as video production studios, for example.

Critical media literacy can be fostered in other ways as well. Temporarily adopting and exploring contrarian viewpoints can help to clarify one's own positions. This might include having learners consider a product they own or are interested in owning, and then exploring the costs born by other entities in its production. Learners can also explore the positive ways they will be affected if they do not own that product, and/or the negative effects ownership will have on them. The point here is not necessarily to dissuade the learner from purchasing the product, but to understand more fully the impact of their consumption in general. In regards to popular culture, critical media literacy can be developed by exploring pop culture's influence on societal norms. Themes of sexism, racism,

homophobia, and others are often embedded in pop culture artifacts that are not always immediately apparent. Taking opportunities to seek out these hidden messages can help make such messages less hidden in later experiences of pop culture. Finally, in addition to critically examining what is presented, media literacy involves noting what is left out. As Chomsky (1999) notes, "It is always enlightening to seek out what is omitted in propaganda campaigns" (Chapter 6, section 2, para. 1).

Critical media literacy is just one of several literacies vital to today's learners. A second form of literacy involves the development of what James Gee (2013) refers to as "mining skills". This literacy, which has also been termed navigation literacy (Rainie and Wellman, 2012), information literacy (Boyd, 2015), and search literacy (Thompson, 2013), involves the ability to successfully navigate the Internet to obtain desired information. Rainie and Wellman define it as, "a sense of internet geography that allows [one] to maneuver through multiple information channels and formats" (Chapter 10, section 4, para. 3). Developing this form of media literacy can perhaps ideally be accomplished through the research paper and/or project. An anecdote from personal experience could be enlightening here. A number of years ago, after taking a few statistics classes and installing open-source statistics software onto many of my school's computers, I began having some of my high school social studies classes conduct quantitative studies. In the course of their work, they have to find numerical data for each variable from the models they created, as well as peer-reviewed articles for their literature reviews. Finding appropriate data and

relevant articles has proven to be the most difficult task for the students. They often are not able to find the specific data they are looking for, or will use data they think is appropriate but is not. They commonly (and falsely) claim that no relevant articles can be found, and misread irrelevant articles and mistake them for relevant ones. The problem in both cases is two-fold; an inability to locate what is desired *and* an inability to interpret what is found. In both cases, feedback either from a teacher or a proficient peer has proven successful, provided students have adequate practice. Only through multiple attempts at searching/interpreting, followed by rounds of feedback, do students begin to show improvement. Like all posthumans, young people are cybernetic systems that adjust their functions according to feedback. More feedback results in more accurate adjustments, such that failure guides future learning.

A third essential form of media literacy to the posthuman is network literacy. We are connected with and influenced by others in our networks far more than we may realize, and often in ways of which we are unconscious. Hansen (2015) writes that, "the dominant coupling of an individualist perspective on action and the privilege of the human as hermeneutic agent causes us to overlook the actual functioning of networks and to neglect the radical dispersal and distribution of agency that occur in networks" (Introduction, para. 2). Developing network literacy is in accord with the posthumanist tenet of recognizing our interconnectivity, in its shift in focus from individual to system. Also, developing network literacy is vital to another theme of posthumanism: the exercise of responsible agency. In short, it is important that posthumans learn

about the functionalities of the systems of which they are biotic components,

recognize their agency within these systems, and understand how their exercise

of agency influences the larger systems. We are not evolutionarily predisposed to

be on our own, but have thousands of years of evolution that has oriented us

towards copious social interaction. This predisposition to network is especially

important today in an increasingly interconnected world. Through his work in

network science, Nicholas Christakis (2009) has found evidence to support what

he calls a "Three Degrees of Influence Rule" whereby, "Everything we do or say

tends to ripple through our network, having an impact on our friends, our friends'

friends, and even our friends' friends' friends. Our influence gradually dissipates

and ceases to have a noticeable effect on people beyond the social frontier that

lies at three degrees of separation" (p. 28). He has found evidence to support

that this rule holds for things like happiness, smoking cessation, and even weight

gain. Various estimates put the average person at between four and six degrees

of separation from any other person on the planet. To influence people three

degrees out from us is potentially to affect many millions of people. This (often

hidden) influence of our networks on us raises a clear curricular imperative. In

addition to learning network science fundamentals, this education must also

include training on social media use. Understanding today's networks is

generally not something that comes to us instinctively. As the field of network

science (itself born of cybernetics, a progenitor to posthumanism) has recently

come into full fruition and scholarship has proliferated, I will attempt to highlight

some contributions by the field such as can inform a posthumanist curriculum.

Maintaining existing ties and developing new ones are increasingly vital practices in today's environment. Finding a job, mate, companionship, apartment, etc., are all facilitated by having a large assortment of "loose ties" with people in our social networks but not necessarily in our inner circles of friends. Danah Boyd (2015) writes, "In a world where information is easily available, strong personal networks and access to helpful people often matter more than access to the information itself" (p. 172). It is no stretch to assert that financial and romantic successes often result more from who you know rather than who you are, what you know, or what you are able to do. Because we tend to associate with people within our own socioeconomic strata, social networks help the rich stay rich as they keep the poor in poverty, challenging notions of equity of opportunity.

Teaching network literacy can resist network inequality effects if such instruction includes a focus on always developing and maintaining more ties and more diverse ties. Rainie and Wellman (2012) write that, "Although some might think that smaller networks will have higher-quality relationships— quality compensating for the lack of quantity— in fact, quantity goes along with quality. Not only do larger networks provide more support, but each person in a larger network is likely to be supportive. We do not know why, but we suspect that social capital breeds more social capital in a positive feedback cycle" (Chapter 5, section 5, para. 8). These authors go on to advocate a number of practices to network effectively, including following the Golden Rule with your ties, developing contacts that are part of social groups that you have yet to make contact with, and being aware of invisible audiences. A curriculum that fosters these and other

practices can help provide young people with connections that could be of tremendous benefit to them. Unless one is born connected, by virtue of well-connected parents for example, one ignores networks at their own peril.

The concept of transitivity is an important one in network theory. Roughly, transitivity indicates the level of centrality of one's location in a network. If one's five friends are friends with each other, this person has a higher transitivity in their friend network than someone whose friends are not friends with one another. This latter person is peripheral to a number of friend networks, while the former is central to one. Christakis and Fowler (2009) write, "Those with high transitivity are usually deeply embedded within a single group, while those with low transitivity tend to make contact with people from several different groups who do not know one another, making them more likely to act as a bridge between different groups" (p. 19). Transitivity gains can accrue via positive feedback loop; as one's location in the network becomes more central, they are more likely to be befriended by others because of their high transitivity.

This rich-get-richer nature of friend networks is a trait common to all scale-free networks. Notably, neural networks exhibit the same behavior. A neuron is more likely to connect to a more connected neuron than a less connected one. Having connections attracts more connections. With their many connections, highly transitive nodes, or hubs, exert more influence on the network. The opinions of a well-connected person are typically more influential than those of a less-connected one. Indeed, such hubs are the chief weakness of scale free networks. Otherwise robust, networks that lose several hubs simultaneously can

fail. Hubs hold the network together, and when they disappear it can fall apart. For hubs, the trade-off they face for their transitivity gains is that of entering an echo chamber. Gains in influence are offset by declines in sensitivity.

Bridges, the less transitive but more sensitive counterparts to hubs, are comparably important to network topology. These nodes, as their name suggests, are more likely to facilitate the sharing of information between networks. In the scale-free topology of a social network or a brain, there exist Russian nesting dolls of networks; networks of and within other networks. Bridges, in this context, are vital for coordinating action between networks. Also, bridges can link networks at one level of organization with those of another, such that neural bridges exist both within and between parts of the brain. I know a young man who was a member of both an anti-bullying club that supported gay rights, and a young Republicans club. As bridges between such groups are becoming increasingly scarce, his network location was quite unique. A nature lover might have a low transitivity in human social networks, but function as a bridge between the natural world and the increasingly removed (for most) human one. Computer programmers might similarly function as bridges between humans and digital machines. Many people live their lives without giving much thought to the nature of their networks and the roles they serve in them. People can become oblivious to the fact that their social networks often serve as echo chambers. We often dismiss these networks as trivial diversions, even as they exert influence on our emotions, actions, careers and bodies. For these reasons and others, network literacy forms a vital component of media literacy.

Critical Cultural Studies

Posthumanism faces a number of criticisms from historically marginalized groups. Many in these groups, who have been striving for many years to be recognized as "human" and to receive more equitable treatment in society, are skeptical about a movement that seeks to dismantle the very club they have sought membership in. Lewis Gordon (1998) for example writes that, "the dominant group can 'give up' humanism for the simple fact that *their humanity* is presumed" (p. 39). Also, transhumanism, which is often mistakenly conflated with posthumanism, has been subject to (often valid) critique on the grounds that the future it envisions would perpetuate and perhaps even bolster white privilege. Transhumanists seek to augment their bodies with new technologies for the sake of greater intelligence, longer life spans, and/or other attributes in which they discern utility. Such augmentations, however, are like much of the technologies we find utility in today: frequently expensive and/or requiring education to use most effectively. As such, marginalized groups will likely have less access and derive less usefulness from such augmentations, much as has already occurred with computers and other technologies. Focusing on the potential benefits to the individual from cyborg-ization, transhumanists frequently neglect to acknowledge the almost certain disparity in access that would (and arguably has) result(ed). Further, as with so many other human technologies going back to and preceding guns and steel, these new technologies available to the privileged classes would likely benefit them *at the expense of* those less fortunate. It would allow those in power to keep and possibly to extend their power over others.

The notion of dismantling the concept of "human" however does not necessarily imply that posthumanists mean to dismiss the struggles of oppressed groups. While posthumanism is in some ways anti-humanist, in other important respects it is a radical extension of humanist thought. Posthumanism rejects humanism's anthropocentrism while seeking to *extend* humanist notions of social justice to all life systems. Posthumanism therefore is opposed to a transhumanism that stands to perpetuate or cause social injustice. To reconceive humanity in ways that broaden its scope is to engage with posthumanism. It must be noted that marginalized groups that were (and continue to be) denied entry into the human "club" have long offered not only critiques of humanism but also new ways of being in the world. Posthumanism is in a sense a rediscovery of and reunion with these groups and ways of being. The alignment of postcolonial, race, feminist, queer theories and other marginalized perspectives with posthumanism is vital because forming a collective of (post)humans is a foundational step in working towards a collective that includes other life forms. I hope in the paragraphs that follow to illustrate origins of posthumanism in cultural, race, gender, and queer studies, and to make the case that curricular inclusion of these studies is a growing imperative.

Pragmatism involves a certain recognition of "the way things are". We must realistically acknowledge the context in which we act. Posthumanism has a pragmatic aspect, in that much posthumanist theory seeks to *re-ground* us in an environment of which we are constituent parts (and not masters). A real danger here though, is that acknowledgement is often conflated with acceptance or

acquiescence. I might acknowledge along with Haraway that we are all cyborgs, without recognizing that some of us are more cyborg than others. Just as oppressed groups have historically had less access to books and education in the past, they have less access to computers and the Internet today, and this reality runs the risk of being neglected when looking at (post)humanity as a whole. Also, I might decry the global rise in carbon dioxide emissions without fully acknowledging that: 1) my privileged position in the global order is built on a foundation of fossil fuel use and 2) many developing countries seek to follow the example led by my own country and finally 3) my society's consumption of imports has been a chief factor in the rise of CO_2 emissions of other countries, as their production depends heavily on our demand. To acknowledge the context of one's actions is to look from the particular to the encompassing. In terms of a critique of posthumanism, this is perhaps the most valid: By acknowledging and focusing on global truths we run the risk of dismissing local truths. Posthumanism brings a perspective therefore that, while not wrong, is often incomplete. This is not at all a case for it's dismissal. Can we not say as much for other –isms (feminism, post-colonialism, etc.)? What *is* special about posthumanism is that its global/contextual focus allows it more readily to form a bridge between other theories. I will seek in the paragraphs that follow to contribute to such bridge building.

Some of the first anti-humanists came from oppressed groups, as they recognized their exclusion from dominant notions of what constitutes the human. They frequently articulated recognition of their exclusion from this group called

"human" and the corresponding association of oppressed groups with barbarity, and recognized humanism as an ideology to justify oppression. Davies (1997) writes, "All Humanisms, until now, have been imperial. They speak of the human in the accents and the interests of a class, a sex, a race, a genome. Their embrace suffocates those whom it does not ignore. … It is almost impossible to think of a crime that has not been committed in the name of humanity" (p. 141). Also, oppressed groups became aware that their distinction from other oppressed groups was itself a tool of oppression. Haraway (1991) writes, "Painful fragmentation among feminists (not to mention among women) along every possible fault line has made the concept of woman elusive, an excuse for the matrix of women's dominations of each other" (p. 155). Calls among marginalized groups to unify in resistance are the first steps towards the broader unification of humans with technologies, life systems, and others. How can we acknowledge our connection to our ecosystems, for example, if we do not acknowledge our links with one another?

Critical cultural studies is an essential component both to posthumanism and a posthumanist curriculum. Haraway (1991) writes of the need to, "craft a poetic/political unity without relying on a logic of appropriation, incorporation, and taxonomic identification" (p. 159). Oppressed groups are well acquainted with the posthumanist tenets of boundary blurring and interconnectivity, as well as methods for building unity. Further, several primary educational goals are bolstered by curricular inclusion of these studies. First, critical cultural studies promote awareness of how one's actions affect other entities, as we become

more aware of power structures and our implication in them. Exploring these structures (including the technology that in part constitutes them) can help us see more clearly how such structures privilege some at the expense of others. With increased awareness, we can pursue a second educational goal, the engendering of restraint in harmful technology use. Knowing how our actions and technology use are affecting others must be paired with engendering habits of responsible action. Educating for awareness and restraint might start with (post)human interactions first, before moving on to considerations of other life systems. Until posthumans are able to see their interconnectivity with one another, it is unlikely that they will recognize their connections with other life systems.

Another reason critical cultural studies is a major curricular imperative is that dominant school structures and curricula today perpetuate oppression. Critical cultural studies within the school must undo damage done by the school. In our capitalist system, schools' social function is understood as "reproductive of dominant values, not only through curriculum content, but via grouping procedures, faculty hiring patterns, and differential school funding" (Pinar, Reynolds, Slattery, Taubman, 1995, p. 318). In her study of African American schoolboys, Ann Ferguson (2000) found evidence for "radical schooling theory in which there is a hidden curriculum to reproduce current inequities" (p. 50). Oppressed groups find in school that rules are often selectively enforced to their detriment. They often face relatively lower achievement expectations from their teachers, which can contribute to poor performance. They are grouped with other

"underachievers" and thereby lose opportunities to learn from high scoring peers, and are placed in less advanced classes. The Eurocentric humanism that posits the white male as the model human is alive and well within the American school.

A prerequisite for teachers to implementing critical cultural studies into curricula is reversing and/or resisting systemic oppression of marginalized groups within the school. Examples of opportunities for teacher resistance abound. Michie (1999) has noticed that, " 'Low', 'regular', and 'top' groups were identifiable at every grade level, and though they weren't labeled as such, the reality of their presence escaped no one" (p. 45). These groups, once sorted, are taught differently. Based on his observations as a public school teacher, Schultz (2008) notes that "middle class students are taught to think creatively and question, [while] poor students are taught to parrot" (p. 13). Similarly, Ferguson (2000) sees "evidence of Friere's banking model" in the education of poor (usually African American) students (p. 49). Teachers cannot negate all systemic oppression. Often, student tracking and discipline are not under teacher control. However, resisting as one is able can impact curriculum positively, even if critical cultural studies is not an overt component of the curriculum. For example, assigning groups that are diverse (or, as diverse as possible, depending on the classroom) with regards to gender, race, sexual orientation, socioeconomic status, etc., can provide a learning experience quite valuable to group members, regardless of the task the group is assigned. Teachers of "lower track" classes can resist the pressure to lower their expectations, and instead seek to engender lifelong learners. Remaining vigilant to ensure equity in one's own handling of

student discipline is another way teachers can resist systemic oppression. Teachers are disproportionately drawn from privileged groups, and are often unaware of their unjust treatment of students from marginalized groups. They tend to see students from their own groups in a more pleasant light, and dismiss infractions for them but not others. In her study of African American schoolboys, Ferguson (2000) found evidence for "radical schooling theory in which there is a hidden curriculum to reproduce current inequities" (p. 50). Implementing critical cultural studies should start with this hidden curriculum, those elements of a curriculum that are not overtly part of the lesson but are nevertheless key parts of the education that takes place.

A theme in posthumanism is that we must take responsibility for the agency we exercise. This is especially true for those in positions of power, including teachers. Posthumanist theorist Rosi Braidotti (2013) writes, "The pride in technological achievements…must not prevent us from seeing the great contradictions and the forms of social and moral inequality engendered by our advanced technologies" (p. 42). Like other posthumans, teachers are part of a technological environment in which structures augment their power over other entities. The technologies that constitute the typical school act in concert to empower the teacher over their students. As such, the agency provided to the teacher by these educational technologies must be exercised with great awareness and restraint. In this manner the teacher can serve as a model for the exercise of posthuman agency. Posthuman teachers must practice what they teach.

More overt education in critical cultural studies should be woven into curricula where possible. This is less possible on the math and science halls than it is in liberal arts and the humanities. Critical cultural studies are most vital and can find the most traction in social studies, literature, and art classrooms, as these are relatively more concerned with people and the communication that takes place between them. Because the standards to which curricula are tied typically leave much to be desired in this area, lessons in critical cultural studies must take place in tandem with state approved lessons. The powers of the teacher to frame and present lessons offer opportunities to add a critical cultural studies component to lessons. Chela Sandoval (2000) writes, "The differential mode of social movement and consciousness depends on the practitioner's ability to read the current situation of power and self-consciously choosing and adopting the ideological stand best suited to push against its configurations, a survival skill well known to oppressed peoples" (p. 59). Teachers might adopt this differential mode in incorporating critical cultural studies elements into lessons. As contexts differ from one school to another, teachers can "get away" with more tweaking of the curricula at some schools than others.

Embodiment

The posthumanist focus on embodiment lies in stark contrast to transhumanism, which treats the body as an afterthought. Transhumanists imagine a day when they can upload their consciousnesses into machines and leave their bodies behind. For Descartes, the mind is non-physical, and so is

distinct from the body. As humanism provides ideological justification for placing the human in power over other life systems, Cartesian dualism justifies "mind over body". In both cases, it is the distinction, or the insistence on difference, that does the damage. The mind has been posited as being unique to humans, justifying our rule over nature. At the same time, our bodies are of nature and fall under this rule as well. Dualism thus leads to a view of the body as a tool to do the mind's bidding. By this ideology, one should resist their animal urges, as indulging them makes us *less human*.

In stark contrast to this dualism, posthumanism blurs the line between mind and body (and human and animal). There is no such thing as a disembodied mind, and to the extent that mind and body are entities distinguishable from one another, their relationship is unavoidably reflexive. The body and the mind shape one another. The mind tells the hands and arms how to steer the car, and the body tells the mind that it is time to eat. However, these examples makes it sound as if the mind gets all of the "thinking" tasks, and indeed this is how we often mistakenly believe the relationship to work. Instead, a cybernetic view of learning includes the body in the learning process. People tend to learn more effectively "by doing", than solely through classroom lecture. The effect of the body on the mind goes beyond the potential for kinesthetic learning, however. In "Our Own Metaphor" (1972), Catherine Bateson argues that the body functions as a central metaphor by which one comes to understand the world. How we move helps us understand the movements of others, our hunger allows us to understand others' hunger, and so on. We stand upright, and

therefore associate "being above" with being better, or more just. Hayles (1999)

argues that, "if we had bodies with significantly different physiological structures,

for example exoskeletons rather than endoskeletons or unilateral rather than

bilateral symmetries, the schema underlying pervasive metaphoric networks

would also be radically altered" (p. 206). Morton (2013) goes a step further,

claiming that the metaphor is actually a working analogy, "We all contain water in

about the same ratio as Earth does, and salt water in the same ratio that the

oceans do. We are poems about the hyperobject Earth" (Chapter 2, para. 29).

Also, there is an undeniable (direct) correlation between mental health and bodily

health. Neglecting the body tends to lead to a decline in mental faculties. Stress

is a good example of influence going the other way, from mind to body, as mental

stress can lead to higher blood pressure, skin rashes and other bodily ailments.

My body provides a path from my mind to the external world, but it is also

more than this. Bergson (1907) writes that, "…if the fringe exists, however

delicate and indistinct, it should have more importance for philosophy than the

bright nucleus it surrounds. For it is its presence that enables us to affirm that the

nucleus is a nucleus, that pure intellect is a contraction, by condensation, of a

more extensive power" (p. 27). For Bergson, fringe is body and nucleus mind.

The body must exist to affirm that the mind is a mind, and the intellect rests on

the material foundation of the body. Bergson writes that the intellect is lacking in

its ability to understand life, arguing instead that intuition must serve this function.

By definition, intuition *comes from* the body, while intellect is an attempt to

distance the mind from the body. Bergson therefore envisions an embrace of the

body, resolving to, "…see the life of the body just where it really is, on the road that leads to the life of the spirit" (p. 157). He therefore seeks to articulate, "…a philosophy that attempts to reabsorb intellect in intuition…" (p. 158). This is not, it should be noted, an attempt to annihilate intellect so much as it is one to reinstate an intuition that itself has been maligned by intellect. Such a reinstatement has never been so important or necessary as it is today, as intuition and body both face new threats of the technological variety.

　　Many of today's technologies tend to neglect the body. We live in the age of the screen, and our lives increasingly take place through these screens. The body is generally immobile during this screen use, and much less aware of the surrounding non-screen environment. Baudrillard (1988) notes a, "…displacement of bodily movements and efforts into electric or electronic commands" (p. 128). Automation is leading to structural unemployment in more and more fields, as robots increasingly replace bodies whose use value in our present society is steadily falling. As our bodies become less central to communication, labor, and leisure, neglect of our bodies becomes a growing problem. This neglect has led directly to a rise in obesity and obesity-related illnesses (heart disease is currently the number one cause of death in the United States). Also, in neglecting our bodies we give up

one of our most powerful learning tools. Our bodies more than our minds facilitate an understanding of the natural world. There is a fable about a person who lives in a place where the only visible colors are black and white. In this place, people know about color but they cannot see it. This is akin to the human

inability to see infrared; we know *about* infrared, but we do not see the world that way. In the black and white world of the fable, there lives a person who is the foremost expert on color. She has read volumes on the science of color and how humans perceive it. One day, she is taken out of this black and white world for the first time, and into a place with color. Though she held much knowledge of color before, her exposure to it now gives her an understanding of which she had to this point been deprived. To become subsumed in a screen-mediated environment is akin to living in this black and white world. A screen-mediated life, though it offers a mind-boggling amount of access to information, fails to provide the bodily contact that is often required for meaningful understanding. Put differently, to live through the screen is to cut off other paths of experiencing and understanding the world.

Schools both neglect and control bodies in the extreme. Grumet (1988) notes that, "…schooling…has functioned to repudiate the body, the place where it lives, and the people who care for it" (p. 129). Students often must remain seated for most of the school day, avoid "horseplay", and generally refrain from acting on bodily urges. The school fixes bodies in space and time, by use of the clock, seating chart, designated classroom and bell. Student clothing is often regulated, as are hair color and style, and visible piercings and tattoos. Teachers may object to postures deemed aggressive, lazy, or otherwise disrespectful. Permission often must be granted before students can go to the restroom or to get water, and teachers often have rules concerning food consumption. Dewey (1916) notes, "Before the child goes to school, he learns with his hand, eye, and

ear, because they are organs of the process of doing something from which meaning results. …His senses are avenues of knowledge not because external facts are somehow 'conveyed' to the brain, but because they are used in doing something with a purpose" (p.114). Classroom education tends to lean heavily on the written word and the lecture, such that student movement is generally kept to a minimum, and sensory perception limited to a small range within the audio-visual (tactile learning being almost entirely absent). These bodily and sensory restrictions often inhibit the very learning they are purported to facilitate. As such, a curricular imperative of embodiment is in large part about mitigating schools' oppressive policies and technologies, much as with critical cultural studies.

Bringing the body into the fold as a component of the learning process should occur via several simultaneous approaches. More freedom of movement, though perhaps a hindrance to textbook/lecture centered lessons, can facilitate "learning by doing". It is not so much that learning cannot occur through textbook and lecture, but that exclusively didactic instruction cuts one off from other potent ways of learning. As such, this is not a condemnation of lectures or textbooks, but an argument for adding other pedagogical forms. In addition to facilitating new paths towards curriculum centered learning, increased bodily freedom helps one learn about their body. The more we move, the better learn how to move. Clothing the body is another important aspect of bodily freedom. As with movement, the more freedom we have to choose our clothes, the better we get at putting together outfits.

Allowing students more bodily freedom in school in the form of more frequent breaks, recess periods, the option of standing during class, etc. could be beneficial to the health and learning ability of the child, but true embodied learning would involve engaging the body in relation with other bodies or the outside world towards a pedagogical end. We see this most often in art and music classes, "shop" classes such as welding, woodworking and automotive, and agriculture, among others. It is also often found in "hands on" projects that require building, gathering, sorting, and/or assembling, etc. It is true that some classes lend themselves more easily to such embodied learning than others. It is possible that since the intellect frequently repudiates the body, those fields that take pride in relying almost entirely on intellect are by their natures less likely to lend themselves to such learning. Calculus, creative writing, chemistry, and economics are just a few examples of courses that could fall into this category. There are two paths forward here in the quest for embodied learning. First, the classes that lend themselves most readily to such learning might be given more prominence. Currently such classes are rarely required and are frequently underfunded, in stark contrast to the esteemed "academic" classes. Students might be required to take certain art and vocational classes, just as they are required to take certain academic ones. Secondly, the teachers of academic classes might look for pockets of opportunity for embodied learning. Just as the mind never escapes the body, academic classes never fully escape the environment from which they were born. Reading one's poem or story aloud to an audience has an important bodily element, and certain economics lessons

might lend themselves to production simulations. Teachers of academic courses might be vigilant for such opportunities, and make the most of them when they are presented.

In addition to removing oppressive bodily restrictions in schools, a curricular focus on embodiment should also provide opportunities to learn healthy habits of body maintenance. As in other areas already mentioned, schools both need to stop obstructing and to start helping. Technological advances have made appealing but unhealthy food abundant and cheap in America. Confessore (2014) notes, "Instead of exposing children to a variety of foods, school lunches [have] tended to indulge their cravings". We are not evolutionarily equipped to resist fatty and sugary foods, and so there is a clear educational imperative here. As with so many other areas in which technology facilitates shortcuts to our desires, we must learn restraint. This should start in the cafeteria, of course. My school has a permanent pizza line, a permanent burger line, and a third line with daily changing selections. The public high school I attended had a *permanent* chili cheese fry line. With the pizza line, daily tater tots, etc., the cafeteria actively facilitates the development of poor dietary habits that impose real costs on society. Having served as a lunch line monitor, I have noticed that the same people tend to show up in the pizza line every day. Removing these unhealthy options, or at least de-institutionalizing them, would be a step in the right direction.

It is not enough to give students the option of healthy meals when unhealthy meals are always available, especially if no effort is made to engender

healthy dietary habits. Tellingly, developing healthy habits of eating does not stand to benefit the economy. Gross domestic product often rises more when we eat processed and/or prepared food (and later see the doctor for diet related health issues) than when we buy ingredients and prepare our own food. Lobbyists in the food industry seek to block legislation and policies that would hurt their bottom lines. Thus, at the same time that some strains of humanist thought (privileging the mind over the body) make dietary education seem less important than other subjects, powerful interests seek to block such education for economic reasons. Big Food has already infiltrated the school through a variety of marketing avenues including Channel One, soft drink "pouring rights", advertisements on book covers, club and activity sponsorship, among many others. Makers of processed foods for school cafeterias have fought and continue to fight legislation that hurts their bottom line. Also, as Marion Nestle (2002) notes, "Congressional reluctance to favor children's health above the rights of soft drink producers is a direct result of election laws that require legislators to obtain corporate funding for their campaigns" (p. 146). Politicians tend to side with Big Food over the interests of American children because the former are significant campaign contributors.

In addition to combatting the marketing and provision of unhealthy foods in schools, there is a strong case to be made for dietary education for all students. Classes that offer guidance in making healthy choices in the grocery store, preparing healthy food, and understanding the consequences of a poor diet would be of practical benefit to students' bodies. Successfully bringing dietary

nutrition into a place of prominence in the curriculum is a way to increase quality of life. Diet only seems trivial to us because we have bought into a Cartesian dualism, believing the mind to be the master of the body. Matters of diet for this reason seem less important than institutionalized subjects like literature or algebra. As with freedom of movement, a healthy diet facilitates learning in general. When the body is properly attended to, the mind is "freed up" to focus on other matters more fully.

In addition to dietary considerations, a focus on embodiment in curricula must include the development of healthy habits of exercise. Reducing limits to bodily movement, as already mentioned, are a first step in the right direction, though this is more an issue of mitigating harm done by the school. Schools tend to offer more guidance and opportunities in terms of exercise than they do in dietary matters. Some minimum number of physical education credits is typically required for graduation, and a variety of after school sports are open to students. Still, the focus seems to be less about developing lifelong habits of exercise than about having fun or winning games. Also, physical education classes that switch activities daily are not conducive to habit formation. The focus might be shifted to physical activity that can be engaged in without undue risk of injury, such that the activity is suitable even for the elderly. Such activities might include running, swimming, hiking and yoga. Developing habits of exercise in one or more of these areas (and others like them), can result in sustained exercise throughout one's life. Winning the football game is too often the ultimate focus, and this

leads students to dismiss the ultimately more important imperative of lifelong bodily health.

Aside from diet, exercise, and opportunities for learning by doing, there are still other ways in which a focus on embodiment can find fruition and offer benefits. Wrestling, dance, judo, yoga and others help develop bodily understanding. They show what the body is capable of and how it can move in relation to other bodies, and make us more comfortable with bodily contact. Bodily contact is especially important today, as our technologically mediated, mind-over-body world tends to shun such contact to a highly unnatural extent. In foraging groups we likely took time each day to groom one another, and our social natures continue to yearn for contact. We are evolutionarily predisposed to regular and varied bodily contact, and so such practices could be another way of attending to our bodies' needs. Kearney (2014) writes, "We need to find our way in a tactile world again. We need to return from head to foot, from brain to fingertip, from iCloud to earth. To close the distance, so that eros is more about proximity than proxy". Also, attending to our bodies might include a focus on what Buddhists call "mindfulness", or consciously directing one's attention to what is happening in one's mind in the present. Though this could be construed as being neglectful of the body, mindfulness involves listening to the body, and acknowledging bodily sensations. Buddhists work towards mindfulness through meditation, and yoga encourages mindfulness as well. Another path to mindfulness is simply quiet self-reflection. In our present technological environment, we are generally in a state of sensory overload. Schools could

provide screen-free, quiet time for students to practice mindfulness, and thereby listen more attentively to their bodies.

<p style="text-align:center">Ecoliteracy</p>

Just as our technologies contribute to the illusion of mind/body dualism, they also fool us into believing that we are distinct from nature. Just as the mind/body dualism led to the false hierarchy of "mind over body", so the human/nature dualism leads us to believe that we are the rightful masters of nature. As Lovelock (1979) notes, "In our belief that all that matters is the good of humankind we foolishly forget how much we depend upon all the other living things on Earth" (Preface, para. 5). Posthumanism is in part a rejection of the anthropocentric worldview, and posthumanist thinkers often address the harmful legacy wrought by this anthropocentrism. Chapter one argues that technology facilitates a one-way conversation with nature, in which humans talk but do not listen. This one-way conversation is also linked to our anthropocentrism, because meaningful dialogue is difficult when a significant power imbalance (or perceived power imbalance) exists between conversants. As long as the slave (nature) is giving us what we ask for, there is no stimulus to engage with or reflect upon the slave. However, this perceived power imbalance between humans and nature is starting to fray, along with ideas that distinguish between humans and nature.

No curriculum today that makes a claim to provide a comprehensive education for the young is adequate without a focus on ecoliteracy. David Orr (1992) coined this term to describe knowledge of how life systems function and

interact with one another and their environments. Crucially, ecoliteracy informs human action, as it explores how our actions affect other natural systems. As such, ecoliteracy offers a path to a sustainable existence with and part of all other life on the planet. Such literacy is a curricular imperative because human actions presently threaten planetary life to the extent that we have entered a global mass extinction period, the first such event to be caused by human activity. Anthropocentric climate change, soil degradation, water and air pollution, ocean acidification, resource extraction, urban sprawl, and others have contributed to a "free fall" in biodiversity.

Sylvia Wynter (2015) places much of the onus for global environmental issues on the Western world, not just for their own direct harm to the environment, but for persuading much of the rest of the world to follow along. She writes that the West told the victims of imperial subordination "…that the problem with [them] wasn't that [they'd] been imperially subordinated, wasn't that [they'd] been both socioculturally dominated and economically exploited, but that [they] were underdeveloped. The West said: 'Oh, well, no longer be a *native* but come and be a *Man* like us! Become homo oeconomicus!'" (p. 20). Wynter here ties the persuasion of formerly colonized peoples to industrialize to the global warming crisis today. This idea, that the West deserves the lion's share of culpability for anthropocentric climate change, would seem to make ecoliteracy an all the more vital component of a curriculum oriented towards Western youth. It falls upon the West to seek to undo and/or mitigate the damage wrought.

As our actions throw more and more life systems into disequilibria, we increasingly find our own livelihoods threatened. Contrary to our anthropocentric beliefs, humans are not masters of life but are rather biotic components of it. Technology, combined with an anthropocentric worldview, blind us to our responsibility to function as beneficial components of the systems of which we are parts. Ecoliteracy can foster ecologically sensitive praxis by overturning these anthropocentric worldviews. By understanding the interconnections and interdependencies of life systems, people come to know their place in the larger scheme. The illusion of the perfectly autonomous individual entity is replaced with a sense of shared identity. Much as we abstain from unhealthy foods due to their impact on our bodies, ecologically sensitive praxis involves abstaining from actions that negatively impact the larger bodies in which we are embedded.

The curricular imperative of ecoliteracy is directed towards inspiring ecologically aware praxis. Leadership is desperately needed in the fights against biodiversity loss, climate change, and others, which are rarely deemed newsworthy. They don't grab our attention, or push our buttons in ways that compel us to know about them. To the contrary, many people seek to *avoid* knowing about these issues, preferring the "head in the sand" approach. As such, there is a need for people to spread this unpleasant and unwanted message. Berners-Lee and Clark (2013) write, "Given where we are now, it's crucial that more people hear the simple facts loud and clear: that climate change presents huge risks; that our efforts to solve it so far haven't worked; and that there's a moral imperative to constrain unabated fossil fuel use on behalf of current and

especially future generations" (Chapter 14, para. 9). In addition, lifestyle choices can help the fight in small ways and large. One should focus on living more simply, which is to say avoiding consumerist tendencies and refraining from actions that (directly or indirectly) cause undue harm to other life systems. Berners-Lee and Clark, again, write, "There are no hard and fast rules except that doing something is better than doing nothing – and that if it feels invigorating it's probably both more sustainable and more catchy. Many of us feel that we're too insignificant to make a difference, but the social and political ripple effects of our efforts may be more powerful than we'd expect" (Chapter 19, para. 2). Individual action can serve as inspiration to others to follow suit, and so individual action can contribute to a movement. However, resisting consumerism is made difficult by that not insignificant portion of our education that comes from corporate marketing.

We must use our technologies with restraint, and recognize that technology will not "save us". As Toyama (2015) notes, technology, "…amplifies people's capacities in the direction of their intentions" (p. 29). People often mistakenly view technology as developing in a neutral and autonomous manner. We often forget that technological advances are human directed, and developed as means to some predetermined end. Societal intention presently is overwhelmingly directed towards maintaining Capitalism's status quo, and as this intention involves taking from nature, technology's amplification is resulting in great harm to the natural world. Without sufficient societal intention to live in

harmony with other life systems, our technologies will remain a central part of the problem, rather than a solution.

It is difficult to make people understand anthropocentric climate change, and still more difficult to inspire action to address it. Global warming is often "too big" for people to wrap their heads around. A consequence of global warming is an increase in temperature aberrations in general, such that many areas experience unseasonably low temperatures at certain times. This can obscure the bigger picture of a long-term global temperature increase. Many of our actions contribute to global warming, and so we may be reluctant to acknowledge truths that implicate ourselves as parts of the problem. Cows emit methane, and so beef consumption adds a potent greenhouse gas into the atmosphere. Driving cars releases carbon dioxide, the main climate change gas. The electricity we use may come from coal burning power plants. Examples such as these are many and overwhelming. There is a tendency here towards what Harman (2011) refers to as overmining, in which we view events as being too large to be influenced by individual action. This suggests that even when people acknowledge the dangers of global warming, they may not adjust their actions to live in a more sustainable way. Climate change threatens our ways of life at foundational levels, especially in regards to the Capitalist system. Smith's invisible hand, thought to be guiding us to ever-greater heights, seems now to be directing us (and other life on the planet) towards our doom.

There are a number of ways to mitigate the educational difficulties of ecoliteracy. Of utmost importance is that, faced by such obstacles, the teacher

not fall prey to overmining. It is vital to speak up, to speak clearly, to speak without exaggeration but to address matters fully and directly. Also, one should not close off paths without opening others. We cannot limit ourselves to telling people what they should cease doing, but must show people alternatives. We need to make the case for these alternatives as being better both for the world, and crucially, the individual. Self-actualization can be achieved outside of the market system, and people need to understand how this is so. Living a life of simplicity is more fulfilling than one of acquisition, and this is most effectively taught by practicing what we teach. Finally, even within the confines of today's schools, it is possible for teachers to weave ecoliteracy education into all curricula. Orr (1992) advocates for the reshaping of, "…institutions to function as transdisciplinary laboratories that include components such as agriculture, solar technologies, forestry, land management, wildlife, waste cycling, architectural design, and economics" (p. 90). Short of this, many existing curricula can contribute to ecoliteracy. Natural sciences and geography provide clear opportunities, but the arts (including literature) can also lend themselves to the task quite well. Art is inspired by our environments, after all. Math, which sometimes seems so disconnected from the tangible world, can be used to explain environmental issues with precision, and offer a forecast of what's to come. History is another valuable contributor to ecoliteracy, as environmental management (or mismanagement) has repeatedly proven to be pivotal in the rise and fall of cultures. There is evidence that deforestation and erosion for example contributed to the fall of the Mayan empire (Diamond, 159).

Biophilia can drive ecoliteracy, much as a child's love of bedtime stories can motivate them to learn to read for themselves. Biophilia is a love for, and acknowledgement of a shared bond with, other life systems. This can be engendered through *contact*, and so education for ecoliteracy should include opportunities for learners to be in contact with (and if possible, immersed in) other life systems. One can also nurture a love for nature by sharing one's own love for it, or that of others. Literature and art can be helpful in this regard. I am reminded of the poetry of Whitman: "The press of my foot to the earth springs a hundred affections, They scorn the best I can do to relate them" (p. 27). One might also look to Thoreau's prose, to the landscape paintings of Francis Edwin Church, the photography of Ansel Adams, and countless others. We are so cut off from the natural world that we often fail to hear what nature says. Developing a craving for that proximity, and following up on those cravings, makes us more receptive to messages from other life systems. The technologically facilitated monologue with nature can be transformed into a dialogue in this way. What's more, developing ecoliteracy turns a person into a translator, allowing other life to speak through them and to other people.

The tendency towards overmining might best be addressed through instructional scaffolding. Learners often benefit from a scaffold or framework on which to hang new knowledge. They must have some way to relate the new knowledge to knowledge that has already been internalized. This is one reason why the order in which a curriculum is presented is important; there is a logical procession, a continuous building onto what came before. With new topics,

teachers are wise to start by relating the topic to something the student has already learned somewhere else. In the same way, one will be more likely to gain ecoliteracy in the global sense if they first develop it at the local level. By gradually scaffolding up from local to global, the learner is less likely to feel disconnected and powerless to global environmental considerations. Put more generally, ecoliteracy can be developed by starting with an investigation of local environmental issues. Learning about local issues can be combined with joining and/or starting local conservation efforts.

Conclusion

Though seemingly disparate, the four curricular imperatives I have outlined (critical media literacy, critical cultural studies, ecopedagogy, and bodily health) all reflect an acknowledgement that our bodies are not autonomous, disconnected, or individual in any definitive sense. As such, these imperatives all can be said to spring from a posthumanism that blurs the boundaries of the human body. Because our bodies are conflated with our media, critical media literacy has become vital. As we recognize our interconnections and interdependencies with all people, we recognize the need to understand the perspective of the Other. Our bodies can become neglected as their functions are replaced by machines, raising the imperative of a renewed focus on embodiment. Finally, the need for ecoliteracy arises from the recognition that we are each biotic components of greater bodies, of which we are each in part responsible. Braidotti (2013) notes that, "For posthuman theory, the subject is a

transversal entity, fully immersed in and immanent to a network of non-human (animal, vegetable, viral) relations" (p. 193). This transversality, this cutting across boundaries of skin, mind, silicon, etc., is what a posthuman curriculum must address. Our bodies can no longer be conceived as ending with our skin, and this makes them much more difficult to conceive. The task of making sense of the posthuman body, however, has never been more important.

Each of the four posthumanist educational imperatives proposed take into account certain vital *connections* that can often go ignored. Our media are among our primary connections to the outside world, and the nature of this media is often left uninvestigated by users. Cultural studies offers an opportunity to examine connections between cultures, including connections that function as systems of exploitation and/or oppression, but also connections that challenge Western notions of the "human". Ecopedagogy and a focus on healthy bodies account for and explore the connections between body and earth, and mind and body. Such a focus on connections is a posthumanist move, as it works to problematize notions of the autonomous human. Note that three broad posthumanist educational goals outlined in the previous chapter were awareness, restraint, and lifelong learning. The focus on *connections* in the educational imperatives of this chapter follow directly from these goals. Knowledge of the connections between mind and body, body and body, bodies and earth, etc. directly facilitate both awareness and restraint. By being more in tune with our inescapable connectedness to the world, we begin to see the health of our bodies, our neighbors, and the life systems that encompass us as

being connected to our own health. The educational imperatives outlined also

promote lifelong learning, as our bodies, cultural relations, environments, and

media are constantly changing. Indeed, the rapidity of some of these changes

raises an urgent need for continued learning (electronic media and environmental

degradation come immediately to mind as two such areas of rapid change). In

the following, concluding chapter, pedagogy will be proposed to facilitate the

educational goals of chapter three, and the curricular imperatives outlined in this

chapter. The posthumanist preoccupation with connections and especially

problematizing the notion of the distinct autonomous human will be reflected in

pedagogy that views education as a distinctly and unavoidably *distributed* affair,

rather than something that occurs in an individual human mind.

CHAPTER 5

BARYCENTRIC PEDAGOGY

This chapter will outline a pedagogy that is mindful of posthumanist theory. After a brief review of posthumanism, considerations of present trends in technology use and environmental issues will follow. These considerations, it is hoped, will prove adequate justification of the need for changes in predominant pedagogies. Following this, I will introduce and elaborate on what I call *barycentric pedagogy*. In physics, the barycenter is the center of mass of two or more bodies orbiting each other. In this case, the "bodies" are (post)human bodies that are both *simultaneously teachers and learners*, and the curriculum is the barycenter, or point around which teacher/learners orbit. This pedagogy is thus neither teacher nor student-centered, and involves learning that is both distributed and reflexive. I will argue that learning does not occur in the individual alone, but is distributed between the (post)humans (including their bodies), technologies used by them, and the life systems to which the they are connected. Next I will explore the ideal setting for this pedagogy, which has gone by a number of names, including "affinity space" (Gee, 2013), "knowledge space" (Levy, 1997), and "community of interest" (Collins and Halverson, 2009). The barycentric pedagogy suggests a vastly different role for professional teachers than what is commonly practiced. This new role will be investigated, and will include a picture of the teacher as *mentor*, and a shift from didactic instruction to common productive inquiry. This chapter will conclude with an exploration of dangers and difficulties of this posthumanism-informed pedagogy.

Review

Humanism has been problematized on several fronts, including its Eurocentricism and notions of human mastery over nature. Notably, these two fronts are related, as people not of European descent have been viewed as more "savage" and less "human". In this manner humanism has helped justify enslavement and oppression. Certain humanist tenets are presently being challenged by two related and escalating trends: environmental damage and technological advance. It is generally accepted that we have entered a period of human-caused mass extinction of life (only the sixth in earth's history, and the first to be caused by human action), facilitated by technology. At the same time technology use threatens life on the planet, it is having profound effects on how we act, look, perceive, and communicate. Mark Hansen (2015) writes, "Encompassing everything from social media and data-mining to passive sensing and environmental microsensors, twenty-first-century media designate media following their shift from a past-directed recording platform to a data-driven anticipation of the future" (Introduction, section 2, para. 1). Fundamentally different from the media that came before, twenty-first-century media are always with us, ready with data to inform present and future actions. In this way they are more akin to bodily *sense organs* than previous media, such that their rise bolsters arguments that we are now posthuman.

Humanism's emphasis on the individual subject has also been critiqued in posthumanism and elsewhere. The "free individual" has been responsible for

much pain and death among both humans and other life forms. Posthumanism blurs the boundaries between the individual and the group, humans and the life systems to which they are connected, humans and other animals, biology and technology, and others. Posthumanism holds that we are all what Pettman (2011) has called "humanimalchine", a mixture of human, animal, and machine (Introduction, para. 12). Through much of human history technology has served to isolate humans from one another and thereby foster individuality, but today's media forge new connections between us. Social media make thinking and expression much more communal affairs and in some ways signal a return to the communal expression of tribal foraging groups who, like today's media users, were always connected to each other. Today's technologies also threaten notions of individuality by reversing the historical order and making *us* appendages to *them*. The algorithms and probabilities that increasingly govern our lives threaten our notions of the distinct agential subject by breaking each of us up into so many regression variables. Where industrialization made us feel like cogs in a machine, today's technologies reduce us to disembodied digitized data.

<div align="center">Present trends</div>

We are entering a period of great uncertainty due to exponential growth in species extinctions, population growth, and computer processing speed. All three of these variables, after a long period of modest growth, are now entering a near vertical phase. This is akin to how compound interest in a retirement account

ideally works. While initial growth is modest, after a number of years interest paid begins to earn more interest itself, and explosive growth can eventually result. Alternately, exponential growth is described in the fable about the traveler who made a wager with a king over a chess game. If the traveler won, the king agreed to pay him an amount of rice that started with one grain, and doubled for every square on the chessboard. When the man eventually won the game, the rice owed was tallied up in the following manner: one grain for the first square, two for the second, four for the third, and so on. The total for the eighth square was 128 grains. While the growth in rice was modest at first, by the final chess square the total rice owed was over 18 quintillion grains. Human population, species extinctions, and computer processing power have all been growing at an exponential rate. Importantly, all three have entered a phase of explosive growth, much as the rice owed begins to grow more quickly after square 58. As these lines become more vertical it becomes more difficult to predict what the future brings. This verticality is akin to being in a state of free-fall. Other life forms, including many humans, have already hit the ground and met their doom. As the rest of us fall, some panic, others are in denial, and still others are trying to put parachutes together.

Moore's Law predicts that computer processing power will double every two years, and has been roughly accurate since it was hypothesized in 1965. While computer capabilities grew modestly in the sixties and seventies, by 1996 IBM's Deep Blue defeated world champion Gary Kasparov at chess. In 2011, IBM's Watson bested Jeopardy champions Ken Jennings and Brad Rutter. These

milestones could be the square 58 of automation. Once relegated to routine tasks, computers, robots and software are increasingly able to perform sophisticated non-routine tasks. Martin Ford (2015) notes that demand for lawyers and pharmacists has fallen as discovery software takes the place of junior attorneys, and robots take over most pharmacy tasks (Introduction, para. 24). In healthcare, software is increasingly able to perform the task of radiologists, among others, and Watson (of Jeopardy fame) is proving to be an adept diagnostician. Even the teaching profession is seeing encroachment, as essay grading algorithms get better each day, and massively open online courses (MOOC's) allow for a virtually unlimited number of students to be taught by one teacher.

In the past, technological advances have offset job destruction through the creation of new jobs. When the blacksmiths were laid off, they could find new employment in the automotive industry. Many economists expect this trend to continue, but for no other reason than that it has become a trend. The fall in the labor force participation rate since 2007 (to its present lowest point in over 30 years) suggests that the trend may have already ended, and that the loss of jobs to technological disruption may no longer be offset by gains in new industries. The list of what computers and robots are unable to do is steadily and inexorably getting shorter. As machines do a larger share of the work needed, our present economic system will shunt larger portions of income to capital, at the expense of labor. In other words, the owners of the machines will benefit at the cost of the former laborers whose jobs have become obsolete. It is possible that this too has

already begun, as labor's share of income has been falling since the 80's, while that of capital has been steadily rising. In addition, income inequality has been steadily rising for over thirty years. We face the impending extinction of the middle class in America as a result of these developments, to be replaced by a technocratic plutocracy. Ford (2015) writes that, "robots, machine learning algorithms, and other forms of automation are gradually going to consume much of the base of the job skills pyramid. And because artificial intelligence applications are poised to increasingly encroach on more skilled occupations, even the safe area at the top of the pyramid is likely to contract over time" (p. 252). Disturbingly, this suggests that even if the quality of education improves, good paying jobs are becoming increasingly scarce. As a result, we are already seeing credential inflation, such that people with college degrees are taking jobs for which a degree is not required at all. These developments are most dire for marginalized groups who are already often at an educational disadvantage, due to discrimination, lower socioeconomic levels, troubled inner city schools, etc. Jobs worked today by African Americans with high school diplomas could be worked tomorrow by college-educated whites. Though the squeeze will be felt by nearly everyone, as usual those at the bottom will feel it most keenly. Aside from the vast social and economic upheavals such developments might entail, the question of how we will spend our time becomes more important. As Voltaire (trans. 2005) wrote, "Work keeps at bay three great evils: boredom, vice, and need" (Chapter 30). In a world in which most people are without work or substantial income, what will we do?

Another rising trend, species extinctions, is tied to climate change, habitat destruction, nutrient depletion of the soil, pollution, and other human causes, such that geologists refer to the present mass extinction as the Anthropocene. In her book, "The Sixth Extinction", Elizabeth Kolbert (2014) notes, "It is estimated that one-third of all reef-building corals, a third of all freshwater mollusks, a third of sharks and rays, a quarter of all mammals, a fifth of all reptiles, and a sixth of all birds are headed toward oblivion" (p. 17). While the exponential growth in the human population is a primary driver of the decline in biodiversity, it is also a function of technological advance. It is not just the growth in the human population, but also the advances in technologies that enable us to take ever more from the earth and saddle nature (including ourselves and especially our children) with more of the dangerous byproducts of our consumption. Today's young people are entering a world in which biodiversity is in free fall, the planet is steadily becoming less hospitable to life, and the population threatens to exceed the earth's carrying capacity (some estimates suggest that we have already exceeded it). As with the advances in automation, these environmental trends are not reversible in the short run, and seem likely to lead to significant societal challenges in the future.

Barycentric Pedagogy

The barycenter is the center of mass of bodies orbiting one another. The moon does not technically orbit the earth. Rather, earth and moon orbit a barycenter that is several thousand kilometers from the earth's center. Notably,

centrifugal forces of the earth's movement around the barycenter are part of what causes our tides. The planets pull the sun this way and that as they orbit the barycenter of the solar system. When a body orbits a much more massive body, the barycenter is located near the center of the more massive body. The earth, for example, exerts very little pull on the sun. Conversely, the barycenter of Pluto and its largest moon Charon (which is about half the size of Pluto) lies well outside of Pluto such that both planetoid and moon orbit a point in between the two.

A barycentric pedagogy views (post)human bodies as being analogous to heavenly bodies. Some mixture of knowledge, skills, and abilities in each person is comparable to *mass* in this analogy, such that those with more of that mixture exert more "gravitational pull". As with planets, stars, and moons, proximity also influences the pull between people. Importantly, there is no strict distinction between student and teacher. Rather, *we are each both student and teacher to varying degrees* and depending on the context.

Consider Ranciere's (1991) explanation of the principle of explication: "It is [superior] intelligence that allows the master to transmit his knowledge by adapting it to the intellectual capacities of the student and allows him to verify that the student has satisfactorily understood what he learned" (p. 7). Explication has long been thought to be an essential component of education. Such pedagogy is oriented in one direction only, directed from the teacher/sun to the students/planets. This sort of pedagogy is unrealizable in reality, much as the assumption that the planets orbit a fixed star betrays a faulty understanding of

basic physics. As with gravity, education never flows exclusively one way. Even in the case of our solar system, Jupiter exerts sufficient gravitational force on the sun that their shared barycenter lies outside of the sun's radius. Even if my knowledge in some area is unmatched, I cannot teach someone else anything of significance without them teaching me in turn. Even Pluto exerts some pull on the sun. Foucault (1977) argues that power is everywhere, that it, "is not exercised simply as an obligation or a prohibition on those who 'do not have it'; it invests them, is transmitted by them and through them; it exerts pressure upon them, just as they themselves, in their struggle against it, resist the grip it has on them" (Chapter 1, para. 25). As such, it is never solely possessed by any one individual or structure. As with Foucalt's conception of power, the barycentric pedagogy is distributed among individuals, structures, objects and others. It is to some extent self-organizing and maintaining, and is therefore not simply created and used by a single teacher. Walter Isaacson, in his book "The Innovators: How a Group of Hackers, Geniuses, and Geeks Created the Digital Revolution" (2014), identified a number of partnerships that proved fecund ground for innovation, including Ada Lovelace & Charles Babbage. While Babbage conceived the Analytical Engine, a precursor to the computer, Lovelace was able to see and to explain to others what Babbage's machine could do, and she glimpsed in it much of what modern computers eventually became. This dynamic can be seen more recently in the collaboration of Steve Wozniak and Steve Jobs, in which the former generated new ideas and the latter envisioned possibilities for their end use. People capable of working in groups in which individuals complement one another like

this can foster innovation. Isaacson also notes the fruitfulness of, "pairing visionaries, who can generate ideas, with operating managers, who can execute them" (Chapter 12, section 3, para. 9). All of this illustrates a need for an emphasis on collaboration in education. In terms of resisting technocracy, for one example, fruitful collaborations between practical, engineer-minded students and artistic, theory-minded ones should be nurtured.

Recognizing the importance of contributions of those who are different from us is of benefit aside from fostering innovation, as it illustrates the limits of individualism. As a society, we are presently hobbled by such individualist sentiments. The prevailing neoliberal ideology emphasizes individual accomplishment while demonizing collective endeavors such as unions and governments. To see the benefits of working collaboratively is to recognize individual limits, to see the wisdom in the contributions of those who are different, and to foster a more collective mindset. Our present technologies allow us, more than ever before, to control whom we interact with. As such, we typically associate with others in whom we recognize ourselves. In high school, artists group themselves with artists, nerds with nerds, jocks with jocks, etc. Schools often exacerbate such self-sorting by further grouping like-minded students in pathways, tracks, diploma types, etc., as well as by age. Students thus tracked might complete high school without sharing a single class with an alternately tracked student of the same grade. Posthumans live in echo chambers, and life in these chambers makes us prone to behaviors that bring harm to ourselves and other life systems. New information gets filtered as it enters one's bubble so as to

be more palatable. Consider partisan news outlets for an obvious example of this, as different networks present the same events in different lights, which frequently leads to the drawing of different conclusions. By closing ourselves off from different perspectives, we foster ignorance and fear. Teachers can work to resist such groupings to the extent they are able, by selective grouping in the classroom, requesting mixed-group classes, fostering collaboration between classes, and others. However, the pervasiveness of the systemic groupings, combined with the urge many of us feel to associate with like-minded people, can make such teacher efforts an uphill battle.

The barycentric pedagogy need not be limited to the binary system of two (post)humans. Any interconnected group of (post)humans will do, from small groups all the way up to societies and beyond. Individual Wikipedia pages are good examples of large groups of teacher/learners. As teachers, page editors each inform the methods of instruction, debating not only what content goes on the page, but *how that content is presented*. On the page for former Australia Prime Minister Julia Gillard, for example, an [edit war](#) sprang up over the topic of religion. While Gillard has expressed that she does not believe in God, the fight arose over whether to label her religion as "atheist", "none", or to remove the religion bullet from Gillard's information box altogether. This fight was thus essentially pedagogical in nature, because while the content was not in dispute, its framing was. There is an easily perceptible truth in the notion that we are each both teacher and learner. The old adage that the student must take ownership of their learning is noteworthy here, and can be interpreted as a requirement for

learners to in some measure be teachers also. This is reflected in the Confucius' Analects: "When I have presented one corner of a subject to any one, and he cannot from it learn the other three, I do not repeat my lesson" (Book 7, Chapter 8). Confucius here explicitly requires the students to partially teach themselves.

There is a reflexivity in influence between the conscious and the unconscious mind. Consciousness is akin to a control center receiving briefings composed by the unconscious, and based on sense data. Conscious decisions are based on these "briefings". Conscious attention, for example to a task involving learning, can subsequently alter the subconscious. Consciously seeking out political views that align with one's own can affect the briefings sent by the unconscious mind. We can unconsciously come to see the world through a "lens" that reinforces our political views in this manner. Comparable reflexivity in influence is apparent between the brain and the body. Each exerts some measure of influence over the other, such that a healthy body makes for a healthier brain, and vice versa. Of course, there is no strict distinction between conscious/unconscious or mind/body, and so it is no great leap to assert that learning, when it occurs, is distributed between mind (both conscious and unconscious) and body. Learning involves changes in synaptic connections in the brain, and thus has a physical component. These changes in the brain can affect future action of the body, which can in turn further influence the brain. Taking a cybernetic view, a feedback loop of information between a system's parts is a prerequisite for system learning.

Using this same cybernetic framework, learning can also be said to occur *between* (post)humans and their environments. Bateson (1972) writes, "The total self-corrective unit which processes information, or, as I say, 'thinks' and 'acts' and 'decides,' is a *system* whose boundaries do not at all coincide with the boundaries of either the body or of what is popularly called the 'self' or 'consciousness'…The network is not bound by the skin but includes all external pathways along which information can travel…" (p. 319). A person learning to serve a tennis ball is part of a system that includes her body, racket, ball, court, wind, and perhaps a peer or coach. Learning and pedagogy are both distributed throughout this system. All parts of the system make contributions both to learning and the method by which learning takes place.

That learning takes place through a distributed system including humans and non-humans is particularly clear in the game "Tetris". This video game consists of manipulating falling puzzle pieces (by adjusting lateral movement and/or rotating the pieces ninety degrees) such that they nest into the pieces below. Kirsh and Maglio (1994) took notice of the habit by players of this game to rotate blocks through all configurations on the screen as they played. In other words, rather than thinking about the best position for the block to be in, and then rotating to that position, players would cycle through all possible positions on the screen before deciding the best one. The authors write, "…certain cognitive and perceptual problems are more quickly, easily, and reliably solved by performing actions in the world than by performing computational actions in the head alone. We have found that some of the translations and rotations made by players of

this video game are best understood as *actions that use the world to improve cognition*" (p. 513). The cognitive task in this case was outsourced to the environment of the game. Acting on the environment in order to improve cognition is referred to by Kirsh and Maglio as "epistemic action".

When playing chess on the computer, I have found that my game improves if my tangible chessboard is nearby. I can game out various courses of action on the tangible board much more easily and quickly than I am capable of doing otherwise. The chessboard and my mind together form a learning system. Other aspects of thought are distributed as well. Daniel Wegner (1991) coined the phrase "transactive memory" to denote "a shared system for encoding, storing, and retrieving information" (p. 923). He found that relationship partners share the task of storing memories, and that their combined transactive memory is therefore greater than the memory of one partner alone. This notion has also been used to explain the Internet's effect on memory formation. We are much less likely to remember information that is readily available online, as we offload memories to our computers. Knowing that we can access the memories online leads us to devote less space in our own heads for memory storage.

Asserting that this barycentric pedagogy is distributed between people is perhaps more intuitively persuasive than the idea that pedagogy is also immanent in other forms of life and even non-living objects. However, a few examples should illustrate how our environment teaches us, and hence contributes to pedagogy. When learning how to serve a tennis ball, the racket becomes assimilated into the bodily system of the learner in undeniable ways.

The player's brain treats the racket as an extension of the body, and is eventually able to know how far the racket extends into space without requiring visual or tactile feedback. The diameter, string tension, grip, etc. all shape the method by which learning takes place. Consider also the impact on pedagogy by educational media. Regardless of the content of the textbook, and hence of the curriculum, the book itself shapes the method of learning. As McLuhan (1964) has noted, the written word emphasizes sequentiality, uniformity, and continuity. Hence, objects within the learning system always contribute in some measure to pedagogy.

Let me review the features of the barycentric pedagogy thus far. First is the assertion that entities are simultaneously teachers and learners. Problematizing the teacher/learner distinction is analogous to the posthumanist effort to muddle the boundary between human and animal. Recognizing our own animality is a step towards a reflexivity of influence between "us" and "them". It is an acknowledgement of connection, and an assertion of kinship. Such muddling is intended to shake us loose from the belief in the rightness of human rule over nature. In much the same way, barycentric pedagogy runs counter to conceptions of learning as a one-way flow of influence between a designated teacher and their students, instead focusing on their kinship as neither entirely teacher nor learner, but both. In the barycentric analogy, a teacher/learner's "mass" is the combination of knowledge, skills, and/or abilities that that entity brings to the system. Greater mass results in greater gravitational pull, but all entities have mass and thus exert some pull. Therefore, all entities in the learning

system shape the method by which education takes place. In other words, *barycentric pedagogy is both distributed and reflexive* throughout a system that may include any of the following: consciousness, unconsciousness, bodies, technologies, the environment, objects, and other (post)humans. In certain systems, a single entity may exert substantially more "gravitational" pull than the other entities, exerting more pedagogical influence than the other bodies in the system. In schools, teachers generally possess significantly more knowledge in their content areas than their students, and as such exert more pedagogical influence. Inanimate objects also can exert more pedagogical influence on their users than the users exert on them. A rifle in the hands of a soldier in basic training is an example of this. A final characteristic of barycentric pedagogy is it's cyclical nature. Teacher/learners cycle between rounds of feedback/sharing and rounds of productive inquiry.

The barycentric pedagogy is in itself not so much a prescription for action as it is a reality we must face. Unlike other methods of teaching, it varies widely depending on the context, and is never under the full control of any one entity. It is immanent in all life systems and the objects to which they are connected. Drawing heavily from posthumanist and cybernetic theories, a this pedagogy problematizes notions of individuality and autonomy. We all exert influence on one another, even as others' influence is always exerted upon us. Following Foucault, we recognize the distributed nature of power. Also, this pedagogy owes much to John Dewey, who recognized the need for a happy middle between student-centered and teacher-centered education. Further, Dewey (1938) wrote

of a "principle of interaction" which he understood to be a prerequisite for experience. This principle, "assigns equal rights to both factors in experience—objective and internal conditions. Any normal experience is an interplay of these two sets of conditions" (Chapter 3, para. 20). Experience for Dewey was thus always distributed between internal and external.

<p style="text-align:center">Barycentric Pedagogies In Full Fruition</p>

We are all biotic components (and ourselves assemblages of components) of larger systems that carry out various functions. Our education system must be judged overall as having only limited success in its stated function. However, thriving educational systems do exist in which the barycentric pedagogy is on full display. These systems have been identified by a variety of names which nevertheless appear to all refer to the same general thing. In the following paragraphs I will review relevant literature on these educational systems that exhibit barycentric pedagogy.

In "Collective Intelligence" (1997) Pierre Levy posits a number of "anthropological spaces" that have organized human activity and thought. The *nomadic space* of totems, lineage, myths, and rites was followed by the *territorial space*, a product of writing, geography and cartography. The territorial space made the rise of the state possible. The Industrial Revolution brought the *commodity space*, with its economy of statistical and material goods. Today, the *knowledge space* is, according to Levy, usurping the commodity space as the primary organizer of human endeavors. In this space, human qualities are more

important than capital or the state, which were primary foci of previous spaces. Identity in the knowledge space is for Levy a function of skill, nomadic cooperation and continuous hybridization, rather than socioeconomic status or lineage.

Where groups in previously dominant anthropological spaces could be designated as organic (based on family relations/lineage) or centrally organized (i.e. by the state), groups in the knowledge space are *self-organized*. Such communities, which he refers to as "molecular groups", exhibit all of the characteristics of a barycentric pedagogy. Molecular groups are for Levy, "…collective intelligences that…continuously refine their skills, and attempt to enhance their individual qualities indefinitely" (p. 53). Such groups allow for direct democracy, which fits nicely with the notion in barycentric pedagogy that all bodies have gravity, or some measure of influence. Levy writes, "…the members of a molecular community communicate laterally, reciprocally, outside categories and hierarchies, folding and refolding, weaving and reweaving…" (p. 55). By reciprocally I believe Levy means at least in part that all members of the group are both speakers and listeners, teachers and learners.

In "The Anti-Education Era" (2013) James Gee examines the educational attributes of what he calls "affinity spaces", which have much in common with the molecular groups above. Affinity spaces, often but not exclusively found online, join people with some shared interest together, often of widely varying levels of knowledge and/or mastery of said interest. Admission is generally open, and participation voluntary. Learners take responsibility for their own education, and

proceed at their own pace. At their best, such spaces make no distinctions of race, gender, culture, rank, intelligence, etc. Instead, the worth of each member's contributions are judged on their merits as determined by the group as a whole. The curricula of these spaces are constantly evolving, and often tailored to the learners. Individuals will visit these spaces seeking answers to questions, putting work up for display and/or critique, answering the questions of others, correcting inaccuracies, etc. That visitors to these spaces come voluntarily is a significant component to their success. Ranciere notes that, "…one can teach what one doesn't know if the student is emancipated, that is to say, if he is obliged to use his own intelligence" (p. 15). In other words, the motivated student can learn even from the ignorant. Importantly, affinity spaces are not typically or even primarily the only places where learning occurs under these curricula. Instead learners alternately visit such spaces sporadically, in between engaging in the endeavor/hobby/passion. The learning that takes place is distributed *between* the affinity space and the learner's engagement in the endeavor.

Such spaces are for Gee examples of, "synchronized intelligence. Multiple tools, different types of people, and diverse skill sets are networked in ways that make everyone smarter and make the space itself a form of emergent intelligence. The sum is more than its parts; the collective is smarter than the smartest person in it" (Ch. 20, para. 13). Importantly, the author specifies that affinity spaces include people of all ages, skills and interest and ability levels. Further, he writes, "In an affinity space, leadership and status are flexible. People sometimes lead and mentor; sometimes they follow and are mentored. There are

no fixed bosses and teachers, though people acknowledge different paths to mastery and know where people are on them (Ch. 20, para. 13). In these spaces, people take responsibility for their own educations. At the same time, as their efforts spring from interest and/or passion, there is no clear line between work and play.

In "Rethinking Education in the Age of Technology" (2009), Alan Collins and Richard Halverson explore what they call "communities of interest" (COIs). These communities are contrasted with "communities of place" (COPs) that are based on geographic location. While churches and schools are COPs, COIs can connect people regardless of their location. For examples of COIs, the authors list scientific societies, teacher unions, orchid fanciers, and rock musician fan clubs. As hubs for communication, the authors argue that COPs are being usurped by COIs. The authors note that information technologies are not a prerequisite for COIs, but that they aid greatly in making them possible. Collins and Halverson lead their book off with an exploration of the one-room schoolhouse of the past, and note that students learned from and taught each other in groups within the room. As with Gee's affinity spaces, the ages of learners was mixed. As such, they argue that the one room schoolhouse was closer to the COI ideal than most schools of today.

The shift from communities that are place-based to those that are interest-based does not bode well for schools, Collins and Halverson note, as education occurs where communication occurs. They write, "The virtue of communities of kids with shared passions is that they can take place without any involvement of

schools…Because the online communities tap into children's passions, they should be self-sustaining, and the community will encourage children to learn deeply about a subject they care about" (p. 124). Another virtue the authors identify in communities of interest is that assessment is *embedded* throughout one's engagement in the community. This is contrasted with the periodic assessment and grading in schools. They write, "By embedding assessment into the ongoing learning process, it takes much of the onus off making mistakes" (p. 99). Failure in such a setting functions primarily as feedback to drive future corrections. Instead of grades, which can be stigmatized, COIs offer constructive critique. A common focus on improvement by all, rather than competition, is a driving function of COIs. By removing the stigma of failure, collectives such as these can foster lifelong learning.

Though the terminology varies, the system described by these authors is essentially the same. What is created in each of these spaces is a mind of minds, in which the total is greater than the sum of its parts. Failure at the individual level is an essential part of the learning process, as it functions as feedback. Engaging in these groups typically occurs in cyclical fashion, such that a member will visit the space temporarily, before leaving it to work directly on the passion or interest, and then returning back later to share results and/or seek feedback. Though the impacts of some contributions are greater than others, everyone is capable of contributing. Pedagogy is not determined by a lone teacher, but is immanent in the system.

In addition to the examples provided by Collins and Halverson above, there are a number of popular locations for these spaces online. Social media in particular offer the potentiality for such spaces. Suppose you have an interest in woodworking. You could search YouTube for woodworking videos. It is likely that you will notice some regular contributors whose videos you particularly enjoy, so you subscribe to them. As you attempt new tasks, you watch videos addressing those tasks. You work a bit, watch a video, work a bit more, watch a bit more, etc. You post comments, questions, and critiques below videos, and may give videos a thumbs-up or thumbs-down. As your own skills improve, you begin posting videos as well, and gaining your own subscribers. In part, you are teaching yourself, but YouTube contributors teach you as well. The YouTube format, consisting of videos, comments, up/down votes, view counts, etc., all contribute to the method by which you learn (i.e. pedagogy). You receive feedback in the form of answers to questions you've posted in comments, comparing your work to the work done in videos, up or downvotes, and responses to the videos you post. By participating in comment threads, posting videos, and even asking questions, you teach others. The YouTube example is just one of many. Facebook groups and pages offer many of the same affordances, as do electronic message boards such as Reddit. I follow educators and curriculum theorists on Twitter, and have learned much through my time in that space. However, all of the same functionalities that make barycentric pedagogy possible online can be generated without electronics. Communities of place and communities of interest need not be mutually exclusive. Book clubs,

writing groups and yoga studios are all affinity spaces. However, areas with smaller populations tend to have less variety in this regard. My current home in Savannah, Georgia has philosophy, ballroom dance, and poetry clubs (among many others) that are open to the public, while my much smaller home town of Cordele has none of those.

Danger: Barycentric Pedagogy Is An Engine, But Doesn't Point the Way

Even when learning occurs through intelligent collectives, such learning might be harmful to the life systems to which the learners are connected. Recall the two proposed primary educational goals from earlier in this chapter: fostering lifelong learning (and thereby offering opportunities for dignity outside of the market system), and habituating self-control and restraint in technology use. The barycentric pedagogy can help accomplish the former, but is of little aid in the latter two. Using the word "growth" as synonymous with "learning", Dewey (1938) writes, "growth is not enough; we must also specify the direction in which growth takes place, the end towards which it tends (p. Ch. 3, para. 8). The child can be passionate about the game they play on their tablet, and devote hours upon hours towards improving their skill at it. A thief can be passionate about stealing, and seek to become a better thief. So, while some measure of passion or interest is a prerequisite for learning, consideration must be made regarding where that passion is directed. There must, then, be a consideration of curriculum, in addition to pedagogy.

Danger: Bubbles

While the benefits of a barycentric pedagogy are significant, this method of education is not without potential drawbacks. A goal of this pedagogy is to foster passion in some area, but passion can lead to tunnel vision. People can become so consumed by their passions that they neglect other considerations. The artist obsessed with perfecting her craft may disregard her family, friends, environment, her own body, etc. Communities of interest can function as "bubbles" in this way, separating members from the outside world. Matters of social justice may merit little consideration by the dedicated pianist, chess player, distance runner, etc. People who become passionate about politics frequently join groups sympathetic to their views. Information entering the bubble from the outside gets shaped as it enters, so that it is more readily digestible by the group. Fox News originally presented the shooting of nine members of the Emanuel A.M.E. Church in Charleston as a religious attack, while other networks included race as a potentially motivating factor (the sole factor, as it later was discovered). Interest groups often actively prohibit dissemination of information not related to the topic of interest, such that message boards or Internet groups might have rules against discussing politics, for example.

As part of the Narcissistic urge, humans exhibit *homophily*, or an attraction to those like us. In Neolithic bands, early humans were closely attached to a group of others varying widely in age, appearance, etc. Any member of a foraging group had access to any other member. From the advent of agriculture on, we have developed both more tools and more advanced tools for controlling

who we associate with. From the private dwelling with walls and a door we have progressed to fully customizable social networks online. From the choice of which church to attend, we have progressed to explicitly deciding who will and who will not communicate with us. As such, we are able to indulge our homophilic urges in much the same way technological advances now allow us to gorge ourselves on sugary fattening foods. Like the sweet tooth I inherited from my ancestors, the homophilic urge must have served an evolutionary purpose. Perhaps, amid such a diverse group in the Neolithic band, homophilia drove individuals to work to see themselves in others not immediately perceived as similar. Perhaps this urge made us work to shape others in our image, and us in theirs. Like the sugar craving, this urge can now be satisfied with hardly any work at all, which is surely to our detriment. The ability to join others of like mind and appearance has resulted in fewer bridges between disparate groups. It has led to the increased partisanship in politics, and helps explain why racism, sexism, homophobia, etc. persist. Social groups increasingly form echo chambers in which suspicion of outsiders is shared, and incoming information is colored by the dogmatism of the group.

By both facilitating social bubbles and fundamentally (and constantly) changing how we interact, 21st Century technologies challenge notions of individual identity. Being posthuman means that we are a new species. More than that, it means we are *always* a new species, as technological advances change what it means to be posthuman. It means that we have no distinct identity, because our changing cyborg bodies rob us of the foundation needed to

foster a stable one. This is evident at the generational level as well, as children today have no new music genres or hobbies to call their own. Gardner and Davis (2013) argue that generations are increasingly becoming defined by the dominant technology at the time-the "Computer Generation", the "Cell Phone Generation", etc. Mastering this ever (and more speedily) changing techno-scape takes up a larger and larger amount of the time of young people. Though senses are extended in the posthuman to allow for more frequent contact with a larger number of people, the net effect of our communication technologies seems to be a step towards Narcissism. Technology is used to associate more closely with like-minded people, such as school cliques (through Twitter, Instagram, etc.) and groups of people with common interests (Reddit, Youtube, etc.). Rather than functioning as a tool to enable people to get to know strangers, networked computers often function as mirrors, something you look at to get an idea of who you are. The effect is often to create a bubble for people, one that furnishes a worldview, a frame through which to process outside events. As such groups are of people who are often similar to one another, they are prone to fostering misogyny, racism, homophobia, religious intolerance, etc., and frequently leave people susceptible to confirmation bias. Frat houses, gamer culture, athletics, and hip-hop, for just a few examples, offer bubbles that isolate these groups from those who are different. Each of the affinity groups listed, it should be noted, struggle with misogyny and homophobia. Bubbles do not just pose this risk for privileged groups. Historically marginalized groups can also fail to see the outside world clearly when they communicate only within their groups. That being

said, those with the most access to the technologies are positioned to cause the most harm to others. Other groups and life systems tend to suffer when the dominant groups become separated or distinguished from the rest. Our bubbles blind us from the suffering of others, including that suffering which we ourselves cause. The "haves," virtually and tangibly walled off from the "have-nots," are free to seek to perpetuate their privilege without being reminded that that is what they are doing.

Communication technology, though it extends the ability to make contact, also frequently allows users to control who they have contact with. This ability to serve as gatekeeper is ultimately an extension of our beliefs regarding private property that originated during the Paleolithic Revolution. The ability to cut off contact with whomever one chooses is generally viewed as a right we enjoy, much like our "right" to own property. Foraging humans, living an existence for which they were evolved, had no conception of private property. The primary method of severing contact with another was to leave the foraging band, or to compel them to leave, and neither of these options were likely to have been commonly pursued. More commonly, foraging humans worked through their differences by necessity. Today, we are gatekeepers of social contacts not just online, but also in our dwellings, through our televisions, and on our phones. We decide individually, to a greater extent than any humans before us, whom we allow to communicate with us, and whom we do not. We create insulated bubbles that are exceedingly comfortable within, but we become increasingly fearful and suspicious of events outside.

If agriculture and the written word made us individuals, computer-mediated social networks make us tribes. These, however, are not the tribes of the foragers or hunter-gatherers. Instead of facing pressure to "make it work" in one's present group, as foragers certainly did, posthumans are presented with innumerable groups from which to choose, with very little external pressure to stay in them. People choose the groups in which they see themselves, and are attached to groups to the degree to which this is so. This process of choosing one's social groups is in many ways the same as an individual choosing books. Books often serve as mirrors, of a sort. People choose the mirrors in which they see themselves reflected in a way that gives them pleasure. For some, this involves adventure stories in which readers can assume the viewpoint of the hero. Others look in self-help or psychology books for a more realistic reflection of who they are. Of course, books are generally both mirrors and windows, and many use books as windows through which to look beyond themselves. Fiction might generally serve as a mirror while non-fiction functions as a window, but this is by no means always the case. Books allow the creation of primitive social networks, in which communication is generally one-way, from writer to readers. By comparison, computer mediated social networks are a mass of interconnections with two-way communication, but the selection and identification process is essentially the same.

What is at issue here, chiefly, is the power to serve as gatekeeper for one's own social interactions. This is a tool we are not evolutionarily prepared to use. Of course, this power is not exactly a new one. From the advent of

agriculture (and hence private property) on, we have had actual gates, as well as doors, walls, etc., that we have used to control whom we interact with. During the Neolithic Revolution we developed an appetite for navel gazing that persists to this day, one that is greatly facilitated by computer networks. We are Narcissus writ large; even when we move our mirrors follow us around, tempting us. Teens, already prone to Narcissism, possess in the cell phone the ultimate mirror. A study conducted by Panek, Nardis, and Konrath (2013) suggests that more Narcissistic people tend to post on social networking sites more often. Getting a "like" or "retweet" from a peer (who is often similar in terms of socioeconomic status, culture, etc.) is not so different from admiring one's reflection in a mirror. One thinks of Facetime, Skype, or some other video chat software of the like, in which the ability to talk with someone else is complicated by the appearance of a small square on the screen showing your own face as you speak. These images of ourselves are distracting, constantly drawing our gazes away from our conversers. A Skype conversation, in this way, is a synecdoche for posthuman life: our ability to communicate with others is hampered by our own gaze looking back at us.

Difficulty: Hard To Get Going

Kentaro Toyama (2015) has outlined what he refers to as the "Law of Amplification" in regards to technology. He writes, "Like a lever, technology amplifies people's capacities in the direction of their intentions. A computer allows its user to perform desired knowledge tasks in a way that is faster, easier,

or more powerful than the user could without technology. But how much faster, more easily, and more powerfully is in some proportion to the user's capacity" (p. 29). With regard to the barycentric pedagogy, this Law implies that the existence of the affinity space itself is not enough to guarantee learning. Though the structures facilitating communication are helpful, they are only useful insofar as they are populated by passionate group members. I have learned this the hard way, as my offer to sponsor a Kung Fu cinema club at the high school where I teach has thus far yet to be taken up, despite offering a space to meet, a large selection of vintage films, and a sponsor with a wealth of knowledge on the topic. Further, enlisting people in a group is no guarantee of their future engagement in it. People must find there way into meaningful engagement within affinity spaces by their own motivation. As Toyama points out, the structure can amplify and facilitate teaching and learning, but only through a passionate and engaged human element.

    If affinity spaces are so rewarding for the people who visit them, this begs the question of why they do not receive more visitors. Though determining the number of people who are actively engaged in affinity spaces would be impossible, it seems likely that many, if not most, people do not commonly visit them. Ironically, it is the very technology that allows so many communities of interest to exist that pulls people away from those spaces. At the same time as information technologies facilitate the existence of affinity spaces, they provide tempting opportunities for escapism. Collins and Halverson (2009) note that, "Kids today spend over 6 hours per day interacting with television, video games,

the Internet, instant messaging, email, and other media. This is more time than they spend in school or with friends, and almost as much time as they spend sleeping" (p. 113). Video games and other forms of entertainment are becoming ever more immersive. Google, Facebook, Samsung, Microsoft and other tech giants are presently investing heavily in augmented reality and virtual reality technologies. Increases in computing power make virtual worlds more realistic by the year. Streaming media services allow for instant access to huge libraries of multimedia content at low cost. All of these aspects and others function as pull factors for escapism. At the same time, push factors exist that make the "real" world a less alluring place. The automation of labor must surely fall in this category, as it reduces the amount of pride one has in their work. The decline in social mobility commensurate with the rise in income inequality might also push one into escapism. In a system in which the game is rigged, players are more likely to lose and hence more likely to seek solace elsewhere. Importantly, escapism today is a form of disembodiment, which is problematic for a number of reasons. Perhaps most vitally, this sort of escapism leads one to neglect one's body and the life systems to which it is connected. This can (and has) led to a general decline in health of human bodies and their environments. There is a relinquishment of autonomy, a sort of zombification in escapism that is the polar opposite of the humanist emphasis on individual freedom. One is never fully independent, and even in escapism their actions (or lack of actions) affect others. As such, providing people with computers not only is insufficient to get them involved in affinity spaces, it might actually hamper learning.

A final difficulty of barycentric pedagogy is that it is in many ways more difficult to implement than more traditional teaching methods. Indeed, in the model examples used thus far, this method of learning comes about as a result of self-organization by learners. Because it relies on passionate engagement, anyone hoping to give rise to a vibrant affinity space must often first engender passion in the learners. This can be difficult, especially if the subject holds no initial appeal to the proposed group members. Writing of his version of progressive education, Dewey (1938) notes: "the road of the new education is not an easier one to follow than the old road but a more strenuous and difficult one. …The greatest danger that attends its future is, I believe, the idea that it is an easy way to follow, so easy that its course may be improvised, if not in an impromptu fashion, at least almost from day to day or from week to week" (Ch. 8, para. 2). This same danger applies to those seeking to implement aspects of a barycentric pedagogy. That this form of education is immanent in and springing from all parts of the system is not to imply that it is easy. Schoolteachers seeking to implement this pedagogy have an especially difficult path to travel. The educational system in which they are situated is in many ways at cross-purposes with barycentric pedagogy. Members of what the teacher hopes to turn into an affinity space are frequently there compulsorily. Grades and the threat of falling behind serve to stigmatize failure rather than using it as a source of constructive feedback. However, the difficulty of implementing barycentric pedagogy must not be taken as sufficient reason to avoid the attempt, just as the relative ease of didactic instruction is not sufficient for its continued use.

Conclusion

In the preceding pages, I have attempted to take a comprehensive view of education in light of posthumanist theory. The first two chapters dealt with the proposition that we are posthuman. The autonomous individual human and the mind/body duality were problematized as our inescapable connections with other life systems, technologies, and entities were explored. The legacy of humanism has been one preoccupied with matters of distinction between mind and body, human and savage, humans and nature, etc., while posthumanism in some ways seeks to "balance the scales"-problematizing those distinctions by exposing connections. In addition to this work of blurring boundaries, posthumanism emphasizes life forms in flux. We are born with urges to distinguish this from that, to sort things into fixed categories, and to ascribe permanence to the things we name. Though often useful, especially in an evolutionary/species-survival sense, succumbing to these urges can leave us with an inaccurate view of the world and our place in it. In truth, distinctions are often lines drawn in the sand, categories are not fixed, and nothing is permanent. Further, beliefs in distinction (mind/body, human/savage, human/nature, etc.) and permanence (of the human as a species, for example) can and have resulted in harm to the life systems to which posthumans are connected. Distinction is often tied to oppression, as difference allows for claims of superiority. Hence the "mind" is greater than the "body", the "human" greater than the "savage" and/or "nature", etc.

I proposed in chapter three a number of broad educational goals meant to mitigate the dangers of such distinctions. *Awareness* was one of these, and it applies particularly to an awareness of our connections to other life systems, people, and technologies. This educational goal emphasizes the idea that we are not autonomous individuals but are unavoidably tied to other life systems, such that our fates are inexorably tied to that of our neighbors. Such awareness makes a second posthumanist goal for education more likely, that of the exercise of *restraint*, particularly in regards to our technology use. Finally, the posthumanist emphasis on flux is reflected in the educational goal of engendering *lifelong learners*. Constant change (in terms of who we are, our environments, our tools, etc.) implies the need for constant education, and this is especially true today, as the pace of technological and environmental change quickens.

From the broad educational goals of chapter three, I sought in chapter four to derive a number of curricular imperatives. *Critical media literacy* was posited as a response to the ubiquity of 21st century media, and the growing role it plays in our lives. These media challenge our notions of autonomy and identity while they often enable technocrats to exert undue influence on our thoughts and actions. The humanist belief in individual autonomy is dangerous today, as it blinds people to this influence. *Critical cultural studies* was put forth as another posthumanist curricular imperative. Just as our connections with our media can be fruitfully explored, so too can our connections with other cultures. The humanist notions of fixed categories are under critique here, including the

human/savage distinction. Today we face strong temptations to enter "bubbles",
groups of like-minded people who are often similar to ourselves in thought and
appearance. These bubbles can lead to feelings of superiority, suspicion,
resentfulness, and others towards those in other groups. Critical cultural studies
is vital then for allowing us to become acquainted with the perspectives of those
in other bubbles, and to counter our urges to withdraw into the safety and
isolation of our bubbles. Educational goals of awareness and restraint inform a
third curricular imperative, a focus on and recognition of *embodiment*. The false
but widely accepted mind/body distinction has led to the common view that the
body is little more than an outdated functionary of the mind. The embodiment
imperative seeks to challenge this view by exposing the falsity of the mind/body
distinction, and emphasizing the reflexive relationship between our thoughts and
our bodies. As our bodies become increasingly displaced in the market system
by computers and automata, the urge to discount or dismiss the body becomes
stronger. We discount our bodies at our own peril, however, as our bodies have a
direct and significant impact on our minds (to the point that, as has previously
been noted, there is no clear distinction between the two). A final curricular
imperative of *ecoliteracy* was proposed in much the same spirit as that of
embodiment. We are unavoidably tied to the life systems of which we are
constituent parts much as our minds are tied to our bodies. Just as technology
has led us to discount our bodies, so has it led us to discount the rest of the
natural world. The one-way conversation technology has facilitated between
humans and nature has led not only to much environmental harm, but poses

substantial threats to our own continued existence. Once again we face a rather posthumanist task in seeking to blur the distinction between humans and nature, recognizing that humans are themselves a part of nature, and are quite dependent on her for our continued survival. These four imperatives: critical media studies, critical cultural studies, embodiment, and ecoliteracy, work together to further the broad educational goals of awareness, restraint and lifelong learning, as they apply these goals to four realms of connections. We are connected to our technologies, other people, our bodies, and our environments, and posthumanism seeks to emphasize these connections while dismantling the autonomous human subject.

In the present chapter, the idea of sorting people into the categories "teacher" and "learner" has been critiqued as we, in posthumanist fashion, have observed unavoidable connections between the two. We are each both teachers *and* learners, often simultaneously. This does not mean that each person is always an equal mixture of the two, in fact one is almost always more in one camp than the other (though which camp we are in and to what degree both are in a constant state of flux). Here, education is proposed as a process that includes the (post)human but is not encompassed by her. Nor is education limited to a binary system of teacher and learner. Instead, education is *distributed* between teacher/learners, technologies, bodies and environments. I have proposed a name for this method of education, *barycentric pedagogy*, to illustrate the reflexivity of influence that occurs between bodies (living and non) in this educational system. This form of pedagogy has been shown to be already on

display in affinity spaces, areas (some physical, others in cyberspace) in which people with similar interests gather to share, learn, appreciate, and show off. Finally, though the barycentric pedagogy seems to avoid many of the pitfalls of pedagogies commonly practiced in schools today (including rigidly delineated subjects, didactic instruction, tracking, etc.), it is not without its own pitfalls. Perhaps the most dangerous of these is that the affordances of affinity spaces allow one to get lost in the pursuit of one's passions. They can serve as the "bubbles" warned of in chapter four, areas one can escape to for comfort. As such, this method of teaching must be tempered by the posthumanist goals and curricular imperatives outlined previously. It is often worthwhile to chase our passions, but it is also vital that we be nudged out of our comfort zones from time to time.

An opportunity for further scholarship raised in this work is that of the role of school in light of the educational goals and curricular imperatives previously outlined. Much remains to be done in laying the groundwork for a barycentric pedagogy. Today's schools are too often a reflection of 19th and 20th Century media, focused on linearity, memorization, sequence, etc. We need schools oriented around the new media. Specifically, a balance must be struck between fostering knowledge spaces and keeping those spaces from becoming echo chambers. There is an opportunity with schooling, too infrequently realized, to provide marginalized groups with access to and education in the use of media otherwise unavailable to them. Schooling can help to level the playing field in this way, and scholarship could consider how schools might best accomplish this

leveling. Also, more scholarship might beneficially be devoted towards consideration of barycentric pedagogies in action. This would involve close study of affinity spaces within our new media, such as those that spring up on Internet message boards, blogs, social networking sites, and others.

Posthumanism's path forward is in some ways unclear, as environmental destruction and technological advance are both proceeding at a lightning pace. However, the preceding pages have hopefully suggested a number of directions future scholarship might beneficially take. One of these lies in continuing to explore links between posthumanism and other theories. We could look especially at Haraway's work linking posthumanism and feminism as a guide here. We are all posthuman and we are all component parts of larger entities. These tenets of posthumanism can continue to be explored in light of other theories more specific or localized in their perspective. Perhaps in this way new or stronger connections might be formed between theories and groups, and localized perspectives might increasingly acknowledge and inform more global environmental and technological concerns.

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