

A COMPLEX ORIENTATION TO EMBODIMENT IN ONLINE EDUCATION:
MAKING ONLINE EDUCATIONAL SPACES MORE ENGAGING AND
MORE SOCIALLY JUST

BY

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DISSERTATION

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Abstract

This dissertation argues that, in order to create more engaging and socially just online educational spaces, a complex orientation to embodiment is needed. A *complex* orientation to embodiment includes critique, care, and reflection on what it means to be physically embodied; what it means to be positioned within society—in ways that reflect the interaction of physical embodiment and societal discourses, ideologies, and institutional practices—in ways that give access to or often draw lines of exclusion from power and resources; and creating critical engagement around embodied relationships of labor. I analyze how embodiment is meaningful for online educational spaces; and then suggest ways to negotiate new design strategies and pedagogical practices with complex understandings of embodiment in mind; to create more engaging and socially just online educational spaces. I advocate for an attention to details of embodiment and materiality; and call for an orientation to embodiment (the physicality, positionality, and material relationships of bodies) to ground praxis.

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Table of Contents

Introduction A Complex Orientation to Embodiment as a New Paradigm for Online Education	1
Chapter 1 Framing Embodiment Through a Discussion of Boundaries and Erasures.....	24
Chapter 2 Embodiment as Physicality.....	54
Chapter 3 Embodied Positionality.....	88
Chapter 4 Embodied Material Relationships of Labor and the Creation of Digital Artifacts.....	119
Chapter 5 Complex Embodiment: New Ideas, New Programs, New Platforms in Online Learning.....	145
References	178

Introduction

A Complex Orientation to Embodiment as a New Paradigm for Online Education

This dissertation argues that, in order to create more engaging and socially just online educational spaces, a complex orientation to embodiment is needed. A *complex* orientation to embodiment includes critique, care, and reflection on what it means to be physically embodied; what it means to be positioned within society in ways that reflect the interaction of physical embodiment and societal discourses, ideologies, and institutional practices and that give access to, or often draw lines of, exclusion from power and resources; and creating critical engagement around embodied relationships of labor. I analyze how embodiment is meaningful for online educational spaces and then suggest ways to negotiate new design strategies and pedagogical practices with complex understandings of embodiment in mind to create more engaging and socially just online educational spaces. I advocate for an attention to details of embodiment and materiality and call for an orientation to embodiment (the physicality, positionality, and material relationships of bodies) to ground praxis.

There has been an immense amount of concerns, fears, hopes, promises, and hype generated around online education. Underlying both the concerns and the promises has been an anxiety about bodies and materiality—the identity of bodies, the diversity of bodies, the potential access, monies, and other resources of bodies, the materiality of economic, geographical, and device divides—as they interact with online educational spaces. These anxieties have been merited. All of these hypes and hopes have been networked into an ecology of technology and education. This environment of technology as either/both the savior of educational aims or a distraction from “pure” learning takes part in both old and ongoing trajectories in education, as well as new contexts and aims of education within increasingly neoliberalist forces.

On the one hand, reformers and technological acolytes have always positioned technology as necessary for ‘making education better’. David Tyack and Larry Cuban (1997) remind us that the inventors of both the chalk board and the pencil had to fight the skeptics in order to get their inventions into schools. Chalk boards and pencils were, at one time, considered suspect technologies that would decrease a student’s ability to learn (or at least memorize). And then, there were also the promises that pencils and chalkboards would revolutionize education and lead to better learning for students. Dennis Baron (2009) also reminds us that typewriters, calculators, overhead projectors, televisions, and computers have each been slotted into school systems with both promises and skepticism. When we talk about online education—the focus of this dissertation—it is important to highlight that these conversations are already part of a larger ecology of technology’s relationships with schooling.

In addition to the attempts of teachers, reformers, administrators, and politicians to bring technology into school—and to brand technology as a way of making education better—there are also the sometimes-subversive attempts of students to bring technology into schools. Students carry cell phones and laptops; they have iPods and iPads. The scene of a student, sitting in a classroom, supposedly listening to the teacher, with the hoodie over her/his head so as to obscure the white earbud cords, has become ubiquitous and even symbolic. The student listening to music or texting in class has come to represent both the “digital native” learner, as well as the uninterested teen who is “distracted” by technology rather than using it to “learn.”

Online education exists within a nexus where technology is not only already part of the educational context and conversation in bricks-and-mortar classrooms, but also is shaped by the discourses and ideologies around technology in the schooling context: that it is a distraction; that it takes away attention; that it decreases one’s ability to focus; and, on the other hand, that it is

already part of a student's natural habitat and norm for learning; that students are naturally adept at it and are better than adults at using it; that technology is important for future jobs; technology will give us the economic edge; that we live in a technology economy. These discourses frame how we talk about and use online education; and they are part of a longstanding trajectory to both laud and belittle technological interventions in education.

On the other hand, the technology-and-learning environment is also shaped by new interventions into the landscape. Increasingly, there are for-profit online colleges that promise a degree with minimum work: you can get your bachelor's degree while working full time and attending class in your pajamas. Universities of all stripes—both teaching colleges and research institutions—are under pressure to bring in more money to supplement the loss of state funds and alumni donations, as well as develop a degree program that is rigorous, affordable, and a platform for helping students to get a job or create job security. There are paradoxical forces driving universities to expand college education—to lower tuition and the cost of attendance—so that more may have an opportunity to get a degree; and yet there is also the push to bring in money. If you can't bring in enough money to support your program, then your program is in danger of being cut.

At this juncture of the drive to lower the cost of a college degree, while also bringing in more funds to the universities, online degree programs have exploded. Universities are experimenting with using online courses as a way to do the impossible: make education cheaper, while also finding more money. Universities can charge more for online courses—thereby bringing in more money—while also claiming that the overall cost has been lowered because students do not have to pay to live near campus or drive to campus. Online courses can also “fit” more students into a “classroom,” while still promising a “personalized” experience.

Online spaces are both the large-lecture experience as well as the graduate symposium experience mixed into one.

Universities are experimenting with how many online courses to offer and still maintain an equality of degree requirements for all students. Some universities only offer a few courses; these are designed to allow students to do some of their class work while maintaining full time jobs, or without actually living near campus. But, the coursework-only programs still have residency requirements that mean—eventually—a student will have to pay the cost of the full-time student experience. Other universities offer online degree programs; they compete with the online-only degree programs, but offer both the rigorousness and clout of getting your degree from a “real” university (getting your degree from the University of Illinois, as opposed to the University of Phoenix). And then there are MOOCs.

In the last 5 years Udacity, EdX, and Coursera have entered the scene as purveyors of knowledge and learning that can be had for minimal cost if not for free. With the advent of MOOCs, many questions about the nature and importance of education and credentialing have come to the fore: Is education supposed to be free? Is getting an education helpful if it does not come with some sort of credential? What counts as education? Is teaching the same thing as distributing facts? Is learning the same thing as memorizing and re-deploying facts? Is there a difference between teaching a body of knowledge and teaching a skill? Are there some subjects that can be taught online and some that cannot? Can one develop relationships and connections—one of the purposes of the higher education experience—if one only attends class online? How many students is too many? Can someone be good at teaching a subject even if they do not do research in that subject? In other words, is it necessary or beneficial to have experts in a field or knowledge teach a course, or is it better to get someone who is good at teaching, but who may

not be at the forefront of the field? Even these questions are shaped and inflected by the ecology of skepticism around technology and education, hype around technology and education, pressure to get more funds, pressure to make education more available, and questions about the purposes of a college degree.

It is within this context that online education is shaped and becomes intelligible. Multiple contradictory pressures bear down on the university; multiple expectations exist; and all of these tensions create conditions where universities feel compelled to be part of the trajectory into online spaces, without due consideration of the competing forces which shape the educational landscape. An example of this comes to mind here.

On June 4, 2013, *Inside Higher Ed* reported on the pilot-partnership between San Jose State University and *Udacity*—a Silicon Valley-based education technology company. The partnership was supposed to bring access to college courses and academic experts for minority students who would normally find college education cost-prohibitive, as well as for high school students who wanted an early experience with college coursework. The intention of the partnership was to help bridge some of the economic and even cultural gaps that divide those with money and those without in this country. While the intent of the partnership was to champion diversity and push against oppressive demarcations, instead it became an example of the divides that are often not considered when implementing online education.

When San Jose State launched their first *Udacity* course, they expected a large number of students to interact with the material and the professors. What they got instead was a large number of students who could not access the program. *The Oakland Tribune* (2013) reports on the debacle:

I get this call from San Jose State: “Uh, we have a problem,” recalled Mark Ryan, superintendent of a charter school in Oakland that was taking part in the project to offer

for-credit online classes to students, including high school students. According to the newspaper, “It turned out some of the low-income teens didn’t have computers and high-speed Internet connections at home that the online course required. Many needed personal attention to make it through. The final results aren’t in yet, but the experiment exposed some challenges to the promise of a low-cost online education. And it showed there is still a divide between technology-driven educators and the low-income, first-generation college hopefuls they are trying to reach. (Murphy, 2013)

The partnership, which intended to use the power of online education to breach economic divides, had not considered that online education happens in real, material, embodied spaces, and relies on physical devices, physical connections, and embodied people who have access to both devices and connections.

My own experiences teaching online, and the anecdotal evidence I have heard from other teachers, further bear out the fact that we are often creating and using online educational spaces without an appreciation of the embodied complexities and lived experiences of students. We feel rushed to be part of the expansion of online education, without an appreciation of all of the variables at play.

I have had teachers tell me about being encouraged by their districts to use online courses as a way of helping ELL students, and creating more bilingual education options. Only after signing up for the courses did the students and teachers learn that the courses were remediation courses designed for native-English speakers, and not bilingual education; hearing the course in Spanish was not even an option. In my own online teaching, I have sometimes made the presumption that all students would be taking the course by linking into class while sitting at home, using a computer that had a webcam built in. Instead, I have had students taking the course from public libraries, using computers that were old, slow, and without webcams, and using tablets and mobile phones while traveling. For me, this has meant reworking both my expectations and the requirements in order to accommodate the embodied realities of my students.

While there are quirks and roadblocks to teaching and learning online, the potential for online education to change the face of both K-12 education and higher education is immense, and the media has been quick to point out both the pitfalls, as well as an increasing sense of hope around online education. *U.S News and World Report* had two articles in June, 2013 (posted two days apart) on MOOCs: one assuring us that MOOCs would lead to more students with college degrees, better teaching on campus, and more money for cash-strapped universities; and the other article questioning the future of MOOCs given the low completion rate for MOOCs and the decision by many campuses to forgo any MOOC only coursework (Kurtzleben, 2013; Haynie, 2013). *Education News* reports that states are working to get rid of laws that put caps on how many online courses a high school student is allowed to count toward graduation; and that, increasingly, charter schools are going virtual. *The New York Times*, reported on July 10, 2013 that the online ed-tech company *Coursera* just raised another 43 million dollars from venture capitalists intent on finding ways to make college education free, or affordable, and yet also make a profit for the company and the universities who use the company's platform. The BBC reported in June, 2013, that new "cloud schools," much like MOOCs, would offer quality education for students around the globe; providing access to courses to students who find education both cost and distance-prohibitive.

The push to use technology to bring greater access to education and credentials is not new. As *Inside Higher Ed*'s Joshua Kim describes in a June, 2013 article, "MOOC Pre-History," the drive to use technology to give more people access to education and to help more students in school has gone on for at least the last century. Kim describes the use of phonographs, tape recordings, re-purposed military training systems, special movie afternoons, and television programs (he specifically mentions NYU's "Sunrise Semester" program which would allow you

to get your degree by watching TV), all in the name of trying to help students get a degree. The concerns and potentials were the same then as they are now.

Most people within the fields and institutions of education laud the idea of more people having the ability to get a college education. We like the idea of helping students who need help, and offering the potential resources of a degree to those who could not otherwise afford it. However, just as in the past, there are concerns over whether or not students are really engaged in these classes; will they really learn anything from an environment that is divorced from reality? There is a concern over multicultural diversity in these classes, as well as concern over the trickiness of talking about issues of race, class, gender, and sexuality when you are not together in the same room as your students. What happens to bodies—and the feelings of intimacy and realness associated with bodies—when classrooms move online?

In addition to these concerns, there is new awareness around the responsibility of teachers to protect and advocate for the protection of their students, particularly as student bodies intersect with technology. K-12 schools offer continuing education conferences on how teachers can teach their students to avoid sexting, posting compromising pictures, counteract cyberbullying, and take care when it comes to social media. There is also increased concern over what counts as free speech and what counts as sexual harassment with the proliferation of creepshots related sites. Teachers are having to broach this subject with both students and fellow staff members. The interaction of online spaces and physical bodies is more than just a matter of online course delivery.

Additionally, more so than in the past, there is an increased awareness that our use of online spaces leaves a very real, material, physical footprint on our planet that has unequally negative consequences for women living in the global South. Campaigns like *Demand Conflict*

Free Electronics focus on the toxins that are released into the air, soil, and water through both the manufacture and disposal of electronics and the use of minerals, in the manufacture of digital devices, that come from conflict areas in Africa and Asia, contributing to the harsh circumstances of these people. The light and sunshine—the nothing but air—we associate with being able to communicate, learn, and do research online comes with a very material cost in physical resources and physical bodies.

This dissertation is not an argument for or against online education. Rather, it is an exploration of what we need to keep in mind when we design and practice online education; it is an argument for how we can make online education better by attending to and designing for the full context in which online education takes place. I spotlight embodiment as both a literal reality and symbolic representation of the competing tensions and overlapping contexts—the ecology—of education in online spaces. Embodiment spotlights the physical, positional, and geo-political interactions that articulate online education and the online student. Materiality is foregrounded.

The *material* concerns of online education are what guide my research and provoke me to argue for embodiment as a new paradigm to guide our continued expansion and proliferation of online education. I argue that a complex orientation to embodiment foregrounds the importance of physical embodiment as we design and teach in online spaces and use online resources. A complex orientation to embodiment foregrounds the ways that bodies are positioned in variable relationships within society; and this has consequences for our relationships with and access to digital technologies. Finally, a complex orientation to embodiment also centers the material and embodied labor relationships that make our online teaching experiences possible; it addresses the labor, pollution, and oppressions that exist and are fortified with our continuing uncritical use of digital technologies.

Advocating for embodiment, in this dissertation, involves centering the ways that embodiment is played out differently in different sites and further involves highlighting the reciprocity of bodies and technologies. Bodies have different relationships with technology in a gaming situation compared to bodies relating to technologies in a classroom or medical space scenario. Nevertheless, in order to flesh out a fuller picture of embodiment, relationships with technology, and possibilities for intervention and change in program design and pedagogy, I draw on theories and examples of embodiment and technology emerging from the fields of science and technology studies, media studies, technofeminism, material feminism, poststructural feminism, social justice pedagogy, and ecology pedagogy. While these different fields are uneven in their understandings of embodiment and practices around design strategy, they all offer important ways of caring for and theorizing how bodies and learning interact with online spaces.

Running through these various fields is the insight that technologies shape bodies and that bodies shape technologies. There is a centering of dynamic “fit,” where technologies and bodies adapt to each other over time for various goals and ends. This dynamism is also a crucial part of the complex orientation to embodiment that I advocate. The ecology of technology and schooling is progressive and active in changing the ways that technology shapes bodies and ideologies, and also the ways that technology gains and loses affordances based on bodies and ideologies. Thus, while there is increasing evidence that our interactions with technology and the modern world shapes our bodies in unhealthy ways (sciatica, neck stress, back stress, carpal-tunnel syndrome), we also have inventions like the standing desk, the treadmill desk, the balance ball chair, and the keyboard wrist cushion that are created to help our bodies adapt to the increased demand for interacting with a machine on a regular basis. Additionally, we have interventions like the

undulating keyboard, eye-motion capture for typing, and nano-clay control devices—where the technology has adapted to fit in with bodies and ideologies around bodily difference.

My methodology for this dissertation is interpretive in nature. I interpret the various relationships and contexts of bodies interacting with online spaces by using various theoretical lenses that foreground materiality, positionality, economic relationships, social justice issues, power dynamics, embodied identity, and powerful discursive regimes of normalization. This means that I draw both on theory and embodied experience in order to further explore the rich context of online education and advocate for embodiment as a way of making online education better. As we center embodiment, our physical, positional, and material relationships with technologies, institutions, and communities come to the fore in ways that allow us to see how online education could be better; could be more engaging; could be more directed to political activism and social justice; could be more community oriented; and more adaptive.

In the next few chapters, I describe and explore a complex orientation to embodiment. I foreground the ways that our relationships to technology call for an understanding of embodiment as physical, positional, and enmeshed in material and embodied labor practices. I give examples of how embodiment is rendered invisible, and how—instead—we can use the digital space to focus on a complex understanding and practice of embodiment. I take up specific examples of how digital technologies of play (games, digital leisure activities) *center* embodiment in complex ways, and argue that these types of spaces should guide best practices around designing and teaching in online educational spaces. I also explore new platforms, software packages, and pedagogical practices that can be used in online educational spaces that allow for (guide toward) this complex orientation toward embodiment, showing how these new ways of designing and doing online education can, potentially, be more engaging and lead to

more emancipatory online educational experiences. I then conclude by giving examples of how this complex orientation to embodiment is demonstrated by three different online educational platforms specifically designed for schooling or educative purposes. In order to map out the dissertation, I review the chapters here.

Chapter Summaries

In chapter 1, I explore the concept of embodiment by exploring the work of key scholars who have written about bodies and embodiment. These scholars hail from a feminist poststructuralist framework as well as materialist feminism; I purposely choose these scholars to signal my own commitment to this literature. While these bodies of literature are often considered contradictory, I frame embodiment by centering the ways these two fields of work overlap and intersect in their tensions and concerns around materiality and physicality of embodiment and space as well as discursive understandings of power, truth, and the force of the normative gaze. My work on embodiment is enmeshed within a literature that insists that there is no such thing as “the body;” there are bodies, physically different and multiply defined and read within the discursive and institutional fields.

While I find sympathies and commonalities with most feminist poststructuralist theorists, I argue that the scholarship of Donna Haraway, Judith Butler, and recent media theorists like Edward Castranova, Nancy Baym, etc, tend to enact an erasure of physical bodies by either insisting on a subversion of physicality and the physical in general, or defining physical embodiment so narrowly that some embodied experiences suffer an elision. In the desire to erase boundaries of normativity and essentialism, Haraway and Butler erase the physical and material lived experiences of embodiment. On other hand, recent media theorists, in order to underline the

importance of physical embodiment, tend to bind up the meaning of embodiment such that it becomes defined against—or as contra to—online spaces. None of these positions get at the complex nature of embodiment. In order to center the complexity of embodiment, I draw on the works of Elizabeth Grosz, Robert McRuer, and Irene Dankelman. These scholars argue for resistance to oppressive societal norms, ideologies, and practices, while also highlighting the eminent physicality of embodiment, as well as its contingent positionality in society.

I first use Haraway's *The Cyborg Manifesto*. Haraway calls for the subversion of the old dichotomies that align men with culture and technology, and women with nature. She calls for affinity groups; contingent coalitions aggregated to push for social change. In order to aggregate for increased affinity for all, Haraway advocates for the eradication of the boundaries between human/animal; human-animal/machine; and physical/nonphysical. In her aim to erase boundaries that separate, Haraway creates an erasure of physical bodies and the materiality and difference of embodied experience. In her advocacy of affinity, Haraway goes too far in her elision of physical, tangible, fleshy reality.

Like Haraway, Judith Butler also advocates for the subversion of boundaries. In her hope of subverting the boundary separating normal and deviant, natural and unnatural, Butler advocates the use of counter-hegemonic enactments of identity (repetitions of “drag” performances). In order to argue for the productivity of these counter-hegemonic enactments, and as a way of explaining the performative nature of identity, Butler discounts the importance of physical embodiment and the shaping of physicality on embodied experience. Like Haraway, Butler goes too far in her erasure of boundaries and creates an erasure of physical embodiment.

Unlike both Haraway and Butler, recent media theorists have tried to sure up the importance of physical embodiment. Theorists like Edward Castranova, Hubert Dreyfus, and

others have tried to draw boundaries around what counts as physical embodiment to the point that they have erased any experience of physical embodiment that happens while we are online. Physical embodiment has been defined by these theorists as contra the disembodiment that happens in virtual spaces. However, this theoretical move makes physicality a contingent quality of embodiment, which pushes against the reality that we are never actually disembodied—even when we are online. In the move to make physical embodiment a contingent quality of “real life”—as opposed to virtual experiences—these scholars have erased the ways that our physical bodies shape how we interact with online worlds and digital devices.

There needs to be more of a focus on embodiment—in a way that gets at the intricate interconnections between the material, the physical, as well as the discursive and positional, and the global. Certain scholars bring focus to embodiment and make its import—for our relationships with technology—quite clear. Elizabeth Grosz, Robert McRuer, and Irene Dankelman center the ways that embodiment is still important even as we enter into relationships with digitalia—and I excavate the works of these scholars in light of my own focus on a complex orientation to embodiment and creating more engaging and egalitarian online educational spaces.

Research by Elizabeth Grosz intervenes into the works of scholars like Haraway and Butler by offering a way to push against societal norms and oppressive institutions while also foregrounding physicality and materiality. Grosz’s work highlights the importance of physical embodiment: we must acknowledge and design for the fact that technologies are used by physical bodies. Bodies are physical, and this physicality shapes the ways we move and interact in the world. Grosz’s work shows that the act of acknowledging physicality is progressive and political in its ramifications. By acknowledging the physical, we are better able to design for actual bodies, and talk about why and how physical differences—and the relationships with

technology that those differences create—might be important. Her work does not deny the shaping influence of ideology, structure, discourse, and institutional practice, but it spotlights the ways that physicality—of both bodies and spaces—intersect with, exemplify, and resist social practices and expectations.

I then mine the scholarship of Robert McRuer for examples of the ways that physical bodies interact with institutional practices and societal discourses to yield embodied positionality—the ways that bodies are positioned differently within society. McRuer advocates for a “Crip Theory”: an excavation of the ways physical bodies are positioned within power, and a political use of the physicality of bodies as a way of contesting oppressive norms and practices. “Crip Theory” is both an explanation of the importance of physicality, and also a call for political activism that highlights embodiment as the focus of that activism. McRuer’s work provides examples of ways that embodiment is both physical and positional, and allows me to more fully investigate how physicality and positionality intersect with digital devices and online spaces.

Finally, I foreground Irene Dankelman’s interconnection of gender, labor, and ecological damage. Dankelman acknowledges that embodiment is physical and positional, and yet also wants to point to the ways that bodies are involved in complex relationships of labor, global geography, and materiality. Dankelman’s work spotlights the embodied material relationships of labor that are produced in the creation, design, and production of technology. The creation of digital technology has real consequences for our environment and on the economic livelihood and labor of diversely situated peoples. Poor women living in rural areas—particularly in the global South—are negatively affected by the physical production of digital technologies. As we create more online educational spaces—and as we aim to make online education more engaging and socially just—it is important to become aware of and act against the cycle of creating and

disposing of technological artifacts in harmful ways. Dankelman's work prompts us to ask: How can I (or we) intervene into the environmental and human exploitation consequences of our use of technological artifacts for education? How can we be sensitive to the embodied material labor practices around the production of technologies?

These theorists provide the scaffolding for the interventions of the other chapters, which will focus on: physical embodiment; positional embodiment; and embodied relationships of labor and technologies.

In chapter 2, I focus on the importance of having an orientation to embodiment that focuses on the physical, that centers the physicality of embodiment. I argue that, currently, both campus-based and online courses tend to position bodies as always immobile, that immobility tends to signify the docile and attentive subject in current school imaginaries. This needs to change if we are to create more engaging and socially just learning spaces. This chapter pushes against the too-easy Cartesian duality of *the* body (just the one?) and the mind. We need, first, to focus on the ways that bodies are real, moving, material, temporally and spatially situated, different, and intimately connected with learning and doing, if we are ever to create more engaging and egalitarian learning spaces.

As a way of putting flesh onto the physicality of bodies, I first focus on movement, that bodies move and are shaped through movement. I excavate the ways that movement results in healthier and more engaged people. As we design educational spaces that promote mobility, we create healthier bodies and more engaged learners. Bodies in motion are bodies in learning. Movement creates more engagement in a classroom and more complex understandings of concepts that are being taught. As we orient toward the physicality of bodies, we can create educational experiences that are designed to interact with the fact that bodies are mobile and

movement-rich. This further allows bodies to be more engaged in and enmeshed within communities. As we promote the practice of movement—and movement out into communities—we simultaneously promote engagement with the curriculum, with fellow students, and with the larger society.

The next concept I highlight—in my excavation of the physicality of bodies—is the concept of physio-temporal contingency. This is the idea that bodies are physically shaped in relationships with institutions, time, context, space, etc. In order to create more socially just classroom spaces, we need to teach in ways that acknowledge that bodies have different physical experiences of the world, and these experiences are shaped reciprocally by the physicality of embodiment and interaction with the world. All bodies can be limited or rendered less able—in various ways—depending on time, space, device, and access to resources. As we focus on how bodies act and move in a space—what bodies actually do when they use various technological devices—we can create more flexible digital spaces or educational moments that recognize the myriad ways that bodies use technology and, indeed, the myriad incarnations of bodies.

This chapter closes by foregrounding some examples of how digital spaces can really bring physical embodiment to the fore. I draw on examples from spaces of digital play and digital leisure to show how technological space can become a truly hybridized experience that is flexible to various bodies and forms of embodiment. Indeed, there are examples from the space of digital play that show how technology can create spaces that honor physicality and yet also create truly “virtual” experiences. Thus, embodiment is not elided, made invisible, or less stable, but is made to move, made visible, and centered as part of the digital experience. This chapter focuses on how understanding embodiment as physicality, can allow us to design educational spaces and engage in pedagogical practices that are more engaging and socially just.

The argument for a complex notion of embodiment continues in chapter 3, as I focus on the ways that embodiment is also positional. A complex orientation to embodiment involves centering identity—and the positioning that identity brings—as an embodied practice. In this chapter, I first focus on the work of McRuer and his exploration of “Crip Theory”—a theory of physical embodiment as the shaping of societal positionality, and the use of physical embodiment to push against that positionality and the structures that undergird societal assumptions and expectations. I recount McRuer’s example of the Rolling Quads and the independent Living Movement, as well as movements for accessibility across the globe, in order to show the linkages between physicality and positionality.

I then turn to the embodied positionality in relation to digital technology. Bodies are positioned within relationships to technology based on the interplay of societal discourse, institutional norms, and embodied physical characteristics. Bodies are positioned to have greater or lesser access to technology. Bodies are positioned as belonging in “the tech world,” or not. How we understand ourselves as being empowered with technology or disempowered—or somewhere in between—shapes how we react to and use (or don’t use) technological artifacts and processes.

In order to make this argument, I explore the ways that embodied positionality often shapes relationships with technology. I start with focusing on the ways that race shapes use of and access to technology. I draw on the work of Eszter Hargittai, Bridget Byrne, Tizia Teranova, Yasmin Kafai, and others to argue that race is correlated with how we use technology to form important connections—or not; how race is tied to feelings of competence with technology—or not; how race is tied to feeling a sense of “belonging” in digital spaces—or not.

Initial hopes for online spaces as beyond gender have not materialized so examining how technology continues to shape gender and vice versa can help provide suggestions for pedagogical approaches that do the same. The work of Eszter Hargittai, Susanna Paasonen, Justine Cassell, Susan Herring, Carrie Heeter, and others to show that gender is correlated with certain practices and experiences (free labor practices in some areas of online space, and silencing practices in other areas) with digital technology which tend to reify oppressive gender stereotypes. I analyze the catch-22 of both the desire to create technological spaces specifically for women (Purple Play Games is my example here), and yet the ways that gender-specific design can also work to rigidify social norms around what it means to be female. I identify some of the sites that have been talked about by other scholars as places that are nurturing to women, and the ways these spaces can be both radical places of experimentation and freedom, but also places that are coopted and even where certain oppressive norms are made more stable—more common-sensical.

Because access to technology and technologically adaptive pedagogies are still subject to various digital divides, this chapter also examines the relationship between social class and technology. Access to high-speed internet, privacy, and the number of digital devices in a home, can all shape one's relationship to technology. Digital divides around class bring to the fore both gaps in resources and gaps in practices and comfort levels around technological devices and online spaces.

Finally, I focus on disability—this time, not as a physical experience, but as a positional experience. I explore the ways that disabled bodies are made visible or invisible in online spaces through practices of erasing disability as an “option” for online avatars, or spaces that normalize and make desirable disability as an embodied identity.

To be clear, in order to show the complex interweaving of race, class, gender, and disability, I chose not to physically separate my excavation of class, gender, race, and disability. Instead, I interweave my inquiry into the ways that all of these various embodied identity positionalities create real effects for how we learn in online educational spaces.

I close this chapter by giving examples from spaces of online education, digital play and digital gaming that can be used as jumping off points for creating platforms and pedagogies—in online educational spaces—that attend to the ways that embodiment is positional; that attend to the ways that identity matters and shapes our relationships with technology. I use examples that showcase how educational spaces might create more engaging environments for diverse audiences, and how we might bring diversity to the fore as we strive to create more egalitarian spaces. I give examples of how social justice projects might be re-imagined in online educational spaces. I explore example of both digital spheres that draw attention to embodied positionality, and others that elide complex notions of identity and body. I argue for a “best practice” around centering embodied positionality in our online courses.

In the next chapter, I bring together both the physical and the positional as I explore the often exploitative relationships created by the material production and distribution of technological artifacts. If we are to create more engaging and socially just educational spaces, it is important to acknowledge our relationships to the oppressive conditions that “birth” digital devices and our abilities to inhabit online spaces. In this chapter, chapter 4, I excavate the labor practices and relationships of designing, producing, using, and disposing of technological devices and digital artifacts. I foreground the ways that these practices and relationships are material and embodied: that there are real, material, and embodied consequences of digital technologies.

This chapter highlights four material/embodied areas of digitalia: the design of digital artifacts and systems; the production of digital artifacts and systems; the use of digital artifacts and systems; and the disposal of digital artifacts and systems. I show that the lifespan of digitalia is replete with gendered power relationships. I focus on the ways that gender comes up over and over again when we focus on the effects of digital industries. In this way, I show how embodied labor practices have material effects, physical effects, environmental effects, and positional effects.

I close the chapter by foregrounding some of the interventions that can be made to make students aware of these relationships, and also to push against the damage we are doing through our use of digital artifacts. I explore some of the political projects that have been created—around the material labor relationships of power, body, and technology—within a learning space. Specifically, I explore both online design practices and classroom pedagogies that educate people about reuse/recycle options for technological devices. I implore an increased sensitivity to the material/embodied relationships of labor and the production of technology, and I advocate a praxis that draws on this sensitivity.

In the concluding chapter, chapter five, I summarize the main points of the last few chapters by focusing on the practical application of these ideas. I focus on three platforms/programs specifically meant for educational purposes. First, I analyze *Second Life* and its education islands. I focus specifically on the islands that are meant to be associated with schooling or schools. I explore the ways that this digital space creates engagement and more social awareness—more socially just spaces. I also note places where it fails—or where it could have done better at creating a complex orientation to embodiment. I then explore the educational program *Environmental Detectives*. This is a program that is focused on grade levels 7-16. It is a

program that overlays pre-programmed information, GPS data, and the ability to connect between user sites, into one package that allows students to *become* environmental engineers in their area for a specific time frame. It is focused on a given problem, and students need to go out and solve the environmental problem in their own community. Again, I talk about how this program creates engagement and more socially just spaces. I also talk about the things that this program could do to be a little more complex or expanded in its orientation to body and community. Finally, I focus on the recent proliferation of *Youtube* videos for educative purposes. I highlight three collections of videos designed to resist inequality and oppressive stereotypes around gender: *This is What a Feminist Looks Like*, *Gay Stereotypes*, *I Despise Thee*, and *Lesbian 101*, are all collections of video diaries designed to educate the public about gender issues. Each of these collections also highlights the interplay of physical embodiment and positional embodiment. Videographers use the physicality of their own bodies and the materiality of the spaces they inhabit to contradict expected norms and confining stereotypes around gender.

For each of these platforms/programs I delve into how physical embodiment, positional embodiment, and embodied relationships of labor are inherently highlighted by the program/platform, or how teachers might intervene to make these experiences more complex—more fully taking up embodiment. I explore the pros and cons, the challenges, promises, and potentialities of each of these programs/platforms.

In this way, I show how a complex orientation to embodiment creates an engaging experience, and has the potential to create more socially just educational spaces. In fact, these educational programs offer the opportunity to create critical and political activism around important issues. These educational spaces/programs offer the ability to show the importance of

both design and pedagogical technique for online courses. While most of the previous chapters of the dissertation will be spent defining and arguing for a complex orientation to embodiment, this final chapter allows me to *show* what this might look like in a real world educational context.

Additionally, I spotlight the ways that current practices of schooling, both bricks-and-mortar practices as well as online practices, have moved away from embodiment. I argue that a complex orientation to embodiment would allow us to push against this elision and create more engaging and socially just educational spaces.

I begin by framing my dissertation within key literature on embodiment. I turn now to exploring embodiment as a question of boundaries, erasures, and demarcations.

Chapter 1

Framing Embodiment Through a Discussion of Boundaries and Erasures

In this chapter, I frame my own discussion of a complex orientation to embodiment through a discussion of boundaries and erasures. I consider the works of key scholars who have theorized embodiment, and the boundaries of the body. I have purposely chosen works embedded in the feminist poststructuralist tradition, as well as works from materialist feminists. My own work takes part in these discussions by insisting that embodiment is multivaried, dynamic, and shaped by race, gender, class, and other identity positionalities; as well as physical, material, and phenomenological. My own theorizing of embodiment dovetails with this body of work in insisting that there are multiple bodies and multiple ways of being embodied, not simply a “standard” body (white, male, Western, straight, able). This scholarly tradition also provokes skepticism around norms, societal expectations, and common sense understandings. It urges us to try and make visible that which usually goes unnoticed.

Theories of feminists poststructuralism and feminist materialism are often pitted against each other in a dichotomous fashion. However, like the ghost in the machine, throughout feminist poststructuralism there is an acknowledgment of physicality and embodiment, although the tangibility and materiality of bodies tends to fall out of the arguments being made by poststructuralists in their attempts to highlight more ideological, discursive, and normativity divides. On the other hand, feminist materialists focus on bodies, objects, scapes, spaces, and sometimes allow discursive force to fall out of the argument. I contend that a more embedded and fleshed out conception of embodiment includes both (in interconnected and overlapping ways) materialist focuses as well as discursive focuses. The interplay, and my centering of a both/and conception of embodiment, is evident in the various scholarship I highlight in this

chapter. My own contribution is to show the lacuna of each theory, to highlight the interplay, and to argue for a nuanced conception of embodiment that takes part in both (and many other) “camps” of theoretical work. I first focus on poststructuralist analysis.

Many feminist poststructuralists focus on the idea of boundaries. Often, the idea is to point out which bodies and embodied identities are positioned within the bounds of normate society and which bodies are outside or defined as Other. McRuer (2006) deploys the term “normate” society, to highlight the paradox of a society that drives toward an insistence on “normalcy” while also discursively defining that norm in a way that makes it impossible to achieve. I deploy this term as well because it works to both draw attention to what counts as normal and highlight the oppression and impossibility contained in that term. In a similar vein, poststructuralist feminists also point to this paradox of common sense norms that are impossible ideals. In order to subvert the power of these norms, many theorists in this vein work to reveal boundaries, push against boundaries, move the boundaries, destabilize boundaries, or erase the boundaries altogether. While my work takes part in this discussion, it also moves within and beyond this scholarship in order to expound on embodiment and mark ways that bodies interact with digital technology

A few of the key scholars who work with the concept of boundaries and embodiment tend to enact the erasure of bodies; erase the physicality and materiality of bodies and embodiment. Donna Haraway and Judith Butler both push us to destabilize the boundaries of physical embodiment in order to subvert hegemonic discourses that coerce oppressive enactments of embodiment and oppressive relationships of power. This drive to destabilization and erasure of boundaries gets at the important work of questioning too-easy and naturalized dichotomies. However, these scholars’ work tends to imply or assume an erasure of the boundedness of

bodies, the materiality of objects, the fleshiness of embodied reality. They move too far toward the destabilization of embodiment, and so erase bodies. On the other hand, recent media scholars like Castranova, Dreyfus, and others try to sure up, define, and mark the boundedness of physical bodies by differentiating embodied material spaces from online spaces to the extent that they erase the embodied experience that we have online. These media scholars create a dichotomy whereby real life is the realm of embodiment, and virtual spaces are spaces of disembodiment. They go too far in the insistence upon boundaries (dichotomies) between the physical and embodied world, and the virtual online world. They draw the boundaries around embodiment in such a way as to erase bodies as soon as they go online.

My own argument is that embodiment, in all of its complexity and fleshiness, needs to come to the fore. As we consider our complex relationship with digital technologies, the boundaries and interaction of bodies (and the boundaries that bodies and technologies cross) are important for creating more engaged and socially just online classroom spaces. To that end, I also highlight the works of other scholars in the feminist poststructuralist tradition who, while acknowledging the messy and multivaried experience of embodiment, nevertheless bring embodied reality to the fore. They center the ways that physical embodiment and embodied positionality shape our relationships with institutions, ideologies, discourses, and technologies. I draw on the scholarship of Elizabeth Grosz, Irene Dankelman (both of the feminist materialist camps), and Robert McRuer in order to talk about physical embodiment, positional embodiment, and embodied relationships to technology and the world—embodied relationships of labor. Grosz focuses on physicality as a living of societal ideologies and norms, thereby focusing on the architectural boundaries that bodies must move within; McRuer highlights the interconnectedness of physicality and identity, and marks the connections between physicality,

material spaces, and identity expectations; and Dankelman expounds on the connections between bodies and access to resources and labor practices, thereby highlighting embodiment across geographical boundaries. Scholarship by Grosz, McRuer, and Dankelman highlights different boundaries, but always focuses on the physical boundaries of architecture, neighborhoods, and nations that bodies must move through and interact with. Their work does not erase boundaries, but draws attention to the boundedness of embodied life, and yet still seeks to move against oppressive regimes of truth and ideology.

I argue that embracing, critiquing, and reflecting on our relationships with technology requires embodiment to come to the fore. A complex orientation to embodiment allows us to make digital spaces—like online educational spaces—more engaging and emancipatory. We need: an embodied orientation that acknowledges our physical relationships with technology (physical embodiment); an embodied orientation that acknowledges bodies as bound up in discursive positionalities that have material and practical effects (positional embodiment); and an orientation that acknowledges the embodied, material, ecological, and global labor relationships and consequences of this digital age. This complex embodied orientation to digital spaces—as still embodied and dependent on the material—will allow us to rethink the designs, practices, and pedagogies deployed in online educational spaces. It will allow us to create more engaging and socially just spaces and pedagogies. The rest of the chapters in this dissertation delve into these relationships more fully, but as a first step, I take up some of the literature on embodiment, as a way of marking my own trajectory into this discussion. I begin with the work of Donna Haraway, by arguing that her work on bodies and technologies (the cyborg) goes too far in an erasure of physical and lived bodily experience.

Erasing Boundaries Between Bodies, Things, and Code: Haraway

Haraway (1991) writes her *Cyborg Manifesto* as a way of pushing back against other feminists who were insisting—at the time—that feminism meant acknowledging the connections between women and nature, and men and technology. Women were positioned as connected to the land in a sort of spiritual or metaphysical sense. Men represented the capitalist push of technology to overtake the “natural” bodies of earth and women. Men were always seen as in opposition to women; nature was seen in opposition to culture and technology; the earth was positioned as opposite modernist capitalism. Haraway counters these dichotomies by providing a “vision”—an “ironic myth”—to position women, animals, and technology as standing together. The fight is against boundaries—too easy dichotomies that bind women to the always-victim; always-natural positionality, and men as both dominant and dominator. Says Haraway (1991), “The evidence is building of a need for a theory of ‘difference’ whose geometries, paradigms, and logics break out of binaries, dialectics, and nature/culture models of any kind” (p. 129). Thus, Haraway contends, we need the myth and political stance of the cyborg: the hybrid of organism and machine that breaks down old boundaries and old dichotomies.

Haraway sees this break down of boundaries as important because the theories that align women with nature and the earth do not provide enough political power or basis in reality to push against the real effects of disempowerment. Haraway (1991) contends that early Western feminisms both elide the differences between women—covering all women’s lives and experiences and differences in empowerment under one identity category—and position women as always defined as contra men and technology. Haraway (1991) argues that postmodern theories are right to question the too-easy and assumed alliances between all women (or all proletariats, or all racial minorities). Says Haraway (1991):

Consciousness of exclusion through naming is acute. Identities seem contradictory, partial, and strategic. With the hard-won recognition of their social and historical constitution, gender, race, and class cannot provide the basis for belief in ‘essential’ unity. There is nothing about being ‘female’ that naturally binds women. There is not even such a state as ‘being’ female, itself a highly complex category constructed in contested sexual scientific discourses and other social practices. Gender, race, or class consciousness is an achievement forced on us by the terrible historical experience of the contradictory social realities of patriarchy, colonialism, and capitalism. (p. 155)

Haraway argues that we need to continue this critique of bounded identities and search for more “affinities” as a way of grounding political action. Haraway focuses on the real material consequences that come with being female, even while she acknowledges the instability of the category “female.” Haraway (1991) recognizes that there are different lived experiences for different women, while also wanting to build a coalition of women. She hopes to build this coalition by offering the cyborg as both political mascot, and metaphor for political action.

In her discussion of the cyborg and cyborg political action, Haraway (1991) sets out to undo the distinctions between animal/human; animal-human/machine; and physical/non-physical (pp. 151-154). Her hope is that, by destabilizing these boundaries or dichotomies, people may be able to build broader coalitions and affinity groups to fight against oppression. Haraway (1991) does this by pushing against the distinction between bodies, things, and code.

Haraway (1991) provides many examples of how these boundaries have already been transgressed. She gives us the example of a human patient who was given a baboon’s heart, as a transplanted organ, in order to live. She points to the scientific connections between humans and our simian ancestors—arguing that there is more of a continuum of human-animal, not a distinction. Haraway (1991) points to new technologies designed to work on and even inside bodies. From eye glasses, limb prostheses, and even designer cells, humans and machines have become hybridized. Haraway (1991) also notes the reduction of the human, in both scientific practice and even popular discourse, to a matter of genetic code or cellular biology. Haraway

(1991) argues that we are all, after all, code that can be put into and processed by a machine. And, in fact, our best and most advanced technologies are not even machines any more—they too are code. “Our best machines are made of sunshine; they are all light and clean because they are nothing but signals, electromagnetic waves, a section of a spectrum, and these machines are eminently portable, mobile” (Haraway, 1991, p. 153). Haraway (1991) argues that this move into “ether” is both dangerous, but also potentially fruitful to create new coalitions against oppression. Her argument is for a destabilization of the difference between bodies and things; between physical and non-physical; a “pleasure in the confusion of boundaries” (Haraway, 1991, p. 150).

Haraway provokes us to see the space of the digital, technological, and human, as necessarily hybrid, undoing the boundaries and binaries that structure our embodied world. But, by making this extravagant and positive gesture, her work implies that we have moved beyond the materiality of artifacts, the vulnerability, boundedness, physicality, and fleshiness of bodies. It is this that concerns me, and this that I push against in the other chapters of this dissertation. Note the ways that Haraway talks about bodies and boundaries in the following quotes.

Haraway (1991) argues for the breakdown between the boundaries of bodies and objects into non-physical code. She says, “No objects, spaces, or bodies are sacred in themselves; any component can be interfaced with any other if the proper standard, the proper code, can be constructed for processing signals in a common language” (Haraway, 1991, p. 163). Haraway (1991) continues the erasure of physicality and boundedness by positing:

High-tech culture challenges these dualisms [of nature/culture; man/woman; physical/non-physical] in intriguing ways. It is not clear who makes and who is made in the relation between human and machine. It is not clear what is mind and what body in machines that resolve into coding practices. In so far as we know ourselves in both formal discourse (for example, biology) and in daily practice (for example, the homework economy in the integrated circuit), we find ourselves to be cyborgs, hybrids, mosaics,

chimeras. Biological organisms have become biotic systems communication devices like others. There is no fundamental, ontological separation in our formal knowledge of machine and organism, of technical and organic. . . . Why should our bodies end at the skin, or include at best other beings encapsulated by skin? (pp. 177-178)

Haraway argues for “boundary transgressions” (p. 178) as a way of destabilizing the dualisms of human and machine; physical and non-physical. But this move erases the materiality and boundedness of embodiment. This dissertation pushes against this move by arguing that embodied experience, while varied, multivocal, and contingent, is nevertheless imminently physical and bounded in important ways.

Judith Butler makes a similar move to erase the boundedness of embodiment. In her push to focus on discursive shaping of embodied relationships, Butler implies a lack of importance and immediacy of physicality and materiality.

Erasing Boundaries Between Body and Discourse: Butler

I focus, in this section, on Judith Butler’s concept of performativity and the use of counter-hegemonic performance as a strategy for political action. First, it is important to acknowledge that Butler believes that performativity has real embodied consequences. How our bodies are made intelligible—through discursive norms and expectations—situates us in different relationships to institutions, communities, and techné. How our bodies are “read” has consequences for our access to resources, our health, and the potentialities of material life. However, while Butler acknowledges that identity is both a performative and embodied practice, her focus on performativity creates an erasure of physicality—of material embodiment. Butler works against the stable notions of embodiment-as-identity, by pushing against the notion that identity is bound up with physicality. Butler offers gender as an example; positing that gender is less about the physical characteristics of embodiment, and more about a repetition of stylized

acts that create the “becoming” (always becoming, never accomplishing) of gender. Says Butler (1999):

Gender ought not to be constructed as a stable identity or locus of agency from which various acts follow; rather, gender is an identity tenuously constituted in time, instituted in an exterior space through a *stylized repetition of acts*. The effect of gender is produced through the stylization of the body and, hence, must be understood as the mundane way in which bodily gestures, movements, and styles of various kinds constitute the illusion of an abiding gendered self. . . the *appearance of substance* is precisely that, a constructed identity, a performative accomplishment which the mundane social audience, including the actors themselves, come to believe and to perform in the mode of belief. (p. 179)

The above quote demonstrates Butler’s unmooring of physicality from identity. She focuses on the ways that discursive norms and societal practices create the appearance of substance, but she is loath to deal with any materiality to that substance.

Butler (1999) continues:

Such acts, gestures, enactments, generally construed, are *performative* in the sense that the essence or identity that they otherwise purport to express are *fabrications* manufactured and sustained through corporeal signs and other discursive means. That the gendered body is performative suggests that it has no ontological status apart from the various acts which constitute its reality. . . In other words, acts and gestures, articulated and enacted desires create the illusion of an interior organizing gender core, an illusion discursively maintained for the purposes of the regulation of sexuality within the obligatory frame of reproductive heterosexuality. (p. 173)

Butler brings our attention to “corporeal signs,” but does not equate the corporeal with anything material or actual. Rather, the focus is on the ways that materiality is known through that articulation of these norms onto bodies. The actual fleshy materiality of bodies gets pruned into nothing more than “corporeal sign.”

In these quotes, Butler is clearly articulating a sense that gender is not something integral to biology or physicality. Rather, gender is a series of repeated readings and enactments in alignment with cultural expectation and societal discourse of the norm. It is this hope—the instability of gender—that allows Butler to advocate for a politics of counter-performance:

performances that would reveal the un-naturalness of identity; the unboundedness of gender from flesh. While Butler's scholarship gets at the ways that power is bound up in identity, it also tends to erase physicality as important or meaningful. Butler makes the physicality of the body unstable, in order to focus on the performative aspects of identity. Notice the way Butler marks the instability of physical bodies in the following passages.

Butler advocates the use of "drag" as a productive parody that displays the lack of connection between physical body and "real" identity. In advocating this position, Butler not only advocates for a de-essentialization of "gender=body," she also unmoors physicality as meaningful. Says Butler (1999):

The notion of gender parody defended here does not assume that there is an original which parodic identities imitate. Indeed, the parody is *of* the very notion of an original, just as the psychoanalytic notion of gender identification is constituted by a fantasy of a fantasy, the transfiguration of an Other who is always already a "figure" in that double sense, so gender parody reveals that the original identity after which gender fashions itself is an imitation without an origin. To be more precise, it is a production which, in effect—that is, in its effect—postures as an imitation. This perpetual displacement constitutes a fluidity of identities that suggest an openness to resignification and recontextualization. (pp. 175-176)

In this quote, Butler (1999) is advocating the idea that "genders can neither be true nor false, neither real nor apparent, neither original nor derived . . . however, genders can be rendered thoroughly and radically *incredible*" (p. 180). Butler (1999) is intentionally creating instability of gender categories in order to open grounds for new and "other configurations, not only of genders and bodies, but of politics itself" (p. 181). In the end, Butler's argument and her politics are about bodies; can bodies be made so amorphous and flowing as to render unstable any category previously seen as "natural"? Butler says: yes. "Just as bodily surfaces are enacted *as* the natural, so these surfaces can become the site of a dissonant and denaturalized performance that reveals the performative status of the natural itself" (Butler, 1999, p. 186).

Butler's scholarship compels us to think deeply about the ways that bodies are bound up in institutions and discourses of normalcy. However, her erasure of physical difference—the physicality of bodies—creates a lacuna around the ways that physicality has meaning for how we operate in the world. If gender is no more than discourse, then the physical body has no meaning; physicality gets erased. This is problematic as physical differences can often shape how one interacts with objects, people, and institutions.

On the other hand, one can also go too far in bounding what counts as physical embodiment. Recent media scholars have fallen into this camp. While these scholars have pushed us to think about what changes when we inhabit both physical and virtual spaces, their insistence on a loss of embodiment—and defining embodiment as something that one inhabits in opposition to online spaces—is highly problematic, as the next section will show.

Insisting on Boundedness of Embodiment; Thereby Erasing Embodiment

In the early days of online communication, there was much lauding of the potential to leave one's cares (and even one's body) behind as one inhabited virtual space. The old trope of becoming someone different online—simply because other people could not see your physical body—held sway; convincing both advocates and skeptics of the power of the virtual space to disconnect people from their physical bodies. Some recent media theorists have taken this belief and structured a line of argument around the loss of embodiment, proximity, and intimacy that happens (these scholars assume this happens automatically) when one goes online.

These media scholars encourage us to be aware of the differences between online spaces and material spaces, and I believe they are right to point out the changes to how we understand intimacy and communication with the expanded use of internet communication. However their

work also assumes that one automatically loses intimacy and embodiment when one inhabits virtual space. This insistence upon embodiment as something that disappears with virtual space is highly problematic. This move to further bound the body by defining it as always against virtuality has the effect of *erasing* embodiment, and the embodied ways we interact with technology. Notice the ways the following media scholars frame the virtual space in opposition to embodied proximal space.

Simone Conceicao (2006) describes online spaces as automatically spaces where there is “an absence of physical presence” (p. 26). Nancy Baym (2006) also sees the online space as one where geography, space, materiality, and physical embodiment cease to matter. Baym (2006) writes:

In terms of time and space, as long as one is in a country or region that has access, the Internet makes physical location largely irrelevant. Interaction between two people in the same building is indistinguishable from interaction between people half a world apart. This creates a kind of spaceless proximity that did not exist to this extent before, a sense enhanced by the speed of transmission and immateriality of time. . . . The reduction of physical appearance cues, along with the evidence of status and attractiveness they bear, creates a kind of invisibility or anonymity . . . obscuring information about participants as individuals . . . there is usually no need to specify identity and location of recipient [of online communications or interactions]. (p. 38)

The media scholar Castranova (2007) has an even stronger vision of the loss of physicality and materiality in these new digital spaces that we are creating. Castranova (2007) writes:

The internet is a “world of perpetual fantasy. . . . Our demands will be largely virtual, and so will the supplies; production, consumption, and income. We will all spend time in virtual reality just because we can. It doesn’t take a lot of resources to keep a body alive, and the mind will be having a good time. . . . If someone built a persistent virtual reality environment where you could be anything you wanted to be, all the time, wouldn’t you go there? (pp. xv-xvi)

Other scholars, too, talk about online classrooms in terms of a loss of embodiment or real-ness. For example, in speaking against online classrooms, Anderson advocates the

“importance of the body in establishing and maintaining human relations” as part of the classroom experience. Says Anderson: “virtual communities by comparison to real ones [are] abstract, diminished, fragile and tenuous relationships, easily broken precisely because they lack the concrete situatedness of embodied subjectivity and intersubjectivity. Clearly, for Anderson, the digital space is seen as one where realness and physicality cease to matter or exist.

Notice, too, the way Hubert and Stuart Dreyfus frame online spaces and internet machines as antithetical to humans and human judgment. The Dreyfuses have warned:

It would be a mistake to replace skilled air-traffic controllers, seasoned business managers, and master teachers with computers that cannot come close to their level of expertise. Computers that “teach” and systems that render “expert” business decisions could eventually produce a generation of students and managers who have no faith in their own intuition and expertise.

Dreyfus envisions a world where real and living people must always be in competition with the machine; that once we move into the use of online spaces, we automatically negate the embodied and human parts of our self. In the 2009 re-publication of Hubert Dreyfus’ book, *On the Internet*, Dreyfus advocates the idea that “machines cannot recognize meaning and so cannot duplicate . . . human judgment.” These remarks become a preface for Dreyfus’ overarching argument: that humans and machines “learn” in different ways and for different ends. While this claim may or may not be true, my concern is that this writing validates a competitive or contrary (polar) stance: humans and material spaces *versus* machines and online spaces. Dreyfus continues his critique of online classrooms by focusing on the online space as a “disembodied” space; a space that separates the individual from reality.

Both the optimists and the skeptics have participated in a language that takes interaction between humans and machines as, *de facto*, non-material, non-physical, and ephemeral. Both the advocates and critics of online education have not taken the time to really examine the relationships between bodies and technologies. By insisting on the dichotomy between human

and technology—body and disembodied—there scholars erase the ways that our interactions with technology are very physical experiences. In this way, they too, erase bodies.

As much as my own work is indebted to these scholars, their account of what digital and technological changes will mean for intimacy, embodiment, and human potential, stand in contrast to my own work that insists on embodiment and materiality—especially in relationships with the digital field—as a still crucial site of greater theorization, especially in the context of online education. This dissertation calls for an understanding of embodiment that insists on the physicality of embodiment, the positionality of embodiment, and also insists that embodiment is a constant state of being—one *cannot* be disembodied.

I finds points of commonality with other feminist poststructuralist theorists. Specifically, the works of Elizabeth Grosz, Robert McRuer, and Irene Dankelman offer a way of articulating the physicality of embodiedness—the fleshiness of materiality—while also working through the dichotomies that position human against machine; virtual against real; natural against discursive; standard against deviant. I turn to their scholarship as a way of framing my own arguments around the complexity of embodiment. Note the ways these authors direct our attention to the physicality of embodiment, while not losing site of a complex understanding of embodied relationships. Notice the ways these authors talk about boundaries—the boundaries of architecture, of neighborhoods and streets, or nations, and even of societal expectations—still while foregrounding the materiality of embodiment. I begin by focusing on physical embodiment and the scholarship of Elizabeth Grosz.

Physical Embodiment in Relation to Technology: Grosz

Elizabeth Grosz's work insists on an understanding of bodies and technologies as shaped by relationships of power and discourse, yet still asserts that bodies are bounded, fleshy and material, and that our relationships with things and institutions are shaped by tangible, material, corporeal bodies within a relationship. In spite of the proliferation of fields of knowledge on virtuality and existence, physical embodiment is still marked, bounded and determined as distinct from machines; there is still a difference between materiality and ephemera. Elizabeth Grosz makes this point by giving examples from the world of architecture, and by drawing on the scholarship of Maurice Merleau-Ponty and Luce Irigaray. Grosz draws on the boundaries created by physical structures—our physical bodies, physical walls, physical objects—to center embodiment.

Grosz (1994) spotlights the work of Merleau-Ponty and Irigaray to remind us of the relationality of the act of touch and physical embodiment. Grosz draws our attention to the act of touching as simultaneously the act of *being* touched. In no other sensual field is the import of the body more apparent. The act of touching reveals that, whenever there is a connection made to an other (object, subject, techne), this connection via touching only serves to reaffirm that there is also a body that stands apart from that other—a body that is touched in the act of touching. The focus on touch allows us to more fully conceive of a relationship where humans and machines—materialities and imaginaries—are connected without synthesizing into each other. Touch can be intimate and consuming, but that does not mean that one body must morph into the other—becoming nothing more than ephemera or an erasure of individuation. In fact, Grosz (1994) insists that individuation and the boundaries created by embodiment are essential to

understanding our relationships to each other, to institutions, to culture, and to things. Bodies are always temporal and material, shaped by culture and genetics, and distinct. Says Grosz (1994):

Indeed, there is no body as such: there are only *bodies*—male or female, black, brown, white, large, small—and the gradations in between. . . . There are always only specific types of bodies, concrete in their determinations, with a particular sex, race, and physiognomy. . . . Bodies are always irreducibly sexually specific, necessarily interlocked with racial, cultural, and class particularities. (p. 19)

Embodiment must be seen as elementary, essential, always enmeshed within the politics of positionality, and always material in its substance and effects. “Flesh is no longer associated with a privileged animate category of being but is being’s most elementary level.” (Grosz, 1994, p. 100)

Grosz argues that, because we are embodied—and because touching is always/already a being touched—we stand in a particular relationship to objects. “It is as an embodied subject that the subject occupies a perspective on objects. . . . The corporeal or postural schema of the body is what enables us to develop a practical relation to objects in the world and a psychic attachment to our bodies and body parts (Grosz, 1994, pp. 90-91). As Grosz contends, it is *as* an embodied being that we understand ourselves in relationship to other subjects and objects around us. It is *as* an embodied person that we come to understand ourselves—as mind, persona, and as bounded physicality. The fact that we, as physical bodies, stand apart from technologies and objects, even as we interact with them—and even become shaped by them—necessitates not only a recognition of embodiment, but also a recognition of the importance of design.

Grosz insists that bodies are always enmeshed in discursive and structural fields of being; and that the physicality of our bodies needs more notice and attention. While space is discursively constructed and shaped, it is also transected by physical boundaries. A sense of finitude must accompany the ways we define both bodies and space. Grosz (2001) takes

architecture as her example. She talks about the boundaries created by the interactions of bodies and physical spaces.

While architecture can be influenced by social expectations—and in fact can also shape social expectations—architecture is also accountable for the ways that bodies are subject to their own fleshly attributes. The fact that an architect prescribes that the counter-height in a kitchen be suitable for a person between 5’4 and 5’7 reflects the fact that architecture is networked into discourses that define the kitchen as female space (females, in general, having bodies that more often than not fit within the 5’4 to 5’7 category). The fact that the architect prescribes that counter tops be made of materials that are not prickly to the touch and that the counter tops be connected to cupboards which are then connected to the floor (as opposed to the ceiling), reflects the fact that bodies feel texture; and that bodies are entities subject to gravity in particular ways (not just code; not just discourse).

Grosz points out that embodiment matters; embodiment shapes how we interact with objects. And, even as objects shape bodies, our bounded bodies still shape how we interact with the objects. I would like to expand on Grosz’s counter top example to point out the ways that we can be physically shaped by—and yet stand apart from or in distinction to—techne. If a counter top is too low, bodies will have to arch backs and crane necks in order to reach the counter top. After extended use of the counter tops that don’t quite fit, bodies can be shaped into a hunched over position. The use of a counter top that is too low can shape the body in detrimental ways. Likewise, bodies can be shaped in detrimental ways if the counter top is too high. If the counter top is too high, shoulders arch close to the ears, in order to lift the arms high enough to actually use the counters. Again, bodies—both skeleton and muscle—can be shaped by using a counter top that is too high. Yet, the counter top, while affecting the body, does not change the

relationship of the body to the counter top. The body still stands a part from the counter top. The body is still physical and bounded. The body becomes sculpted through use of the counter top. In fact, the body can become quite connected to the counter top through the use of the counter top (hands on knife, on cutting board, on counter top). Yet, at no time does the body morph into the counter top or become merely a sign of the labor conjured through the relationship of the body and the counter top. The body is always physical, and always has physical relationships with the techne of counter tops.

Something similar can be said about our bodies relationships to more digital technology. For example, we may use a computer—as a tool—to connect with someone else in an online environment. And, we may have a moment where our use of the computer recedes from view: we have a moment where we don't notice the computer, but only notice our interaction with a loved one—perhaps using Skype to facilitate that interaction. The relationship we may be intentionally building stands between our self and the loved one, but the computer is also part of that relationship and also stands as a distinct entity apart from the other two humans in the relationship. Technology can instill a potential for intimacy between humans, and can, in a way, meld into the relationship between humans (receding from view), but always stands as a separate physical object in triad with the two embodied humans who are connecting. Our interactions with others (subjects and objects) are still structured through embodiment and physicality. Grosz centers this point when she talks about the need to see technology (digital technologies, the internet, digital bodily enhancement, online role-playing games) as still part of a relationship with physical bodies that stand in difference to technological objects. Grosz (2001) writes:

I get as much pleasure as anyone from this technology and its potentialities, but it seems to me that what this technology offers is precisely an enhancement of the body, not its replacement. The body you have is still the one sitting there hooked up to the machine, regardless of the clothing or apparatus you put on [or in] it. . . . The body can harness a

whole load of technological input, but there is a limit to its capacity for technological transformation. I don't know what this limit is, but there is a boundary beyond which the body ceases to be a body. . . . It is arbitrary, but there is a certain point at which the replacement of every organ by a prosthetic one produces something fundamentally different in type. There's a point at which you can replace toenails or a spleen or whatever, and yet the body can still be considered the same. . . . But there is a point beyond which things start to function differently. . . . You would have to be a fundamentally different kind of person. (pp. 16-17)

This understanding of an embodied relationship to technology has important ramifications for online learning.

For one, it means we need to focus on how actual technological objects are designed. We need to notice that bodies are variable and different, and design accordingly. It means we need to honor the ways that technology shapes bodies, and that all relationships and interactions are embodied; that to touch is always/already to be touched. There are multiple examples on how flesh—embodiment—makes a difference for how we interact with technology. Here are two examples.

I think of my father, who has now passed the point of needing glasses to read. He has a job that requires him to be constantly connected to others; sending multiple texts and emails every hour. He often bemoans the fact that most phones are not made for people whose vision is starting to be impaired. The task of reading and sending messages on his phone (whether via text or email) often requires the “dance” of moving the phone toward the eyes and away from the eyes—in order to be able to focus enough to see what one is reading or sending back. Either that, or one must go through the hassle of finding and then discarding reading glasses whenever one has to go from interacting with the phone, versus interacting with the rest of the physical objects in the world. My father could benefit from a more personalized cell phone experience.

On the other hand, website design sites like *UXBooth*, constantly have posts about the lack of complete standardization in both screen resolution and display size among cell phones.

The constant query is: for whom do you design the website? Do you design for the cell phone that has a limited display, or for the cell phone that has a large display and high resolution? Depending on design choices, individual users may see a very shrunken version of a website, or may upload a website that does not fully fit on the device screen.

This is because, when designers engineer technologies like cell phone or computers, human bodies are part of the equation—but only part; and a standardization of what humans look like (the size of hand, the ability to see) is assumed. Writing for *ZDNet*, the blogger Ken Hess (2013) blogs about the interaction of human bodies, consumer desire, and technological limits in the design of digital devices. The physical characteristics of the “standard” human are considered, but so are other facets. Hess (2013) ruminates on the changing size of cell phones by observing:

It was funny when Will Ferrell pulled out his almost microscopic cell phone during a skit on Saturday Night Live and it’s funnier still to look back at ‘80s sitcoms when the posh kids used the giant cell phones that were so cool. But for a moment, one has to ponder the question, “What has happened to cell phone size over the decades?” I find it puzzling that we would evolve from heavy, brick-type phones that would hardly fit into a brief case to tiny, palm-sized ones only to go back toward the brick days with slabs that are too large for pockets. Unless you wear cargo pants or cargo shorts, that is.

Are we trending toward larger phones because of their multi-functionality, or is it because we have an aging, presbyopic population on our hands?

Just how big is too big for a cell phone? How small is too small for a tablet? And, just as query worthy, how small is too small for a cell phone? (Hess, 2013, blog)

Hess (2013) notes that cell phones need, ultimately, to be portable. If they are not portable, they lose functionality, but if they are too small, they also lose functionality. Thus, the design of cell phones must walk the line between how humans read and type with their phones, but also humans carry around their phones. Devices are also limited by the cost-benefit analysis of corporate profits as companies try to both work within and push to expand the limits of engineering. However, this acknowledgment of physical embodiment and design practices brings

up questions. Who is assumed as the standard consumer? What hand size is considered standard? What level of vision acuity is considered the norm? What method of carting around your cell phone is considered average?

Acknowledging that fleshly bodies interact with technology provokes us to concern over how technologies are designed. This turn toward embodiment encourages us to think through how students with disabilities or some form of impairment might interact—or be at a disadvantage when interacting with—technologies designed for learning. Furthermore, this orientation to embodiment guides us to consider how technologies assume a standard of embodiment (bodies must be a certain size and shape) in order to interact comfortably with the technology. When we think about the ways that embodied interaction requires both a touch and a touching, we are compelled to think about how technologies might be designed differently, more flexibly, in order to create a fuller sense of empowerment and engagement when interacting with the technology. More will be said on this in chapter 3 which focuses on the physical relationships with technology. Suffice it for now, to say that Grosz makes a serious argument about the tangible, material, and fleshy interaction of technology and bodies.

Another scholar who focuses on the interactions of physicality and institutions, ideologies, and discourses, is Robert McRuer. In his *Crip Theory*, McRuer (2006) uses Butler's work on performativity to draw attention to a politics of performing identity differently. However, McRuer walks a much finer line in insisting on centering the physicality of embodiment, as well as discursive identity.

Performative Embodiment, Physicality, and Positionality: McRuer

McRuer's (2006) project is to create both fluidities and boundaries around bodies—bodies of scholarly work and actual physical bodies. Primarily, McRuer's (2006) work pushes for a place within the academy for a disability studies shaped by queerness, and a queer studies that remains queer—and “disabled” from the academy. McRuer (2006) wants both subversiveness and play, but also close attention to physical and material realities. In order to establish the place of the “body” of scholarship he calls “crip theory,” McRuer also articulates a political stance around bodies.

McRuer (2006) believes in play and subversion, and is partial to some of the “performative” activism put forth by Butler. For example, McRuer (2006) calls for people to “out” themselves as HIV positive as a sort of counter-hegemonic performance that works against that notion that only “deviant” people get AIDS.

In order to further the rights and life choices of people with disabilities, McRuer (2006) calls for both an acknowledgment of and an “acting out” of the fact that “we are all disabled/queer, since all of us (at some point and to some degree—or to some degree at *most* points) inhabit composing bodies that exist prior to the successful alignment of all of these features [of the ideal subject]” (p. 157). McRuer (2006) focuses on the fact that all people become unhealthy and un-able at different points in their lives. It is impossible for any bodies to fully inhabit the “normal” subject position, so, in effect, we are all queer; we are all disabled.

In this way, McRuer (2006) actively erases the line between queer and normate; between able-bodied and disabled. And yet, while McRuer advocates for creating instability in embodied identity, he nevertheless centers embodiment (embodiments) as an important stance for understanding relationships to power.

McRuer advocates the idea that we are all disabled, but he also points to the ways that institutional norms and societal discourses work on bodies in different ways. McRuer (2006) notes that bodies which appear to be disabled are automatically assumed to be asexual. Thus, when people with dis/abilities assert their sexuality and sensuality, they are seen to be breaking social norms. McRuer (2006) ponders the ways that bodies marked as disabled are structured outside of desirability. He advocated for the assertion of overt sexuality as an antidote to this (pp. 190-193). Thus, physical bodies become both the mark of the outsider, but also the terms and tools of contestation and political action. Like Butler, McRuer advocates for pushing against societal norms, but he does this by centering physical embodied differences, not the erasure of those embodied differences.

Another example of this comes from McRuer's description of an "act out" campaign where people in wheelchairs used machines to chunk out sections of curb along city streets. People with dis/abilities—perhaps especially people in wheelchairs—are often positioned as vulnerable, victims—and therefore non-threatening. Thus, the campaign to actively rip up streets brought attention both to the physical objects (the curbs) which rendered people in wheelchairs impaired, and also worked to subvert the assumption of people in wheelchairs as docile.

McRuer's scholarship works to both call attention to embodied positionality, while still focusing on the physicality of embodiment. This is important because where and how our bodies are positioned, within the societal power hierarchy, often have grave consequences; physical consequences. Consider the following.

Not long ago, *Frontline* created a documentary that followed the employees of—from the hospital CEO to one of the surgeons, to one of the nurses, to one of the billing specialists, and then on to one of the janitors—to show that class status matters for your health; for your body.

They should that, even though all of the people in this study lived within 20 miles of each other, and all had histories of illness in their family line, there was a strong correlation between money and health. Those with more money, even when they had demanding jobs, experienced less stress, had a lower chance of diabetes and heart problems, and had a decreased chance of mental degeneration with age; all of this even though all parties had access to preventative care. The identity of each individual—how they were discursively positioned within society and acted upon and within identity constraints and expectations—was strongly correlated with what happened to their physical bodies.

Our positioning within society is often based on and has affects upon our physical bodies. This is important, especially as we consider the relationship between embodied positionality and our relationships with digital technology. According to the blog *Feministing*,

About a year ago, the Wikimedia Foundation, the organization that runs Wikipedia, collaborated on a study of Wikipedia's contributor base and discovered that it was barely 13 percent women; the average age of a contributor was in the mid-20s, according to the study by a joint center of the United Nations University and Maastricht University.

Sue Gardner, the executive director of the foundation, has set a goal to raise the share of female contributors to 25 percent by 2015, but she is running up against the traditions of the computer world and an obsessive fact-loving realm that is dominated by men and, some say, uncomfortable for women. (Feministing, 2011).

This gender gap is echoed in many other spaces on the internet. The OpEd Project has found that, in general, you can find this same 15-85 gender split from everywhere in the blogosphere to the Opinion pages of newspapers. The Pew Research Foundation has made similar findings about the gap between women and men and the use of technology (Pew, 2011, Gender Divide).

There are not just gaps between genders; there are also gaps that arise based on race. Eszter Hargittai (2012) has found that far more Whites and Asians use the web to find political and “informational” news, and to *create* content. According to Hargittai (2012), Blacks and Hispanics use the web to *consume* media and find information about “entertainment.” These gaps

between the creation versus consumption of media—that correlate with race—are troubling. Many researchers (Daniels, 2009; Hargittai, 2012; Taylor, 2012; Terranova, 2000) have found that there are racial gaps in how people use the internet, how much they produce artifacts and information rather than consume artifacts and information, and where people go. The Pew Research Foundation (2011) has also found that there are gaps in how intense and for what purposes different races use the internet. There is a gap—less in access to the internet—and more in usage of the internet.

Why these gaps and others exist deserves more focus. In chapter 4 of this dissertation, I excavate how embodied positionality frames our relationships with technology, and how we can change or contest those relationships, while still maintaining a complex orientation to physical and positional embodiment.

Finally, Irene Dankelman is another theorist who points to the complexity of embodiment, and also focuses on the boundaries that divide nations. Her work, along with the work of Grosz and McRuer, more fully informs the trajectory of my dissertation. Dankelman's scholarship points to the complex embodied relationships of labor that exist around the interaction of bodies and digital technologies.

Embodied and Material Relationships of Labor: Dankelman

In this section, I highlight the material and embodied relationships between people and the creation of digital technologies. Like both McRuer and Grosz, Dankelman focuses on the ways that physical embodiment and embodied positionality within society shapes one's relationships with technology. Irene Dankelman shows the connections between lived embodiments and material realities as they relate to technology. Dankelman's (2009) work

focuses on “the theme of gender, environment, and development (GED)” (p. 464). Again, focusing on gender, Dankelman notes that women have a particular relationship to the environment—an environment that is increasingly shaped by the production of digital technologies. Says Dankelman (2009):

At first sight, the relationship between society and the physical environment appears gender-neutral, affecting both men and women in a similar way. But a closer look reveals that it is not neutral at all: the socio-cultural construction of relationships between men and women means that linkages between people and the environment work differently for them. (pp. 458-459)

Dankelman argues that women are more affected—given their various socialized roles—by the changes in environment and labor productions.

In her work, Dankelman sites research by various NGO’s and other pro-environmental and feminist organizations that draw out the specific effects of changing labor practices and the increased destruction of land/material environments on women’s lives. Dankelman (2009) quotes from a report given by The Center for Science and Environment that states:

Probably no other group is more affected by environmental destruction than poor village women. Every dawn brings with it a long march in search of fuel, fodder, and water. It does not matter if the women are old, young, or pregnant: crucial household needs have to be met day after weary day. As ecological conditions worsen, the long march becomes even longer and more tiresome. Caught between poverty and environmental destruction, poor rural women in India could well be reaching the limits of physical endurance. (p. 460)

This report helps Dankelman to establish the unequal effects of changing practices and destruction of the environment on the lives of women. However, Dankelman is quick to point out that “women” is not a homogeneous category; that globalized and technologized practices have different effects depending on gender—and also depending on race, class, and other postionality factors. Says Dankelman (2009):

There are vast economic, cultural, and social differences among women. Distinguishing factors include class, caste, race, kinship, age, and nation of origin. Even within the same village, women of different classes and castes may have very different positions and

roles. The same is true for women living in a rural or urban setting. The position of a tribal woman can be completely different from that of her female neighbors; from a settler's family. These differences are as crucial as those between women and men. (p. 461)

It is important to note that there are differences in how women experience and are affected by globalized environmental practices.

While Dankelman acknowledges that there are extreme differences contained in the category "women," there are still commonalities as well. Dankelman points out that, in general, women have the role of running households; the responsibility to make sure the basic necessities of life are provided. Women do this in varying ways, some by literally gathering these resources from the land, and others by going to various stores and procuring these resources. Either way, women have been socialized to take on the role of caregiver: caregiver of children; caregiver of homes; caregiver of other family members and neighbors. This role positions women as the ones who are most often knowledgeable about what it takes (the cost in labor or money) to provide things like food, fuel, water, clothes, and other necessities. Dankelman (2009) argues that:

Women bear the highest costs of the environmental crisis because of their role in providing water, food, and energy for their families. On the other hand, women also have the potential to contribute significantly to environmental crisis solutions precisely because of their management of those primary resources. (p. 460)

That is to say, in addition to being the most affected by destructive environmental and labor practices, women are also often in the best position to work for change.

How does this relationship between women and the environment translate into specific embodied relationships with technology? Increasingly, research is showing the material effects—effects on the environment—that the making of digital technologies has. A study by the United Nations University (2004) reveals that there is an immense cost to building our technology sector. This cost comes in the form of varying and often sub-par wages for women and children, and also comes at the cost of worsening environments.

The BBC (2004) detailed this UNU report on the destruction of environments due to the building of digital technology artifacts by recounting the following: The making of the average PC requires 10 times the weight of the product in chemicals and fossil fuels. Many of these chemicals are toxic, and contribute to global warming. Any waste in the creation of these products is dumped into landfills. Consider further that, according to the UNU report (2004), the manufacturing of a 24kg PC with monitor “needs at least 240kg of fossil fuels to provide the energy, and 22kg of chemicals. Add to that, 1.5 tons of water, and your desktop system has used up the weight of a sports utility vehicle in materials before it even leaves the factory” (UNU Report). The UNU report (2004) states that, in both the manufacture and disposal of digital devices, people are exposed to “Chemicals such as brominated flame retardants and heavy metals including lead and cadmium [which] pose potential risks to factory workers and users of water supplies near landfill sites where old computers are dumped” (UNU report, 2004).

The report from UNU details the very *material* cost of this cyber revolution, and further lays out the material costs of technological artifacts by contending that:

The study examines a variety of environmental impacts associated with computer production processes. The main impacts are believed to be:

- Significant energy use in the production and operation of computers.
- Possible long-term health effects on workers, families and neighboring communities due to chemical exposure and emissions from production stages such as microchip fabrication.
- Possible health impacts due to exposure to hazardous materials contained in computer products, in particular brominated flame retardants and lead. The main risk of exposure is probably from computers that have been dumped in landfills or from environmentally unsafe recycling processes in the developing world. (UNU Report, 2004)

According to the UNU Report (2004), 1.8 tons of raw materials are required to manufacture the average desktop computer and monitor. Many of these materials will be emitted into the

atmosphere or will end up in landfills—sometimes affecting soil and water quality. These material realities have a disproportionate effect on women—especially poor women of color living in rural communities in the global South.

We need more awareness of the embodied material relationships of labor, and unequal negative consequences of these relationships of labor. Chapter 4 in this dissertation takes up these embodied relationships of labor and posits a turn to eco-social justice pedagogy as a way of pushing against these unequal embodied relationships. Dankelman’s work grounds my own focus on the embodied labor consequences of our digital world. I explore the “lifespan” of a digital artifact—from design, to production, to use, and then to disposal—to show the complex material embodied labor relationships we have with technology. Only by first noticing these relationships, can we start to act. We can change how we use technology. We can design software to run on older and more re-usable machines. We can make ecological and environmental questions a part of our coursework and pedagogical practice. More will be said about this in chapter 4.

Throughout this chapter, I have shown that embodiment matters: it matters that we are physical beings; that we are embodied, and perform that embodiment within hegemonic regimes of truth that construct our understanding of bodies and norms; and finally, it matters that we exist in real material relationships with labor, objects, globalized practices, and bodies. We exist as *bodies*—variably placed, empowered, physical, and situated—in relationship with technological artifacts, and materials of production and labor. All of these relationships of embodiment invite us to re-think how we articulate, create, design for, and teach in online educational spaces. We need to rethink both pedagogies and platforms for online learning—and this is the final intervention of my dissertation.

In the next chapter, I begin my intervention into the debate over embodiment and online education by centering the *physicality* of embodiment. As we become oriented to the physicality of embodiment, we can create healthier, more engaging, and more socially just learning environments.

Chapter 2

Embodiment as Physicality

As part of arguing for a more complex orientation to embodiment, in this chapter, I argue that we need to take up, focus on, and orient to the *physicality* of embodiment. The physical nature of embodiment is only one part of the complexity of what it means (and how/why it is important) to be embodied. However, as a way of parsing out this complex concept, I focus, individually, on the physical, the positional, and embodied material relationships of labor. For this chapter, I focus on physical embodiment.

Bodies are *physical*; physically different; and shaped by the physical and material world in which they exist. These qualities of embodiment should be considered as we design educational spaces and pedagogical strategies. By focusing on physical embodiment, different needs and practices of *doing* online education come to the fore, such that we can more actively create engagement and socially just educative spaces.

For too long, educators and theorists have been tempted by the too-easy Cartesian duality of mind and body, where *the* body (as if there is just *one*) is simultaneously disavowed and coerced into “fitting in” (fitting into uncomfortable chairs, for long periods of time, without moving, without much talking, and without disrupting the teacher or other students; in essence, fitting into societal expectations of docility). This chapter pushes against these Cartesian practices, and argues that, only as we design with *physicality* in mind, can we create more engaging and socially just learning environments.

In order to trace out what an orientation to physical embodiment might look like, I first explore some of the theories about physicality, why physical embodiment is important for how we learn and exist in the world. Then, I excavate two of the qualities of physicality as they

pertain to engaged and egalitarian learning spaces. Specifically, I excavate the concepts of movement and—what I am calling—physio-temporal contingencies (or, the ways that bodies are physically different, and shaped by material realities and temporalities). I contend that we need to focus on both movement and physio-temporal contingencies in order to design better learning environments. I also give examples from the world of online games and digital leisure—examples of ways to take up and take into consideration movement and physio-temporal contingency—that could be ported into online educational spaces. Provoked by the desire to expand market share and pushed by market demand, the world of digital play and leisure has been particularly responsive to creating a more “physical” and “embodied” experience; the game world, again, for market reasons, has been at the forefront of the design-for-all movement which makes gaming experiences more dynamic and responsive to variable embodied realities. These ideas can be used within the educational context as we try to create better online learning environments. I begin by relating some of the theories on physical embodiment that have framed and forged my own understanding of physicality.

Theorizing Physicality

As I have reflected on and sought after a complex orientation to embodiment in my own practice of teaching and scholarly work, there have been theorists who have directed my attention to various aspects of physicality of *physical* embodiment. These theorists have shaped how I see embodiment, and I offer a short *precis* of some of their work as a way of giving shape and definition to why *I* find physicality so important for education and learning. These works will also ground further arguments about the need to orient toward physical embodiment throughout this chapter.

Maurice Merleau-Ponty has prompted me to think about the ways that we know (and come to know) our world, and even abstract concepts, *through* our bodies. Merleau-Ponty (1948/2008) insists that the only way to access knowledge is through our bodies—through our senses. Even the ways we go about understanding an abstract concept relies on knowledge we gain through our physical (and sensory) bodies. Merleau-Ponty (1948/2008) argues that all metaphors and all symbols have meaning only through a complex “looking back” to something that we know through our senses. Thus, physical embodiment is the path to knowledge and meaning. Merleau-Ponty’s work pushes against both Cartesian and Kantian notions of a mind that exists *a priori*, or even a space that exists *a priori*. Spaces are known through our physical senses, and our physical senses are brought out (brought into meaning) through their constant use in the world. The mind and the action of thinking and knowing is matter of making sense of our physical senses and physical experiences in the world. The more we pay attention to our physical experiences and perceptions, the more we come to know *how* we know and *that* we know something. Merleau-Ponty’s work highlights the importance of foregrounding physicality as part of knowledge-making and the learning process. Merleau-Ponty’s work provokes me to think about *how* bodies are used to make meaning of the world; and also prompts me to ask how bodies are used—or not used—as part of the education or schooling process.

Expanding and contesting Merleau-Ponty’s work, Luce Irigaray, both takes up Merleau-Ponty’s foregrounding of knowledge-through-the body, and also pushes against Merleau-Ponty’s apparent insistence on “the” body (just the one?), and further pushes against Merleau-Ponty’s privileging of the sense of sight—or the visual. Irigaray (1984) reminds us that there is not just one body; that all bodies are different, and that different bodies will experience things differently. Irigaray (1984) foregrounds the fact that women’s bodies can experience things that

men's bodies are not capable of (pregnancy is brought up), and that these experiences can lead to different types of knowledge and perception. Furthermore, Irigaray (1984) counters Merleau-Ponty by insisting that the sense of "touch" is the prime sense of perception. She notes that, to touch, is always/already to be simultaneously touched. The sense of touch is always bound up in the sense of "feel." In this way, the sense of touch gives us the most direct access to our world and knowledge-making, as well as a mark of the individuation and interconnectedness between bodies and our world. This is not to say that the sense of touch is somehow pure or "unmuddled" by other senses, contexts, or social institutions. However, Irigaray argues that to knowingly touch the world is to *know* that you will be touched back. This creates a different sort of relationship to the world. And, for me, these points are worth considering as I think about educational practice and learning spaces. Through Irigaray's scholarship, our critical attention is turned to the myriad ways that bodies are different, that they will *know* things differently. Her work also causes us to reflect on how we *touch* educational spaces—and how they touch us back.

Other theorists who shape my definition and understanding of physicality include both Elizabeth Grosz and Christopher Tilley. Both of these scholars insist on understanding bodies as always/already within real space. In fact, Tilley (2008) expounds on the idea of the "placial": the idea that bodies don't exist in empty space; they are always within a particular relationship with other objects or bodies in the world (p. 17). Tilley (2008) gives an example of going to see some ancient carvings on some massive rocks. Tilley (2008) argues that the rocks

exerted bodily or kinesthetic influence on the way I moved and what I perceived. . . . If I wanted to see them closely, I was forced to move about the rock in a particular manner and in a particular sequence. The carvings were exerting their own power and influence in relation to what I saw and from where I saw it, and how I saw it. (p. 16).

Tilley reminds us that context matters: bodies do not exist apart from other things and other bodies.

Grosz makes a similar argument. Says Grosz (2001):

Conceptions of space and time are necessary coordinates of a reinterrogation of the limits of corporeality: there are always two mutually defining and interimplicating sets of terms, always defined in necessarily reciprocal terms, because any understanding of bodies requires a spatial and temporal framework. Conversely, space and time themselves remain conceivable insofar as they become accessible for us corporeally. (p. 31)

Grosz contends that knowing the world requires an insistence on physicality of embodiment and the materiality and temporality of the spaces bodies inhabit. Bodies and other objects (both physical and non-physical) remain actants that are interconnected and intersecting, but still distinct. It is this relationship that both creates perceptions of reality, and frames how we act in the world, and act *toward* a better world.

Grosz (2001) continues:

There can be no liberation from the body, or from space, or the real. They all have a nasty habit of recurring with great insistence, however much we try to fantasize their disappearance. (p. 18)

Grosz's work intervenes into any theories that either discount the importance of bodies or suggest that there are times we become disembodied.

Grosz provokes us to think about the physical; and that physicality—what Grosz calls the corporeal—always exists within real, material, temporal spaces and relationships. This theorization of physicality and temporality pushes me to think about my students as existing within contexts of their own, and not as decontextualized entities that somehow only exist within our relationship as student and teacher. Grosz reminds us that physical bodies matter, and that there are real life materialities that exert influence on my students outside of the classroom.

Finally, as I seek to frame my own understanding of physicality, I highlight the work of Robert McRuer. His work on “Crip Theory”—which brings together queer studies and disability studies—reminds me of the subtle, and not-so-subtle, normalizing practices that privilege some forms of physical embodiment and not others. McRuer (2006) reminds us that most spaces tend

to privilege physical bodies that are, in many ways, a culturally constructed ideal, and not a lived reality. He further reminds us that all bodies are (or will be) in need of accommodations, at some point, in order to have equal access to spaces (places?) and resources. In describing the “ideal” physical body, McRuer (2006) notes that the societal conception of able-bodied-ness:

emerges from disparate features that are supposed to be organized into a seamless and univocal whole: a standard (and “working”) number of limbs and digits that are used in appropriate ways (i.e., feet are not used for eating or performing other tasks besides walking; hands are not used as the primary vehicle for language); eyes that see and ears that hear (both consistently and “accurately”); proper dimensions of height and weight (generally determined according to Euro-American standards or beauty); genitalia and other bodily features that are deemed gender-appropriate (i.e., aligned with one of only two possible sexes, and in such a way that sex and gender correspond); and HIV-negative serostatus; high energy and freedom from chronic conditions that might in fact impact energy, mobility, and the potential to be awake and “functional” for a standard number of hours each day; freedom from illness or infection (ideally, freedom from the *likelihood* of either illness or infection, particularly HIV infection or sexually transmitted diseases); acceptable and measurable mental functioning; behaviors that are not disruptive, unfocused, or “addictive”; thoughts that are not unusual or disturbing. Optimally, these features are not only aligned, but consistent over time—regeneration is privileged over degeneration (read: the effects of aging which should be resisted, particularly for women). (pp.156-157)

McRuer (2006) notes that this ideal of normalcy—the “normate”—is unachievable. None of us fit this ideal, or will continue to fit this ideal throughout our lives. This leads McRuer to conclude that:

One could easily conclude from these circumstances that we are all disabled/queer, since all of us (at some point and to some degree—or to some degree at *most* points) inhabit composing bodies that exist prior to the successful alignment of all of these features.” (p. 157)

McRuer (2006) reminds us that able-bodiedness, health, and heterosexist norms are discursively constructed ideals that do not actuate the embodied realities of *anyone*; that all of us are—or will be—limited by our bodies which do not—or no longer will—fit into societal expectations of “normal” movement, health, identity, and being. This prompts us to think about how educational spaces tend to *assume* certain types of physical bodies to be the norm.

McRuer's work further provokes an inquiry into how we can design educational spaces differently, to be more flexible and accommodating to all types of bodies and contexts, and how this move toward flexibility can create more engaging and socially just educative spaces.

Drawing on these various theorists, I define physical embodiment as a complex intermingling of facticities: that bodies are physical, they have shape and form; that bodies can touch and are touched by objects and people around them; that bodies are different; that different bodies have different experiences and perceptions of the world which are shaped by the unique physicality of each body; that bodies are shaped by contexts (space, place, objects, temporality) around them; and that we know the world *through* our physical bodies.

This centering of physical embodiment prompts me to ask: What do physical bodies *do* during a day? How do bodies move in and exist in space? Specifically, what do bodies *do* in a classroom context; in an online classroom context? What do we assume and expect of physical bodies as we design online educational spaces and deploy pedagogical strategies? More importantly: what *should* we expect from physical bodies? How do we create an engaging and egalitarian experience for all physical bodies? The rest of this chapter is devoted to exploring what bodies do, what they could be doing, and how we could be designing for physicality in a more productive way. I highlight two concepts or characteristics of physical embodiment: movement and physio-temporal contingency. I use these concepts to guide a thick description of what physical bodies do, what they could be doing, and how we could design online classroom spaces differently. I begin by focusing on movement.

Physical Bodies and Movement

Physical bodies are designed to move. According to Kenney, Wilmore, and Costill (2012) and Lippincott, Williams, and Wilkins (2010), physical bodies are evolutionarily designed to move and to get exercise. Our brains develop in conjunction with movement and exercise. Physical exercise—movement—can lead to lower death rates, increased brain function, increased ability to concentrate, increased executive function, increased brain plasticity, increased cognitive longevity, increased test scores and increased G.P.A.'s among students. Excerpts from the following articles will illustrate my point.

The academic journal *Trends in Neuroscience* has published many articles on the connections between exercise and brain development. One of these articles claims:

Recent studies using animal models have been directed towards understanding the neurobiological bases of these benefits. It is now clear that voluntary exercise can increase levels of brain-derived neurotrophic factor (BDNF) and other growth factors, stimulate neurogenesis, increase resistance to brain insult and improve learning and mental performance. Recently, high-density oligonucleotide microarray analysis has demonstrated that, in addition to increasing levels of BDNF, exercise mobilizes gene expression profiles that would be predicted to benefit brain plasticity processes. Thus, exercise could provide a simple means to maintain brain function and promote brain plasticity. (Cotman & Berchtold, 2002, p. 295)

This article exemplifies current scientific research which links movement to brain health, as well as musculoskeletal health.

There have also been numerous studies to show the benefits of exercise for children, especially regarding cognitive development, the ability to learn, and perform in school and on tests. Studies from UIUC, Duke, and the California Department of Education have all yielded strong positive correlations between increased physical activity and increased abilities in school and testing environments (Ratey, 2008, pp. 20-25). In fact, a study by Kempermann et al. (2010) revealed that physical activity is vital for the brain to function properly as we go through the process of “learning.”

Physical activity might thus be much more than a generally healthy garnish to leading “an active life” but an evolutionarily fundamental aspect of “activity,” which is needed to provide the brain and its systems of plastic adaptation with the appropriate regulatory input and feedback. (Kempermann et al., 2010, p. 189)

And one final note: according to research by Davis et al. (2011) “Besides its importance for maintaining weight and reducing health risks during a childhood obesity epidemic, physical activity may prove to be a simple, important method of enhancing aspects of children’s mental functioning that are central to cognitive development” (p. 91).

All of this research argues that physical bodies are healthier and our brains work better when we are physically active; when we move. Thus, it is odd that so much of schooling is focused on keeping physical bodies *still*, preventing physical bodies from moving. In many ways, this propensity in schools to hold bodies *still*—to resist movement—leads to un-health (and outright illness) and discomfort for our physical bodies. Research by Galen Cranz (2000) illustrates this point.

Cranz (2000) focuses on one of the common apparatuses of schooling: the chair. The chair literally positions the body to look forward, remain still, and be accessible to the power of the teacher. The chair also teaches the body through habituation to stop noticing other signals or stimuli around the body, as well as to stop noticing feelings of pain and discomfort.

Galen Cranz (2000) spotlights the ways that chairs render our bodies immobile in ways that *hurt* our bodies. She talks about the ways the chair actively erases the perceptions of the body—erases the ability of the body to feel and know itself. Cranz (2000) posits “that years of sitting in chairs have contributed significantly to this problem [of kinesthetic awareness] because chair sitting distorts and reduces . . . perception of comfort” (p. 93). Cranz (2000) contends that, in order to successfully sit in chairs, especially for long periods of time and on a regular basis, we must teach our bodies to ignore signals of pain and discomfort. We must teach ourselves to,

literally, ignore the feelings and perceptions of the body. In fact, if we took the time to notice the discomfort, we would try to work against the contours and shaping-force of the chair. Cranz (2000) argues for the use of the Alexander Technique—which guides students into noticing when their bodies are uncomfortable, and then trying to maneuver the body into a better position. However, the chairs that Cranz (2000) highlights are part and parcel of a system (schooling or work-environment) where users of the chairs are actively conditioned to ignore their bodies, and “pay attention.” Chairs become the material representation of the Cartesian discourse: the need to ignore the body in order to somehow help the mind work. This bodily captivity—produced through the use of the chair—is justified by the societal expectation that chairs help us to “pay attention”: pay attention to our work; pay attention to those who are giving us knowledge; pay attention to authority. The act of paying attention is discursively aligned with the act of sitting still, being quiet, tuning other things out, and focusing forward. This is problematic, says Cranz, because chairs *hurt*.

Cranz (2000) traces out exactly why and how chairs are harmful. Interestingly, she notes that her work specifically focuses on chairs—the kind you would find in a classroom—and not on recliners, or lounge chairs, or anything actually designed for the ergonomic needs of human bodies. Cranz (2000) insists that there are some chairs that actually do support the body—that sustain the body in a position that allows for proper alignment. Cranz is critiquing the types of chairs that are canted back, have no support, and are enclosing structures: chairs typically found in schooling spaces are specifically mentioned. These chairs tend to compact the head-neck jointure. “Any chair that puts people in a posture that distorts this joint upsets the equilibrium of the entire body” (Cranz, 2000, p. 92). If the head-neck joint is compacted, then the back slumps out, the shoulders round, and the body is thrown out of alignment. “The cervical vertebrae

including the first cervical vertebrae extend forward, while the weight of the head comes back and down, rather than forward and up, in relation to the neck” (Cranz, 2000, p. 95). The problems of this off-kilter posture “include back ache, neck ache, problems with vocal production, eye strain, sciatica, shallow breathing”(Cranz, 2000, p. 95). Often, chairs condition the body to slump back in the chair rather than sit with a tall spine. Chairs—specifically classroom and office chairs—cause “thoracic humping” where the neck and upper back must slump forward in order to counteract the backward canting of the chair. This move to bring the head forward causes such strain on the neck that, often, people will then move the upper chest forward in order to relieve strain on the neck. “This then collapses the ribcage over the abdominal region and exaggerates the curve in the mid-back” (Cranz, 2000, p. 95). This will often lead to back injuries such as: Gleno-Humeral tension; migration of the scapulae; cervical lordosis; brachial plexus compression; prolapsed discs; disc protrusion; spinal stenosis; and collapsed vertebrae. Repeated and prolonged tension on the vertebrae—produced from a slumped over or tucked under sitting position—often results in disc and vertebrae injury and neck and back pain. The immobility, produced by chairs, as well as other habits, expectations, and apparatuses, *hurt* our bodies.

As highlighted by Cranz (2000), chairs—found in a classroom—often produce negative consequences for bodies. Chairs are not the only features of the schooling process that contribute to immobility, bad posture, and negative consequences for our health. Desks also reign in the body, making it increasingly immobile. This lack of mobility also leads to damage of musculoskeletal tissue and the compaction of vertebrae. Additionally, the lack of movement, constrained by desks, works against the increased level of focus induced by physical movement.

Pedagogical practices and policies tend to habituate students to stay in one place for prolonged periods of time; they tend to render bodies immobile, and contribute to unhealthy body postures.

While students, stuck in chairs and desks in school all day, could benefit from the ability to move around—benefits provided by gym classes and recess—these programs are often the first to go when budgets are cut or students are deemed in greater need of test-training. Benamati (2010) reports that loss of recess and loss of gym time are often used as punishments for students or whole classes who do not perform up to teacher expectations. Rubin and Kazanjian (2011) have shown that schools are increasingly cutting recess and gym time in order to focus on subjects tested under NCLB.

In addition to research showing that movement leads to brain development, and lack of movement leads to unhealthy bodies, there is also a large body of research showing that movement can and should be used as part of the learning process; that movement can and should be used as a classroom strategy or pedagogy in order to create a more engaging learning environment.

Movement—as a classroom strategy or pedagogy—is correlated to more engagement by students: better ability to recall facts, a more complex understanding of facts, and a higher level of self-reported satisfaction with the learning experience. When students use their bodies to model a concept, they develop a more nuanced and complex understanding of that concept. There is a gestural performance that allows students to retain information better and become more active in understanding concepts.

Scholars, like Lengel and Kuczala (2010) have shown that when teachers use movement as a teaching strategy—use it to actually teach—not just as an attention-getter before one does the “real” teaching—that students get more involved in the activity, ask more questions, do better

on tests, and self-report a better understanding of the concept. This has lead Lengel and Kuczala (2010) to create their six steps or “purposes” of movement-centered learning. According to Lengel and Kuczala (2010), using movement as part of the process of learning will do the following:

- Prepare the brain for communication from one part of the brain to another, so as to better develop brain synapses.
- Provide time for the brain to process and consolidate information; creating and generating expanded schema for a concept.
- Support exercise and fitness as part of a healthy lifestyle.
- Develop cohesion among classroom members; among students and between teachers and students.
- Using movement during a lesson leads to better retention and understanding of the material.
- Teaching through movement allows students of various cultures and language abilities to access, process, and critically engage with information in more expanded ways.

Other studies have corroborated the correlation between movement and increased engagement with others in the class and with the concept to be learned. Nunez and Freeman (1999), Clark (1999), Iverson and Thelen (1999), and especially Sheets-Johnstone (2000) have all written extensively on the importance of movement and touch to the acts of learning and cognition. In order to fully understand objects, and the self-object relationship, we must be able to move around said objects and touch them. Not only that, but as Sheets-Johnstone (2000) argues, the very act of moving strengthens our brain’s ability to make connections between what we see, what we think, and how we reason. This is because, as we move, not only does our body take on a greater sense of awareness of the world (in order that we won’t run into something or be harmed by something), but we are more likely to come into contact with and experience (touch) other objects or subjects in the world. A body in motion *is* a body in learning.

In addition to citing studies that show this correlation between a pedagogy devoted to physical movement and increased engagement in an educational context, I will provide a case study. The following example will show how this type of pedagogical move can create more engaging learning environments. The following example is taken from a bricks-and-mortar classroom, but the concepts could also be used in an online classroom.

In 2011, Ella Shoval published a study that showed a strong correlation between the use of embodied movement as a learning/teaching technique and engagement in the classroom that lead to increased test scores and student engagement. Shoval (2011) describes the study as researching the links between different types of movement and learning outcomes. Shoval (2011) explored five different types of movement that are intended to allow children to be both active and aware of how their activity correlates with the concept being learned. Shoval (2011) highlights physical movement through the environment; touching objects in the environment; visually and kinesthetically modeling objects in the environment; socio-kinesthetic interaction among and between students and objects; sustaining the movement; and awareness of non-movement and non-learning. Shoval's (2011) project examined the ways that movement can help students have a more complex understanding of geometry, but this type of movement for learning could also be used in other subject areas. In Shoval's (2011) study "261 learners from eight-second and third grade classes in six different schools participated in the research. The experimental group included 158 learners from five classes. The control group included 103 learners from three classes" (p. 453). In the study, the groups using movement for learning achieved significantly better results on tests designed to gauge understanding of geometry concepts.

In this study, Shoval (2011) describes the movement for learning as a process of consciously moving the body in order to better understand a concept, using the body to learn. Shoval (2011) defines mindful movement as a learning technique where students engage with each other and the spaces around them. Children form a circle with their bodies in order to learn about the concept of “circle;” they form complex angles with their bodies in order to learn about the relationship of various angles in different versions of a triangle (isocetes, scalene, equilateral). They make physical and visceral connections between the way a bowling ball rolls into the pins and various laws of physics. The students learn to equate the falling of pins, the falling of bodies, with concepts of directional force and impact. As movement-for-learning proceeds, the students connect with their peers as they see their peers moving, they touch them and they touch objects, and they cooperate to make the required movements.

Shoval (2011) insists that the type of movement that she is advocating is different from “movements for the sake of movement.” While the latter is usually conceived for the specific goal of improving physical capabilities or motor skills and puts emphasis on the quality of the movement, movement-for-learning can be performed without giving any special attention to the quality of the movement. Movement-for-learning focuses on using bodies to learn concepts, rather than on perfecting bodily skill sets. Shoval (2011) further contends that “Mindful movement is also different from ‘incidental movement,’ which is not directed at learning, but occurs as a result of active learning” (p. 454).

For Shoval’s (2011) study, students were divided into a control group and an experimental group, and each group was given the same test designed to account for students’ abilities to understand and create complex geometric shapes and angles. Students also needed to

have an understanding of the relationships between shapes and angles (the two equal angles in an isosceles triangle—for example). Shoval (2011) writes:

There was no difference in the average grade of the two groups in the achievement test administered before the research: both scored below 40. In contrast, in the identical test administered after the experiment, the average grade of the experimental group was significantly and statistically higher (79) compared to that of the control group (59). (p. 460)

Not only were students getting higher test scores after using the teaching/learning strategy that foregrounded embodied physical movement, the students were also more aware of their own learning and comprehension. “Subjects were able to assess their knowledge much better when it was linked to moving in and feeling their physical surroundings than when it was linked to learning with a map [or visual device]” (p. 455).

Shoval (2011) has some ideas on why these results occurred. Shoval (2011) argues that, when attention is seen as purely a mental activity, the activity becomes the nerves and muscles—the body—is inactive. Also, when attention wanes or there are no exterior cues (the dropping of arms, the lack of physical movement) that alert both students and teachers that attention is starting to wander. When bodies are active, both physiological and mental alertness is sustained. Both the physical and mental movement or activity work to sustain each other. Shoval (2011) argues: “Not only does moving in the environment supply information about the environment, but it also supplies a reaction component, which is a kind of feedback about the correctness of that information” (p. 463).

Shoval’s (2011) argument is that the use of movement as a way to learn—as a pedagogical strategy—leads to educational gains. It can lead to increases in test scores. It can lead to a more complex understanding of a concept. It can lead to more student interaction. It can lead to better and more frequent student self-assessment. In a word: it can lead to more

engagement. Using our physical bodies—becoming attuned to moving them—can lead to better educational spaces.

Many of the examples I have used thus far to show the need for movement—and the terrible consequences of a lack of movement—have taken the bricks-and-mortar classroom as the norm. Indeed, campus-based classroom spaces could do a lot more to focus on the need for movement; to focus on physical embodiment.

However, this dissertation specifically targets online classroom spaces. And, in many ways, online educational spaces have only exacerbated this move toward immobility. As Haraway (1991) ironically points out, our devices that are said to make us increasingly “mobile,” in fact, render us more immobile. Take a moment to imagine *how* we interact with online educational spaces: that is, what is it that our bodies do in order for us to enter and interact in online educational spaces? More often than not, our bodies sit in chairs, our hands and wrists go through micro-movements that often lead to carpal-tunnel syndrome, and our eyes make small and repetitive movements that can often lead to headaches and eye strain. Our bodies are rendered just as immobile in the online classroom as in the bricks-and-mortar classroom, if not more. Within the campus-based model, most of us have to move in order to walk from one class to another, or the parking lot into class. In online classrooms, we only have to walk the few steps to our computer. However, it does not have to be this way. There are many examples from the world of online games and digital leisure that highlight the ways that bodies can be connected, learning, and still *moving* through the world. There are many examples of how we can create engaging online experiences that orient toward physicality by providing opportunities to physically move through our world; move through and within our communities.

Designing for Physical Movement: Going Digital

There are many examples from the world of online games and digital leisure that highlight the ways that bodies can be connected to one space or group of people, while physically moving through a different space. While I realize that the context of online education and online gaming are different, the world of online games has had a longer history of research and development into areas of engagement, presence, movement, and embodiment in online spaces. Thus, I draw from online games as a touchstone for what *might* be done in educational spaces. The following examples can act as a jumping of point—inspirational fodder—for creating online educational spaces. Note the ways that the following examples allow physical bodies to move through physical space, but also allow for a connection to an online community or learning group.

My first example comes from the sport of geocaching. Geocaching is an outdoor treasure hunt that can take place within the confines of your own city, your state, your country, or the whole world. In geocaching, participants use GPS-enabled devices to find treasures or “caches” that are buried or hidden in various places. Once you have found the cache, you document the fact that you have found it by signing a log book, or taking a picture of yourself at the cache and uploading it to a record-keeping website. You must go online to document your hunt experience. Users comment on each other’s experiences and share photos of the hunt. You can also create a geocache or geocache hunt, and upload coordinates for the cache to one of the various geocaching websites. You can then invite friends and family to your “hunt.” There is a general sense of community and sharing on these websites; people after the thrill of the hunt who want to share their love with other people. Geocaching is a user-generated game or sport that requires both the use of digital technology and the actual movement from one space to another. It is a

sport that operates simultaneously online and in the real world environment. It is a space that relies on physical embodiment and the movement through physical space, but simultaneously a presence online.

This sport exemplifies an in-between sort of space that is both online, and yet is also oriented toward physicality and acknowledging the physicality and movement of bodies. It is a hybrid of online connection and physical movement through spaces. The participant must operate online in order to get the coordinates, the participant must operate using an augmenting-device (GPS), and the participant must move from one real world location to another. Additionally, the participant must document and share the experience by—again—going online. Here is an activity that cannot be seen as *either* an online experience or an offline experience. Rather, this activity is simultaneously online and offline. It is a space where learning, and lived experience happen *in-between* online and offline spaces—and yet is also always/already an experience that foregrounds physicality and movement.

Geocaching provides a great example of how online spaces can be parlayed into the use of both online and offline experiences. It highlights the ways that physical movement can still be foregrounded as part of an “online” experience or community. Another example that features this same combination of physical movement and online presence is the sporting site Strava.

According to Strava’s website, in order to use Strava, you “Grab a GPS device. Go out for a run or ride. View your activities on Strava.com.” Participants carry a GPS-enabled device with them on their runs or bike rides and then, by registering their device with Strava.com, users can: see where they have gone, see how fast or slow they were in different spots on the trail, compare their new stats to previous stats, and even compare their own stats with other registered Strava users. Strava enables you to see what other registered runners and riders are doing. You

can then compare the time it took you to do a 20-mile course with how long it took other users. Additionally, Strava allows you to “challenge” any other users to run a particular course, or meet a particular goal. Strava will tell you how many people “accept” your “challenge,” and how many people follow through. While Strava is a vehicle for increased competition, it also creates a sense of community. There are forums where you can chat with other users. Strava provides “leaderboards” for various trails: so you can see who has the best numbers on a trail in real time. Strava also gives out “suffer points” to those users who have chosen to go through particularly grueling runs or rides.

With the use of Strava, runners and riders participate in a moment that is concurrently online and in material space. Strava users both move their physical bodies through physical spaces and connect with a community online. Runners and riders are moving along trails in the material world. GPS-enabled devices are tracking their progress online. Fellow users are watching the progress online. Both the runners and the watchers will chat about, curse over, and laugh at the day’s happenings in the online forums.

Strava is a great example of the ways that a community can form—through the use of technology—even when users are spread out and do not know each other personally. It is a great example of how we can foster movement, and yet still connect online in order to talk with and learn from each other.

I want to give one more example of a “digital experience” that allows users to move, and yet also allows users to connect with others and learn from others using web-technology. I want to highlight the soon-to-be-on-the-market technology of *Google Glasses*. Not to be confused with *Google Goggles* (a sort of smart phone app that provides a connected, simultaneous, and multi-layered experience when you view a space using your smart phone), *Google Glasses* are

devices that are designed to be worn by the user. They offer an *augmented* reality for the user. Looking like a pair of Oakleys, these glasses come complete with a retina screen, several motion sensors, GPS, 3G or 4G connectivity, and a camera that would allow the user, with a tilt of the head, to overlay information onto and even record whatever location is within sight range. Wearing these glasses creates an experience where the user can move through the material space, get directions, share information and personal thoughts with friends about the space (or anything else), see reviews on or information about the space, and even create recordings—overlaid with information chosen by the user, to send to friends. Designers are imagining an experience where physicality and movement are important—in fact—integral to the experience. While *Google Glasses* come with their own set of privacy worries, they are yet another example of the combination of the ability to move through space, move within communities, be grounded geographically, and yet also share the experience—in an educative way—with others who may or may not be near to you geographically.

In many ways, the above examples from the space of digital play showcase how movement can be important and emphasized, even while using web technology to connect with others. I have used this kind of embodied-tech teaching experience in my own online (and offline) classes.

While studying the ways that classroom layouts can symbolize power and hierarchy, I have had my online students go out into their communities, snap pictures of some sort of “classroom space” and then blog about how that space showed hierarchy in the classroom. I had students take pictures of their local elementary schools, of their summer camp amphitheaters, of children’s library spaces—all in the name of showing what they saw as hierarchical learning spaces in their communities. My students physically moved through space—moving through

their communities. But then, while blogging about their experience, students engaged with other class members in order to make deeper meanings around what they were seeing. Having my students take pictures of their “home” spaces, provided an opportunity to create “personal” and intimate understandings of how classroom layouts can *show* who is in charge, who has power, and how has a right to speak. My students commented that they felt both more engaged in their geographical communities as well as more engaged in our online classroom by going through this “movement experience.”

Movement is integral to what it means to be physically embodied. Moving through the world shapes our experience of the world. However, another important characteristic of being physically embodied, is that we are shaped by physio-temporal contingencies. That is to say, we are shaped by our physical differences; we are shaped by physical contexts; we are shaped by our situatedness in time and space. This next section takes up how and why physio-temporal contingency matters for physical bodies and educational spaces.

Physio-Temporal Contingencies

In this section, I highlight the ways that physical bodies are different. There is not just one “body,” or one “physicality,” or even one experience of being embodied. Furthermore, I push against the tendency to explore the concept of bodies and embodiment as if bodies exist in a vacuum—outside of other contexts and other physical and material temporal-spatial relationships. Part of a nuanced understanding of physical embodiment involves excavating embodiment *in situ*. In this section, I argue that physio-temporal contingencies affect our abilities to participate in educational spaces.

For example, a vision or hearing impairment may affect my ability to participate in an educational experience or to be part of a play or learning community. So, too, might my abilities be shaped and limited if I had not the financial resources to go to a campus-based class, or to buy the latest and greatest laptop in order to participate in an online class. My abilities to participate might be affected by my ability to get a fast internet connection. My participation—in online or offline educational spaces—would surely be affected if I was unable to see information that was written on the white board or other “screen.” When we are oriented toward physical embodiment, we reflect on the ways that bodies are different, and how bodies move through space differently; and then we design and teach with these things in mind. Awareness of embodiment and different forms of embodiment should be part of any educational endeavor. It is only by creating flexible spaces—where all bodies can participate—that we can truly create a socially just and egalitarian learning environment.

In this section of the chapter, I recount some of the statistics on “recognized” physical disabilities in the U.S. context, and how these statistics might shape how we design educational spaces. I also push for a recognition of the differences in physical embodiment that don’t “count” as “recognized disabilities,” yet, nevertheless, affect our abilities to participate fully in a classroom experience. Furthermore, I reflect on one of my own teaching experiences, and how this has shaped the ways I understand physical impairment in a different way. I begin by recounting some statistics on physical disability for both children and adult learners.

According to the CDC website (2012) on census data on disability for “noninstitutionalized adults 18 years or older,” there are:

- 37.1 million adults with hearing impairments (16% of the U.S. adult population).
- 21.2 million adults with vision impairments (9.2% of the U.S. adult population).

- 17.6 million adults who cannot walk a quarter mile (7.6 % of the U.S. population).
- 37.4 million adults with physical impairments (16.2% of the U.S. population).
- 73.7 million adults with activity limitations (32.8% of the U.S. adult population).

These statistics reflect the adult population. However, there are also a large number of children with physical dis/abilities or impairments. According to the U.S. Census Bureau (2011), there are roughly 4% of children aged 5-17 with a recognized physical disability. These physical disabilities include blindness or extreme vision impairment even with the use of glasses, hearing impairment, and mobility impairment. All of these statistics reflect differences in physical embodiment across the population. All of these statistics reflect the need to consider how we teach so that we create spaces and pedagogical strategies that are inclusive and productive for all students.

These statistics and experiences make a case about the need to acknowledge “recognized disabilities.” However, there is also a need to recognize the ways that physical bodies are “different” in other ways as well and recognize the need to acknowledge and design for those differences. For example, while being tall is not a recognized disability, it certainly affects how you enter a low-hanging doorway, or how you sit in an airplane seat, or how you sit in a desk-chair combo seat. As Hettrick and Attig (2009) point out, being large or fat is not a recognized disability; however, it certainly shapes one’s interactions with physical objects as well as one’s relationships to social institutions. One’s body shape and size often affect how one experiences the classroom environment. Let us consider left-handedness: often classroom spaces do not have desks, scissors, or other “classroom” tools designed for left-handed people. Left-handed students are positioned into “fitting in” with right-handed expectation of where your hand, elbow, and paper will go as you sit down to do some serious note-taking or even take a test.

Colorblindness—also not a recognized disability—can affect one’s abilities in and relationships to schooling. My brother is extremely color-blind. He got horrible grades on some math tests until adults realized that the problem was not with him, it was with the tests. He was unable to distinguish “what fraction of a circle or square was shaded blue rather than purple,” because he was unable to see the contrast in the colors. The problem was not his math ability; the problem was a lack of awareness of embodied differences.

As disability scholars like Turner and Shakespeare have shown, disability is a complex interaction of actual embodied difference, and society’s inability or refusal to account for those differences in the ways we shape physical places, interact with each other, and create policy. Disability is an interaction of physical embodiment and social institutions and practices.

More than that, though, if we take a wider view of disability as a moment where one’s ability is limited or curtailed, then disability can be defined as an interaction of physicality, society, and sometimes the temporal moment. Let me give an example.

Last year I taught an online course during the summer that really shifted the ways I think about how physicality and materiality affect our interactions in a space. I was using an online course platform that would allow my students and I to meet synchronously. The expectation was that we would meet together for several hours a week and critically engage with the course materials. When I started the class, I verbalized my expectations that we would communicate a lot in this course. There were only around 10 students, and I wanted a lot of interaction. I pointed out to the students that this particular online program would allow students to use webcams and mics so that we could hear and see each other as we talked. While I told the students that actually speaking their responses and comments (as opposed to just using the provided “chat box” to write them down), and using the webcams—so that we could see each other—was strictly

optional, I also encouraged them to make use of these features. I admit, that my expectations were that we would see and hear each other. On the first day, however, only three of my students used their webcams, and only four used the mic. At first, I thought that this was more about the students' lack of familiarity with the technology. I told myself that things would be more "lively" the next time.

We met the next week, and while the chat box was very active, still, not many people used their webcams and not many people actually spoke. Finally, by the end of class on the second day, I voiced my concern that not very many people were "actually talking." I was concerned that the lack of webcam use and mic use was a sign of lack of engagement with our "community of learners" and a lack of engagement in the subject. However, suddenly the chat box lit up with explanations.

Many of my students had limiting circumstances. I had one student who was working at a camp for the summer. She would come out of the camp, where there was no internet connection, and go to the public library in order to participate in the class. The library did not have any private rooms, so, she felt too exposed—sitting in a public space whose ethos is one of quietness—to try and talk into a mic, even if she could find one on the outdated computers in the library. I had a new mother, who would put her baby down for a nap during class time, and this mom was afraid of waking her baby by talking in—what she described as—her small cheap apartment. I had a student who had broken her leg, so she thought it was nice that she could take the class while sitting in her apartment rather than walking to class on campus, but she was concerned about turning a mic on when that would mean that our class could hear her roommates in the background. I had one student who would use the mic, but informed me that she did not own a webcam; so even though the computer program allowed for a visual connection between our

class, she was limited by access to a webcam. We were limited by access to technology and access to private spaces.

Teaching this class did several things for me. First, I had to re-think my definition of what counted as “participation.” I admit, that my expectations of participation—even in an online course—tended to include actual spoken communication. However, I soon realized that the students were being extremely active in the chat box. People were posting long comments, interacting with each other, and responding to my questions. These students also used weblinks to communicate with each other, often posting links to pictures, poems, and videos that they thought correlated to things we were discussing in class. Next, I had to expand my views on how online classes are shaped and taught. It is important to design online educational spaces that allow for a large variety of student interactions. However, it is also important—as I discovered—for the teacher to know about the physio-temporal contingencies and contexts of the students. None of my students had a recognized physical disability. However, their educational experience was still very shaped by physio-temporal factors.

The multiple above examples demonstrate the concept of physio-temporal contingencies. We need to consider, teach for, and design for the ways that physical bodies are different (different—even outside of or in expanse of the able/disabled dichotomy). We also need to actively engage with the ways that bodies are enmeshed within other contexts. And then, we need to “design for all.”

As we become more oriented to the physical embodiment of our students, we can create more inclusive design and pedagogical strategies. As we center physical embodiment, we come to see how physical interactions with a space and with the expectations of teachers, students, and society more fully, *matter*. An orientation to physical embodiment allows us to question: how

does this space shape the ways that student can and cannot move within the space? How does the space favor one type of embodiment over another? How do my teaching methods, expectations, and techniques favor one type of body over another? How do my expectations, as a teacher or fellow student assume a certain body type or type of space? How do my teaching methods assume a certain outside-of-the-classroom context as the norm? As we consider these questions—as issues of fairness and quality of engagement—we can create better educational experiences.

In the next section of this chapter, I explore some of the digital interventions that can be used to address issues of difference in physio-temporal contingency. I take examples from online learning spaces, as well as examples from the world on online games, to act as jumping off points for how we might imagine online educational spaces differently.

Design for All

There are many useful accommodations and points of flexibility that are offered in the online learning environment—as a general practice—already. Imminent to online learning is the push for greater flexibility in how students access and participate in coursework. In the online context, students can often choose a course that is synchronous, asynchronous, or a hybrid of the two. In this way, students are able to choose an educational experience that closely fits into the physio-temporal contingencies of their lives. Students are able to choose, for example, to take a synchronous course online if they know that the learning experience will be better—more attuned to their needs—if they can plug in and participate from home, rather than travel to campus (with the car money, bus money, time commitment, maybe even child care or elder care commitment, that travel to campus may entail). Students living in some rural regions—where both travel to a university and a stable, and fast, online connection are hard to come by—would

benefit from an asynchronous course. One of the many benefits of the online space is its inherent flexibility and the potential for personalization within a community-developing context.

Online courses tend to accommodate students with disabilities much better than campus-based classroom spaces. Online programs offer closed captioning, which tends to offer fuller translation than person-to-person signing. (Not to forget, closed captioning tends to be more economical than person-to-person signing as well.) Furthermore, online courses tend to use more (and varied) visual cues for learning, not just aural cues for learning. In other words, in online courses, students are expected to hear and speak with each other (either through text or audible speech), but they are also expected to watch more video clips; see and draw more diagrams; interact in more varied ways. Online learning spaces are adept at using multiple visual examples of a concept. In this way, online courses offer one more modality than is usually offered in campus-based courses (where lecture and oral discussion are the norms).

Still, online educational spaces can be better, more flexible, more accommodating, more engaging and egalitarian. The following examples—taken from the digital gaming sphere—illustrate some of the accommodations and points of flexibility that could be used to make online learning better. Online gaming spaces (driven both by the desire to see more profits and—I hope—a desire to create more egalitarian spaces) have been at the forefront of the design-for-all digital movement. My hope is that the next few examples of digital interventions or changes can be used as inspiration for how we might make online educational spaces even better.

Even 10 years ago, if you wanted to play video games and you had a physical or mental impairment, you had to invest in expensive hardware or software that would allow you to modify the existing video game experiences, or you had to play one of the few “indie” games that were *designed* for gamers with various dis/abilities. However, this imaginary around disabled gamers

as outside-the-norm, has shifted over the last decade. There has been increased push toward the design-for-all concept in gaming, and an increased awareness of differences in both physical bodies and physical contexts in which bodies move and live.

In 2004, the IGDA (International Game Designers Association) put out a paper (almost 40 pages), multiple conference calls, and multiple postings on the need for greater accessibility in all games. On the home page of IGDA (and on further pages specifically highlighting issues of disability), there is a call to action that reads:

There are more than 180 million people worldwide who have a visual impairment. . . . Add to these, people with hearing impairment, motoric disability, and many more, and you realize that accessibility is big business. . . . Compared with the web industry (only about 10 years old), the game industry has done very little (if anything) in the accessibility area. With this article we want to change this. . . . By collaborating with the rest of the community we think it is possible to develop methods of making all game genres accessible. (IGDA, Home, Accessibility)

While the language in the above call-to-action is infused with the desire for capital, it has been answered with a drive to make more online games accessible and fun for everyone. The AbleGamers association has had increasing power within the online game community to shape how all games are coded. The AbleGamers site posts reviews of games that are accessible to all, offers suggestions on how to make games accessible, and posts/blogs about the increase in total numbers of disabled online game players.

Increasingly, companies like “Simply Entertainment” are making all of their games accessible; touting the company’s ability to make games that are fun and easy to play for *all* players. While the online game world still has many strides to make toward complete accessibility, there is a push within the community to increasingly find ways of designing for all. There has been an increased and proliferated belief that all games should be accessible to all bodies. There has also been an increased “imaginary” around the idea that *all* bodies can use various “accommodations” from time to time.

This industry-wide push toward design-for-all (from IGDA, from *Massively*, from the AbleGamers Association, and from many of the big game companies), has created an ethos around making games accessible to bodies that are not just limited by recognized disabilities, but also a move to design games open to bodies that are limited by things like arthritis, loss of vision, loss of hearing etc. Guidelines like: don't use drag-and-drop interfaces; don't require excessive double clicks; don't have long menus or a lot of right-click menus; re-think the controller (create changeable key-bindings); increase the use of captioning; increase camera angles in-play; and develop graphics that can be turned on and off to make some characters and forms of play more visible for those who have some form of vision impairment, have all started to become standard in the industry. AbleGamers have further suggested: increased use of captioning, increased camera angles in-play, and the use of NanoClay, that can be shaped by the user and by commands in-game to become the type of controller that each individual user needs in the moment. Interestingly, the discourse around these new guidelines tends to spend less time marking disability as difference, and, instead, marks *all* bodies as in need of some form of accommodation. There is a very focused attention to physical embodiment, and the ways that all bodies can be limited or shaped by material circumstances in ways that affect their ability to play.

While the design of these types of “universal games” is still in its infancy, there has been an increased interest in creating games that can be played in “limiting circumstances” (Braz, 2009), where those “limiting circumstances” include both State-recognized disabilities, as well as the desire to play if one is tired, if one's vision is going, if one is on a mobile phone rather than a console, etc. For example, Gamasutra has now implemented both graphical and audio interfaces in all of their games, thus allowing both audio-impaired and visually-impaired players

to play on equal grounds as other non-impaired players. The scope is enormous and is enmeshed within a discourse that recognizes that all bodies may be “impaired” or “limited” (by circumstance, by space, by the type of device one is holding, by age, or by physical or cognitive impairment) at any time. New games are becoming possible because there is a new social imaginary about what constitutes “impairment,” “limitation,” “accessibility,” and “design-for-all.”

In addition to the change in industry standards that affect how games are coded, there has also been a proliferation of hardware and software that can help to make non-accessible games more accessible. For example, If games are built on the Quake 1 platform (it is open source, and many games run on it—think of it as the Unix of the game world), then there is a 2-D audio patch that can be used to make audio-cues pause-able for users. In this way, users can more easily control the speed of the game. This is a great software intervention.

There are also some great hardware interventions. Companies like OneSwitch have developed a device to turn a game that requires multiple inputs (through the use of multiple keys on the keyboard, the use of a joystick, or the use of a console device that requires the simultaneous push of multiple buttons), into a game that can still be played using a 1-switch device: that is, the 1-switch device can be pushed multiple times or in different directions to *become* the different keys required to play the game. This OneSwitch device is designed to make games accessible to people with limited hand, finger, and arm mobility.

Many companies are creating a package of hardware and software interventions to make games more accessible. ITU, for example, will sell you their Gazetracker device, that allows the computer to track your gaze and *command* the computer using your gaze. These Gazetrackers are often used on more mundane computer uses: reading news, writing letters, etc. However, ITU

now offers their Snap Clutch software that, when used with the Gazetracker, allows people to play online games using their gaze as the form of control and interaction.

None of these interventions are perfect. Sometimes the software and hardware can be buggy. Sometimes the lack of traditional menu options, and the use of additional hardware and software can slow the play of the game overall. However, all of these interventions provide affordances for users who are limited by various circumstances, to play the best games, right alongside users who may have fewer limits placed on time, space, circumstance, device, and interaction of body and environment.

In this chapter, I have explored some of the mediations, features, and intercessions that are being made to shape the online game world into a space that is diversity-friendly; movement oriented; and open and accessible to all. There are multiple spaces of digital play or digital leisure that are attuned to embodiment, and the ways our physical bodies interact with the material world. In fact, many of the technologies I have mentioned above are designed to encourage movement of the body, engagement of the body, and an acknowledgment of variability in bodies. We can use online games and digital technologies of leisure to shape the ways we think about and talk about online education and diversity, as well as use the online game world to shape how we can design spaces and enact pedagogical strategies to support multiple conceptions of embodied learning. We can use examples from digital leisure to shape design and pedagogical practices that foreground embodiment. We need to think beyond the traditional imaginary of the bricks-and-mortar classroom that has, thus far, shaped our imaginary of what the online classroom space is *supposed to* look like.

In this chapter, I have argued that we need to focus on the physicality of embodiment as we design classroom spaces and teaching pedagogies. As we foreground and center physical

embodiment, we can develop new ways to teach that create more engaging and socially just educational spaces. We can make online education better—more embodied. While the physicality of our embodiment is vitally important, so, too, is it important to recognize that embodiment is more than just physical, it is positional.

Positional embodiment works with and across physical embodiment; with real consequences to access to resources, health, and our relationships to technology. As a way of showing the complex nature of embodiment, and arguing for the need to have that complexity inform our praxis and practices in online education, I now turn to the positional nature of embodiment, taken up in the next chapter.

Chapter 3

Embodied Positionality

In this chapter, I foreground embodied positionality. I take up the ways that understanding embodiment means more than just orienting toward physicality; a complex orientation to embodiment involves centering embodiment as linked with identity and social institutions as an embodied practice with material consequences. Bodies aren't just physical; they are also significations of social norms and institutional expectations. The ways that bodies are positioned within society have real material consequences for access, use, and social understandings of the self and possibility.

For example, a student who has limited use of their hands and fingers is both societally positioned as disabled, and also physically embodied difference. This physical difference will undoubtedly influence the ways a student interacts with online games and learning spaces, computer keyboards, and other technological devices. However, physical differences become meaningful not just as an interaction of physicality and object, but also as a positioning within society. In our society, limited use of hands and fingers translate into a social understanding of deficiency; this student may be subjected to language and policy practices that *produce* the student as always/already unable to use technology in an acceptable and efficient way. As institutions, citizens—and perhaps even the student—come to understand the impaired ability to use technological devices as translated into physical disability, this reifies the positioning of certain students as automatically *unable* to be tech-savvy and comfortable with digital devices. Thus, if we are truly to design more engaging and egalitarian online educational spaces, we must also focus on the ways that embodiment means being positioned—through societal discourse,

expectations and practices—into different relationships with institutions, practices, and technologies: embodied positionality.

In order to argue for a more complex orientation to embodiment, I explore the ways that embodied identity—especially in relation to digital technology—is positional; that is, the ways that embodied identities are positioned differently across, and in-between, complex networks of digital interaction. Embodied identities are significations of social norms and institutional expectations, but are also a matter of fashioning and “reading” of a self in alignment with those norms or counter to societal norms. The ways that bodies are positioned within society have real material consequences for access, use, and social understandings of the self and possibility.

I target the ways that positional embodiment becomes particularly meaningful as we interact with technology, as we interact in online educational spaces. This chapter specifically takes up the ways that positional identity can and should shape that ways we teach in online spaces and has ramifications for creating activist projects—as part of our digital teaching experience—to bring embodied positionality to the fore.

I argue for positionality as a metric for understanding embodied identity; the ways that physical bodies and the social readings of those bodies create material relationships and real effects. I parse out the ways that embodiment is not just about physicality, but is also about identity—and not just identity, but identity as existing within societal norms and institutional practices. I define my own understanding of embodied positionality by highlighting examples from Robert McRuer’s scholarship which unites a disability studies approach with a queer studies approach in order to get at the ways embodiment is both physical and positional. His work exemplifies the shaping of both physicality and societal discourse and expectation. This interaction of physicality and positionality is clearly complex, and evident in the intersections of

identity positionality, particular bodies, and digital technology. Embodied positionality has strong correlations to both access and user-practices of digital technology. In order to provide a complex accounting of online spaces, I foreground both the risks and potentialities of online spaces for identity positionality. Online spaces can be oppressive; and in fact, mirror many of the hegemonic and destructive social norms, beliefs, and expectations that circulate offline. However, I also highlight some of the online spaces where counter-hegemonic practices and critical activism for social justice are fostered. I show that online worlds can be spaces for social justice and egalitarianism through the actions of both users and designers. As a concluding section, I turn my attention to sites specifically designed to be activist in intent. My hope is that we can use these examples from current online spaces as we consider what to do (and what to try and avoid) in our own online educational spaces. I begin by further defining embodied positionality.

Defining Embodied Positionality

I posit that embodiment is more than the physical flesh of the body, or the ways that bodies moves (or do not move) through spaces. Embodiment also involves a sense of identity or place within the structures of society. Bodies become intelligible in society—bodies have meaning in society—because embodiment is more than just physicality, but is also a process of coming to be known and understood in the world. Bodies are markers for various common-sense “truths.” For example, white bodies signify middle class moral rectitude in ways that black bodies do not. Male bodies signify confidence and “leadership” in ways that female bodies do not. Bodies *mean* different things. Embodied positionality encompasses the ways that bodies are positioned within society—via discursively constructed societal norms and institutional

expectations—to mean different things; to be granted different kinds of access; to be seen as belonging (or not) to certain groups and spaces; to use and be used in different ways. I draw on examples from Robert McRuer’s *Crip Theory* to give examples of identity positioning and physical embodiment—embodied positionality.

McRuer’s (2006) project involves defining the interaction of physicality and societal discourse in order to understand how physical bodies signify identity positions within society. His project also involves conceiving of ways that physical bodies act out of those societal positions in order to effect political change. He is very attendant to the materiality of bodies. According to McRuer (2006) it is “the materiality of queer/disabled bodies . . . that have populated the movement and brought about the social changes I discuss” (p. 32). One of the examples McRuer (2006) gives of bodies both positioned in society in oppressive ways and then acting out for social change comes from the Independent Living Movement of the early ‘70s. McRuer reminds us of Ed Roberts and the Rolling Quads: Ed Roberts and 12 other students, who wanted to go to Berkeley for an education. All of these students were considered disabled, and the only housing they were offered (the only housing that would “accommodate” them) was an infirmary wing of a local hospital. When two of the students were threatened with removal from school because they were considered “infeasible”—unable to ever get a job and benefit from an education—the student, with Ed as their leader, staged a protest. All of the students were threatened with both removal from Berkeley and with further institutionalization in a nursing home. The Rolling Quads contacted the press. Finally, both the state and the university administration backed down from their threats and reinstated all of the students. The Rolling Quads then took to the streets to advocate for independent living facilities in or near campus.

These students were successful in establishing the first campus-based center for independent living.

The Rolling Quads were aware that their physical bodies marked them as standing outside of normative society. Some of these students were expelled from the university over the perception that they were ineducable. Ed Roberts is quoted in a 1970 letter to friend Gini Laurie as saying:

I'm tired of well meaning noncripples with their stereotypes of what I can and cannot do directing my life and my future. I want cripples to direct their own programs and to be able to train other cripples to direct new programs. This is the start of something big—cripple power. (Ed Roberts, Father of Independent Living)

However, while the Rolling Quads were aware of how their physical bodies and societal expectations interacted to position them outside of power, these activists also used their bodies as a signifier of both outsider status and of policies that needed to be fixed. Their bodies became a double symbol both of societal expectations and an acting against those expectations.

This example shows us the complex interaction of societal norms, institutional practices, and physical bodies. The students were disabled by the inability to be mobile: all were in a wheelchair. However, a greater level of impairment happened because of societal expectations and institutional practices that worked to *define* wheel-chair-bound bodies as ineducable, incapable of living on their own, unable to get a job, and unworthy of university resources. The practices by the university and expectation of administrators coalesced around the materiality of wheel-chair-bound bodies. The tension over who gets to go to school and how does not was bound up not just in physicality, nor societal discourse, but was a co-instantiation of both physical embodiment and embodied identity positionality. This both/and of embodiment is reflected not only in McRuer's other examples, but is also a reflection of the processes that mark bodies in relationship to digital technology.

Female bodies—viscerally and materially marked as female—become queer in the digital technology space; and this queerness instantiates an expectation of impairment regarding digital technology. Women are positioned as less tech savvy, and are often treated by the media and other institutional forces as less tech savvy. This treatment, in turn, creates both a silencing of women’s voices in online spaces, and a lack of experience with digital technology which—in deed—renders women less tech savvy. Women are generally marked as tech-impaired, and this marking renders them less able/inclined to be exposed to technology, thereby actualizing the impairment. More will be said about this, and other, embodied positionalities and technology later in the chapter. McRuer’s (2006) work highlights the complexity and reciprocity of physical embodiment, positional embodiment, and material effects.

McRuer (2006) gives many more example of “queer/disabled” bodies positioned outside of power. He shows that one’s body carries meanings within society, that one’s physical body is marked as belonging or not belonging within certain spaces. McRuer’s work exemplifies the complex interactions of identity construction and physical embodiment; societal expectation and physical body interact to create societal positionality. McRuer’s work also shows that bodies can push against societal expectations in meaningful ways; that focusing on embodiment allows us to critically engage with empowerment, oppression, and a means of change.

In this chapter, I follow after McRuer in advocating embodiment as important for understanding power and change. I specifically excavate the ways that positionality shapes one’s relationship to digital technologies. I begin by recounting some of the real effects of embodied positionality vis a vis digital technology.

Real Effects of Embodied Positionality: Relationships with Digital Technology

Our embodied positionality affects how we access and how we use digital technology. There are strong correlations between “who” you are, and your experience online.

Consider what it means to be positioned as a woman in relationship to digital technology. There are many social norms and institutional practices that cue women into the idea that digital technology is not for them. Television shows and commercials position women as inept when it comes to the use of technology. I think of an episode of *Modern Family* where all of the women were positioned as unable to use the remote control or program recording devices. The men in the family had an “instinct” about how these devices worked. Other examples of this kind of gender typing exist. Cherie Todd’s (2012) research confirms the gender bias that exists around technology and online spaces. Women are not considered “normal” in the “techy” space. Todd (2012) argues that, in most digital game spaces, the expectation is of a *male* participant.

Boys and men were targeted as the major consumer audience for the sale of video games. . . . Take for example, the stereotypical portrayals of gamers which depict boys and men playing multimedia video games. This particular stereotype has been greatly influenced by past and present marketing strategies which (for the most part) continue to pitch the sale of games chiefly towards a male audience. (Todd, 2012, p. 103)

She notes that this fact continues to influence who frequents video game worlds and the prevailing ethos or culture of most game worlds. When women go online, they tend to have a feeling of entering a male-dominated space—even when there are a number of female avatars present. Thus, women are positioned as both technologically incompetent and abnormal in, or justifiably excluded from, digital spaces. Is it any wonder, then, that women do not contribute as often as men to online spaces. Articles by Cohen (2011) and Collier and Bear (2012) show that only around 15% of posts or contributions on *Wikipedia* are done by women. Women are being left out of the chance to “produce” one of the most widely used sources of information. What happens when the world’s encyclopedia is created almost exclusively by males? Fewer women

have open blogs than men. What happens when most of the dialogue that is produced online happens among mostly men? The web—as some sort of Agora—becomes (again) devoid of women.

To echo the point made above, the physical embodiment of femaleness coalesces with societal expectations of impairment regarding technology in order to create a lack of women who are tech savvy. There is a coinstantiation and reciprocity—a reinforcing tension and drive—that aligns physical identity with discursively constructed positionality in order to create material consequences. The interaction of the physical and the positional has actualizing effects.

Gender is not the only positionality that affects one's relationship with digital technology. Research by Polat (2012) shows that, still, access to the internet as well as skills to use it tend to correlate with privilege in other areas. Says Polat (2012), “Those who are old, disabled, female and reside in rural areas are less likely to be internet users and existing policies do not reach out to these groups” (p. 589).

In fact, *how* one uses the internet, as well as *access* to the internet—meaning access to a computer, access to some sort of internet connection, or access to a high speed connection—have a highly robust correlation to socioeconomic status, gender, and race. Hargittai (2011) argues that, “diversity of experience and comfort level with online spaces is positively correlated to connections online, being white, and high SES” (p. 1). Hargittai (2010) also insists that: “Findings suggest that Internet know-how is not randomly distributed among the population, rather, higher levels of parental education, being a male, and being white or Asian American are associated with higher levels of Web-use skill” (p. 92). In 2009, Hargittai also found that: “Results suggest that socioeconomic status, gender, race and ethnicity are all predictors of

contributing to online content. These results hold even among a group of users who have easy access to Internet-connected machines” (p. 1).

Hargittai is not the only one who has found a correlation between privilege and access to and use of the internet. Bucy (2000), and Porter and Donthu (2006), have shown that the frequency of going online is determined by socioeconomic status. Those who are poorer go online far less than their wealthier counterparts—even with the *same* level of access to software and connection speed. Work by Cho, Zuniga, Rojas, and Shah (2003) have shown that socioeconomic status is the primary factor that correlates with whether the internet is used mostly for *consumption* of material or information, or *production* of material or information.

Discourses that circulate in spaces of privilege *normalize* the idea that the internet is something to be explored, shaped, and mastered. Discourses that circulate in spaces that are less privileged tend to equate online spaces and the internet as something for entertainment, time-wasting, expense, and danger. Thus, we have studies (mentioned above) that show that—even with the same speed of connection to the internet and access to the same spaces, devices, and programs—privileged groups tend to use the internet more, they tend to be *producers* of information online, they tend to exhibit more confidence with multiple digital technologies, and they tend to see themselves more as belonging online and in the digital sphere.

Social norms and institutional practices—circulating offline—position some groups as tech-savvy, in-the-know, and the proper producers of digital content. Some are *positioned* into privilege vis a vis technology. However, it is not only offline that these discursively constructed social norms and institutional expectations circulate. Online, many oppressive discourses circulate in ways that position some as in privilege and some as outside of privilege. Online

spaces often mirror the oppressive discourses and norms of offline spaces. Next, I will explore some of the ways that oppressive discourses and embodied positionality is reified online.

Mirroring Oppression: Embodied Positionality in Online Spaces

Many of the same institutional expectations and societal norms exist online just as they exist offline. Discourses of “natural-ness” and circulate online in ways that shape both what is offered as part of the online space, and how users behave in online spaces.

For example, in most online games, participants are asked to choose avatars as a way of representing the self in-game. The choice of avatar is often guided by the specs of the game—what is possible or easy to create in-game. However, choices in avatars tend to be even more shaped by societal expectations that are carried over from offline spaces into online spaces. This can be clearly illustrated when we look at gender norms and gender expectation in many games. Research by Andrew Dunn (2010) shows that, as people choose avatars for most console games and online games—including RPGs—people tend to choose avatars who exhibit high SES and traditionally-gendered notions of “attractiveness.” While gender norms tend to remain stable in many online games, it is—perhaps—unexpected to note that Dunn’s research shows that both men and women notice in-game privileges to creating an avatar that looks like an attractive female. When men choose these female avatars, they create avatars with larger chests—focusing on traditional secondary female sex characteristics. When women create avatars, they care more about the height—wanting tall avatars—and overall thin-ness of the avatar. Women tend to focus more on creating a body that looks like a fashion model. The norms around what constitutes a “good” female subject are instantiated in online role playing games, and these norms are not usually transgressed.

The selection or creation of an avatar is not only shaped by the expectations of the user and the ideologies of normalcy coerced by society, this selection process is also shaped by what is made most-possible in the game space. There tends to be a cultural understanding that the creation of an avatar offers a high degree of choice, experimentation, and counter-hegemonic options. This is only *sometimes* true. As Cherie Todd (2012) points out, more often than not the selection process is highly shaped by hegemonic discursive norms. Says Todd (2012):

One element rarely seen in mainstream games is lesbian, gay, bisexual and transgender (LGBT) characters or interactions . . . [Scholars] argue that this is due to the current attitudes of the gaming development community, who are reluctant to disrupt their current construction of gamer audiences. As a result, the exclusion of LGBT content effectively maintains heterosexuality as the dominant norm within most game spaces. Moreover, in many mainstream MMORPG games a homophobic discourse occurs across general/trade chat channels, which all players within the virtual region can read on their screens. At present, the majority of gaming spaces do little to challenge heterosexuality as the dominant norm in cyberspace. (p. 105).

In fact, Todd (2012) argues that even the creation of female avatar options is less about the desire to attract women to the activity of online gaming, and more about giving male gamers a play thing. Says Todd (2012):

Although gender representation has altered during the last decade, game developers openly state that their rationale for the inclusion of female characters is based upon the premise that they appeal more to the average boy gamer than an equivalent male character. Games utilising strong, “sexy” women as leading characters have been very successful in appealing to a male consumer audience—to such an extent that it has become common practice for men to use women avatars as re-presentations of ‘self’ while playing games. . . . A recent study examining gender-bending in games shows that up to 80% of men use or have used female avatars when gaming, whereas the majority of women gamers prefer to game as same-sex characters. (p. 107)

Furthermore, research by Brookey and Cannon (2009) show that, often, online spaces create opportunities to legally live out even more destructive and oppressive fantasies than would normally be permitted under the law. Brookey and Cannon (2009) point to *Second Life* as a space that is both potentially empowering *and* potentially oppressive and warped by brutal discourses of gender and power. Brookey and Cannon (2009) give an example of an island in

Second Life where unconventional sexual fantasies are allowed to play out. While, there is research that argues that sexual fantasy islands *can* act to subvert normalized notions of a sexual relationship, Brookey and Cannon (2009) contend that there are also many instances of groups of heterosexual men who frequent these spaces in exploitative ways: a few of the men will take on avatar bodies of men, and a few other men will take on avatar bodies of women, queer adults, and/or queer youth. These men will then play out graphic scenes of gang rape, mutilation, and lynching of the female-identified and queer-identified bodies. They have found a space to play out reprehensible fantasies. There's nothing subversive or emancipatory or empowering about that.

Online spaces often provide the illusion that the user/participant enjoys unconstrained choice of who and what to be online. However, these "choices" are shaped, made possible, made intelligible, and made desirable through a matrix of discursively shaped social imaginaries around what should be played out online, shaped by the social imaginaries of both users and creators. This is why online spaces often mirror the same oppressive discourses around positionality that one sees in offline spaces. As Nakamura (2010) argues:

Digital profiles and avatars that are produced by users encourage the sense that one is producing one's "self" without any type of constraint or limitation, such as gender, size, body shape, or skin color—thus avatars have often been celebrated by scholars and users alike as ideal entrepreneurial spaces for identity formation. However, avatars are often constructed from a fairly narrow range of faces, bodies, and features. This creates a normative virtual body, one that is generally white, conventionally physically attractive, as well as traditionally gendered, with male and female bodies extremely different in appearance. (p. 3)

Positionality continues to shape one's experience online because hegemonic discourses so easily carry over to online spaces. Let's take a moment to consider the ways that positionality appears online, and how these online spaces both reify hegemonic understandings of embodied

identity, and potentially shape a positionality-dependent relationship with or experience of online spaces. Please examine figures 1 through 6.

Reflect on this image from *Slingo Quest*:

Figure 1: Webshot of *Slingo Quest*



Note that you can choose to be the already-created avatar, or customize your own avatar. In either case, your avatar will be white. You can only choose a gender-normed male or female body, and then you can choose hair and eye color.

Reflect on the following screen shots from *Bomberman* and *Driving With Kids*:

Figure 2: Webshot from *Bomberman*



Again, note that all of the characters from which you can choose are white. They are also recognizable as female or male based on normative hair styles and whether or not your character is wearing a dress.

Figure 3: Webshot from *Driving Kids*



Notice the selection of avatars for *Colony of War* and the ways that race and gender are represented:

Figure 4: Webshot from *Colony of War*



In this case, there are more than just white people represented. However, the representation of bodies is done in alignment with popular stereotypes. Indeed, the avatars are almost caricature-like in the extreme use of the body to portray black-ness, white-ness, and female-ness.

In *My Fantasy Wedding*, you can have one Black bridesmaid, but all of your bridesmaids still need to be traditionally feminine and have high SES.

Figure 5: Webshot from My Fantasy Wedding



And, if you want to challenge your body and brain using XBOX 360's *Dr. Kawashima's Body and Brain Exercises*, the people you see as your guides and mentors will be Asian or White and have high SES.

Figure 6: Webshot from Dr. Kawashima's Body and Brain Exercises



I have explored some of the ways that embodied positionality matters; that it correlates with who has access to digital technology and how that technology is used. I have also argued that oppressive hegemonic discourses around embodied positionality circulate in both offline and online spaces in ways that reify oppressive norms and shape how we act, what we can do, and what we expect online. However, I also argue that online spaces can engage us in activities and practices that are counter-hegemonic, that online spaces can also be empowering and anti-oppressive. In the next two sections, I excavate some of the ways that online spaces can help us to critically engage with embodied positionality in ways that potentially lead to the creation of more socially just spaces and more critically engaged users.

Online Spaces as Places of Productive Potential

While there is much scholarly work on the ways that online spaces reify oppressive norms, there is also a growing body of work that shows how online spaces can be anti-

oppressive, critical, and even radically counter to normative discourses and practices. Mary Bryson (2004) insists that there are a myriad of ways that online role-playing games and online communities provide a safe space for LGBTQ and LGBTQ-curious youth (and adults). These are spaces where LGBTQ adults and youth can experiment with identity, find safe havens of community, and express themselves in ways not open to them in their daily “real” lives. The book *LGBT Identity and Online New Media*, edited by Pullen and Cooper (2010) has 20 chapters devoted to the ways that online role playing and online communities provide safe harbor for finding and living out truths about one’s self. Jonathan Alexander (2002; Alexander & Cagle 2004) has written extensively about online spaces as a place where LGBTQ, Feminist, and “Other”-ed communities can find validation; a space for organizing, and a space to *become* that counter-hegemonic discourse that subverts—even just for a moment—the dominant discourses of gender, sexual, and racial normativity. These scholars give multiple examples of online spaces where normative understandings of embodied positionality are critiqued and challenged and where participants attempt to live out their positionality in counter-hegemonic ways. The scholars highlight the ways that these online spaces use constructs of physical embodiment to push against oppressive norms. Both physical and positional embodiment or critiqued, explored, and enacted in anti-oppressive activist stances.

In this section, I provide two examples of online spaces that take up embodied positionality and try to engage with hegemonic norms by critiquing those norms and creating counter-hegemonic embodied positionalities. The first example comes from an online role playing game devoted to helping students get better at Math. This example—and my description of this example, comes from the work of Kafai, Cook, and Fields (2010) and their research work around *Whyville*.

Kafai, Cook, and Fields (2010) open one of their articles by describing a “body problem” in the online game *Whyville*. Kafai et al. (2010) quote from the newspaper associated with the online world to describe the problem of avatar selection. Kafai et al. (2010) quote:

Hello I'm Kerri_87 reporting live at Whyville (M)ost black faces don't have bodies or if they do have bodies, they are white. Now I'm not saying that anyone in Whyville is exactly racist, but we do have the tendency to only make bodies for white faced avatars. What I'm saying is that there are faces other than white ones and we shound (sic) remember that. I am trying to produce a whole line of products for black avatars and I would appreciate it if some of you out there would help. I already have some people working on designs but we need more! If anyone could possibly spare some clams to give to this project or make a piece yourself, please contact me about it through Y-Mail. So if you are donating clams or making a piece I can record it so people will get the proper credit. Please Please Please think about this cause and see if you can support it!

According to Kafai et al. (2010) over 1.5 million registered players between the ages of 8-16 inhabit *Whyville*, and most are very involved in creating clothing for their avatars, interacting with friends, and advocating for different policies within the game space. Keri_87 was advocating a position that was very familiar to many of the teens and tweens inhabiting the world: that there was a lack of non-white avatar bodies, and that whiteness seemed to be the default position. Too many people who had the skills to create avatar bodies were using those skills to create only white bodies. Also, the default avatar body—that you are given as you enter the game space for the first time—is a white face. Thus, whiteness becomes normalized as the expected positionality of bodies in this space.

Kafai et al. (2010) argue that the “digital divide” has often been framed as a lack of resources; the divide between those who have computers and those who do not. The divide has been framed as a lack of minorities getting onto the internet. However, according to Kafai et al. (2010) the more meaningful and prevalent divide is between those who have skills to negotiate, work, and create in online spaces, and those who do not. There is a “participation gap.” As Kafai et al. argue: “In fact, Kerri_87's observation captures both aspects: not only are there a limited

number of players representing themselves as Black within Whyville.net but, more importantly, there is an inconsistency in that ‘most black faces don’t have bodies or if they do have bodies, they are white.’” (p. 45). This means that even when minorities desire to enter online spaces, the avatar bodies that are available often reflect a closed space for minority bodies; online space is reflected back as a space open to white bodies only.

Kafai et al. (2010) use the example of *Whyville* to argue that online spaces can be seen as highly oppressive in the sense that they position white bodies as “standard” bodies, and black bodies, Latino bodies—any other non-white bodies—as outside the norm. Students are positioned as incongruous with the *Whyville* space if they are not white. However, in the case of *Whyville*, students were vocally critical about this exclusionary practice. They wrote and talked about it with each other. They also wrote to the creators of the game. There was an active organization around making others aware of the white privilege in this space, and also an organized campaign to contact the game designers; to try and change the space. This push for change ended in what Kafai et al. (2010) term “The Bluebie Invasion.” The “Bluebie Invasion” marks out the change from white faces as the default position for new participants, to blue faces as the new default.

As new players enter *Whyville* for the first time, they are assigned a blobby round white face to be their avatar. It is only by amassing “clams” (in-game money) that participants can buy ways to customize faces, and also buy clothes. It is important to point out that, in this game, clothing is always sold with body parts attached to it. So, you would keep your avatar face, but when you wanted a change of outfit, you would buy an outfit that came with its own set of arms and legs. Thus, in this game, it was common to have a Black face wearing a white body. Whiteness could also come back to haunt you, even if you had amassed enough money to get a

non-white face. If there was ever a server glitch, all players would revert back to “newbie” status: all players would once again become white blobby faces with no bodies. Thus, whiteness was ever present.

Whyvillians began to publicly criticize the ever-presence and normalized whiteness. Kafai et al. (2010) recount the numerous letters in the “Whyville Times” which resist the whiteness deemed “natural” in-game. Kafai et al (2010) give an example of one of these angry letters to the newspaper.

Moocow92 observed, “Just today I realized something. The first face you get in Whyville is Caucasian.” He went on to suggest that new members have the option of selecting different colored newbie faces when they initially register with Whyville, saying, “I just think it would be a good idea, so newbies who do not make much clams could get their own real skin color” The problem of “white” newbie faces was mentioned again three times in The Whyville Times during 2004 and 2005. It was taken up by Ninja’04 (2004) in an unsuccessful bid for senator in 2005 and was then championed in the 2006 senate race by ps2man1, who suggested the following:

“I know this has offended some of my friends who have joined Whyville in the past, they log on to their brand new account and see their skin tone color and think, “Why am I automatically peach?!” . . . I think when you register for Whyville, there should be a choice at the beginning of what color you want to be or are I know this might ‘clog’ up the servers a tad bit, but I am sure it would help some. If we can’t do this, maybe we could all start out as some unusual color that we ALL know most likely nobody has of skin tone, like green or blue!” (p. 55)

Participants repeatedly wrote to game designers and aggregated a large number of in-game support to change the “white-as-default” newbie avatar. The game designers responded by making the default position—the newbie avatar—a body-less blobby *blue* face. Thus, if you were a “newbie” you now became known as a “bluebie.” Every time there was a server glitch, all players would turn into *blue* blobby body-less faces, rather than white blobby body-less faces.

Citizens in *Whyville* have continued to push for change. Participants have made cogent arguments stating that “blue-ness” is just a less-marked stand in for white-ness. The game designers have, once again, responded to criticism, by allowing a larger proliferation of color

choices for the body-less faces you can choose from to represent your newbie self—your beginning avatar. Still, because the game is designed to promote user-generated artifacts, there has been the divide in what kinds of bodies are made available. Still, the overwhelming number of body-inhabited clothing that you can buy contains white bodies. There is still the divide in the skills and desires of users to create non-white body-clothing combinations.

In the case of *Whyville*, students used the space to make a difference. They spoke back to the intentions and designs of the creators of the space. In this way, the online space—which was designed to privilege whiteness—was critiqued by the community and made to change to accommodate a more open and inclusive understanding of which bodies are positioned to “belong” online. Kafai et al. (2010) argue that *Whyville*—even the new and improved version of *Whyville*—still poses problems for bodies and identities positioned as outside the norm. Kafai et al. (2010), for example, bring up the fact that there are still fewer “body” options for non-white avatars. Kafai et al. (2010) describe this as a continuing digital divide where white students are often put in a position to acquire the skills of coding (in order to create new avatar body options) in greater number than non-white students. Still, they frame this story as one of hope and productive potentiality because the user-community is practiced at questioning norms, critiquing design decisions, and pushing against oppressive positionings of embodied identities. This space has shown that it can be used as—and potentially will be used again as—a space of anti-oppression, critical engagement, and counter-hegemonic practice around embodiment; resistive embodied positioning.

Another example of online spaces or programs that can be seen as critical and counter-hegemonic includes the internet browser filter *Jailbreak the Patriarchy*. Created by Danielle

Sucher, *Jailbreak the Patriarchy* is a browser extension/filter that prompts users to see the world in a different way. This is how Sucher describes it on her website:

Jailbreak the Patriarchy genderswaps the world for you. When it's installed, everything you read in Chrome (except for gmail, so far) loads with pronouns and a reasonably thorough set of other gendered words swapped. For example: "he loved his mother very much" would read as "she loved her father very much," "the patriarchy also hurts men" would read as "the matriarchy also hurts women," that sort of thing.

This makes reading stuff on the internet a pretty fascinating and eye-opening experience, I must say. What would the world be like if we reversed the way we speak about women and men? Well, now you can find out! (DanielleSucher.com)

Sucher provides the justification for creating this filter in the following way:

Why create such a thing?

I was having dinner with the incomparable Jess Hammer a couple weeks ago, when the topic of ebooks came around. I made an offhand comment about how someone really ought to make an app that toggles male/female characters' genders in ebooks, and promptly started thinking about what I was really looking for along those lines.

I'm not much an ebook reader myself, so a Chrome extension feels much more useful to me. But it absolutely genderswaps html-formatted Project Gutenberg books, if that's what tickles your fancy.

Running Jailbreak the Patriarchy for the past few days has already changed my perspective on the world in a way that I find interesting, enjoyable, and valuable. I'm very curious to hear how other folks feel about the experience! So please give it a try, and let me know whether and how it affects your perspective! (DanielleSucher.com)

Jailbreak the Patriarchy is designed, from the ground up, to push against oppressive hegemonic discourses associated with embodiment and embodied positionality. It is *designed* to shape the perspectives of users so that they become more aware of social norms and institutional practices; so that users can further critique and push against those oppressive practices. This filter calls for a critique—and a re-imagining—of the ways that males and females are normatively positioned. *Jailbreak the Patriarchy* is not the only use of digital technology designed to take account of positionality and work toward more critical engagement and socially

just spaces. This last section will give further examples of digital technologies that are intentionally designed with a critical understanding of embodied positionality in mind.

Anti-Oppression Online: Critiquing Traditional Relationships of Embodied Positionality

This section spotlights the ways that some forms of digital play can create attention to, focus on, and awareness of the embodied realities of identity positionality. I highlight several digital spaces that are making positive interventions into creating an awareness of embodied positionality, fostering ways to be critical of hegemonic normativity, and re-imagine positionality and embodied identity in more empowering ways. I begin by focusing on the choose-your-own-adventure stories of *Katawa Shoujo*.

Online game narratives/novels have become popular in the past few years. In this genre, you follow the stories of multiple characters, and make choices for you—as the main character—in a sort of Choose-your-own-adventure style of game story. This genre almost always includes a love-interest theme. If the game is good, you also get amazing graphics and great character development. One game that has become popular recently, is *Katawa Shoujo*. This is a Dojin-style visual novel/game, where main characters (players) can choose to involve themselves with any number of other in-world characters. The story is designed around a “dating” experience, and is still subject to overt sexism. However, one of the things that marks this story as productively subversive, is that all of the characters—including the main character options—have some sort of impairment or recognized disability. The point of the game, according to developers, is to consciously create a normativity around people with disabilities as attractive, and “sexy.” The designers are not trying to create an identity tourism experience—where you come to “know what it means” to inhabit a given embodied positionality. Rather, according to

the designers, the game aims to normalize disability and actively counter the oppressive hegemonic discourse that positions impairment or disability as always/already “not desirable.” As a main character (player) you may have a learning disability. All of the partners you can choose from have some form of disability or impairment (they may be wheel-chair bound, blind, deaf, have a loss of arm function, etc.) While I am not intimately familiar with this game, I understand that the “love themes” are both heterosexual or homosexual in nature. The reviews suggest that all of the story options include characters who are fully developed as characters in-game. While the name *Katawa Shoujo*, is a sort of an inappropriate/slang term for “cripple,” the characters are portrayed as desirable and very human. The term “cripple” is being re-claimed or re-imagined in alignment with desirability rather than derogation. The game receives great reviews for subverting hegemonic discourses and practices that position disability as undesirable or “less than” in some way. The game purposefully tries to both highlight and then subvert hegemonic narratives that *position* disability as a deficit. It tries to work against traditional and oppressive representations of disabled bodies.

Another game that is similar in its representation of disability, is Microooyun’s *Wheelchair Rugby*. This game is part of the EuroSport suite of games. The designers have created a fun game that normalizes the intersection of sport and disability. Avatars are all wheelchair-bound in this game; and the play is fierce. This game actively positions bodies with mobility impairments as very capable and adept at sport. The game plays out bodily impairment in a way that does not fetishize, criticize, or hide disability. In other words, this game actively tries to work against the oppressive discourses that normalize only a narrow form of embodiment (young-ish, white, male, high SES, straight, English-speaking, and “able”). This game intentionally *positions* bodies with impairment as empowered.

In addition to certain games that push against oppressive hegemonic embodied positionality, there are also movements within the game design community that attempt to enact a critical stance toward the lack of women in online games; they attempt to empower women by designing games for women. Here, I highlight the move from “pink” games to “purple” games within the game design community.

In an effort to get more girls and women into gaming, many game designers have tried to focus on designing games “meant for females” In general, these games are called “pink” games. The problem, of course, is that in designing games meant for girls, the designers and companies often rely on and reify hegemonic notions of “female desire.” In other words, in the act of designing games, designers and game companies are concretizing socially acceptable understandings and practices around what it *means* to be a girl or a woman. Thus, some of the popular “pink” games are: *Unicorn Princess*, *Barbie Winter*, *Play in the Rain Dress Up*, *Play Princess Photoshoot*, *Cheers Squad*, *Birthday Cake Challenge*, *Cute Puppy*, *Cute Kitten*, *Heather’s Stylish Hairdos*, *Campus Crush*, *Barbie Makeover*, *Puppy Rescue*, *Mommy Cares*, *Fashion Crush Dressup*, *Chic Salon Sisters*, *New Funky Manicure*, *Mommy Makeover*, *Make Me Stunning* and the list goes on. Apparently, if you are a female, you care about fashion, makeup, nails, beauty, kids, being popular, and pets. One of the popular launch sites for “pink” games claims:

It’s the new black, the new red, the new everything: it’s pink!! The color that makes you gorgeous no matter what you’re wearing! It will switch your mood, taking you to the happiest days you’ve had and helping you become the adorable minute of joy in everyone’s life. Oh, yes, girls, it’s time to pink it up! Steal the sun from everyone’s heart and bring the color of the century instead! Have fun and show the world how much fashion really needs this drop of pink and glamour! (girlgames4u.com)

Girls and women are actively positioned as having desires that run along traditional considerations of femininity. We are positioned both as consumers, and as subjects who should

actively worry about fitting into popular conceptions of beauty. Girls and women are not positioned as having any desires or worth beyond how they look and how they fit in.

Noting this trend, various groups of female game designers have started to design games for girls that try to subvert these female stereotypes. These games are referred to as “purple” games. “Purple games” attempt to design a promotion of women in STEM fields into the game, thereby counteracting traditional notions of where women belong and what they care about, and also acting toward getting more women into the field. However, it is easy to point out, that “purple games” tend to swap out one set of gender normalizations for another, to create a *different* set of norms that are just as powerful in their appeal to some sort of “truth. “Purple game” designers are aware of this, and so have tried to push against the matrix of identity norms in general—with varying degrees of success. One “purple” game—designed by women and advertised as being for females—asks girls to go through a series of challenges that are designed to teach coding skills (html). It could be argued that this game sets up a different gender norm: to be *our* type of “girl,” and acceptable within how we view the world, you need to know how to code. However, according to the developers, the purpose of this game is to push back against the stereotype that only men know how to code. “Purple” games try and offer counter narratives for femininity. While more could be done to trouble normative identity, these games still make a valuable intervention into bringing awareness of traditional positionality for girls and women who are often positioned as inept with technology.

Another intervention that can be made to push against hegemonic narratives and oppressive embodied positionality is to design avatar creation spaces that are more user-friendly in their ability to let users create a more nuanced representation of identity. The blogger Stella Powers suggests that one of the best ways to de-center whiteness and maleness from the internet

is to create more differentiation and flexibility in the selection of avatars for games and SNS. Powers advocates creating the opportunity to upload a photo for your avatar, use a generic symbol as your avatar, or create an animated avatar of yourself using a photo. (some Wii games and some other online game sites have started to do this.)

Finally, I provide one more example of the use of technology to speak back to and critique hegemonic embodied positionality. I argue that many interventions drawing on digital art to create counter-hegemonic discourse and develop critical conversations around embodied positionality offer productive ways to think about online spaces as subversive and also still attuned to the complexity of embodiment. The following example allows us to reflect on the ways that digital spaces and artifacts can be used for political (social justice) projects; and that these projects are part of an educative experience where embodied positionality is brought to the fore.

Chela Sandoval and Guisela Latorre (2008) analyze the interventions made through SPARC (Social and Public Art Resource Center) and spotlight “activist” projects that create counter-narratives of embodied positionality with digital arts. Sandoval and Latorre (2008) open their text on the SPARC project by talking about an art installation known as *Arnoldo's Brother*.

Arnoldo's Brother watches us watching him from out of one of the most powerful digital media labs in the country, the Cesar Chavez Digital Mural Lab, located in the Social and Public Art Resource Center (SPARC), a production facility devoted to creating large-scale digitally generated murals, educational DVDs, animations, community archives, and digital art. *Arnoldo's Brother*, a digital mural created by Chicana artist Judy Baca and UCLA students, is an avatar rising out of these technologies, a modern-day Chicano cyborg. Arnoldo is a fourteen-year old boy, a figure created through the minds and souls of the young people who have come to the SPARC teaching facility, led by Baca, to testify and witness on behalf of their communities. Their offering to SPARC is a photo of one of these artist's younger brother, which they then Photoshopped into an artwork that tells on story of Chicana/o consciousness at the turn of the millennium. *Arnoldo's Brother* is here to speak actively back to history. . . Digital productions like this have emerged from the minds, souls, and digital art of the great public artists Judy Baca and the youth of color who have collaborated with her over the past ten years. . . We call their

activity “digital activism,” a word that is, itself, a convergence between “activism” and digital “artistic” production. The digital activism we find expressed through SPARC, we argue, is symptomatic of a Chicana/o twenty-first century digital arts movement. (Sandoval & Latorre, 2008, p. 81).

Sandoval and Latorre (2008) argue that this activist creation acts as “a mode of liberatory consciousness that Chicana feminist philosopher Gloria Anzaldua calls *la conciencia de la mestiza*, that is, the consciousness of the mixed-race woman” (p. 82).

Sandoval and Latorre (2008) argue that these types of activist projects push us to re-think hegemonic positionality, and create counter-hegemonic practices and ways of being that *re-position* the traditionally invisible, silent, and disenfranchised into empowered embodied subjects. Sandoval and Latorre (2008) contend that the most “subversive” advance of digital technology is that it has the potential to destabilize and upend oppressive positionings of embodied identity. These authors particularly draw attention to the ability of technology to potentially disrupt the traditional positionings of “youth” as less powerful and less knowledgeable than adults. Say Sandoval and Latorre (2008):

Digital technology provides unprecedented means for young people to represent themselves outside of adult control; the fear here is that they are thus capable of further disrupting the “natural” evolution of social development. Ultimately, what seems most distressful to these analysts of youth culture is the idea that digital technology brings about a general destabilization of the categories “youth” and “adult” themselves, categories that, in the past, maintained critical social hierarchies. In our analysis, we explore how Baca and her young apprentices critically and strategically undermine such categories to enact various forms of activist aesthetics. (p. 86)

The digital artist and critic John Jota Leanos (2008) describes the work done by the activists at SPARC as a tactical intervention into identity practice and creation. Says Leanos (2008), “Xican@ murals and digital murals are forms of tactical media entrenched in an historical and visionary politics of *barrio* consciousness that works in conjunction with other forms of oppositional politics” (p. 82). Leanos (2008) sees the potential re-positionings that technology makes viable.

The SPARC project draws attention to embodied positionality—the literal embodied habitations and the lived oppression—experienced by these youth. These oppressions are brought about by the complex interaction of physical embodiment, material distribution of resources and powers, and hegemonic discursive expectations and ideologies. Oppression focuses on variability of embodiment. However, these students also use their bodies to create projects that draw attention to embodiment; draw attention to embodiment lived in a more egalitarian reality. These art projects draw attention to bodies that are acting toward new ways of being and more emancipatory spaces; they also highlight the loss of bodies—the death toll, prison pipeline, and other divides made onto and through bodies—that are experienced in various minority communities. Embodiment is always present.

These examples of games, design-strategies, and activist projects intrigue me because they showcase the ways that online spaces can be oriented toward re-positioning bodies and embodied identity into more empowering spaces and roles. Online spaces can be flexible and dynamic. They can work to push back against the hegemonic discourses around who is “normal” or “acceptable” in online spaces. Online spaces can work to engage students in critical thinking, in opportunities to shape their own concepts of identity, and to fight for justice and equality. Online spaces can be used to create new mediums, modes, and venues for intervention into the political; interventions that insist on equality and empowerment.

The SPARC project also showcases the ways that digital spaces and artifacts can be used as avenues for political activism. In order to create more engaging and socially just educative spaces, we need to create venues for that political activism: we need to work toward political projects. This “activist” project demonstrates the ways that embodied positionality can be

excavated and then challenged—in a productive way—using online tools and spaces. This type of practice should inform our own work as we create and enhance online education.

This chapter has striven to expand and further multiple our understanding of embodiment in order to argue for a complex orientation to embodiment as a move toward more engaging and socially just online education. I have centered issues of diversity, power, representation, and access. Focusing on the ways that bodies are positioned allows us to critically encounter the ways that power circulates, the social imaginaries around who is included in the digital space and who is not. Focusing on embodied positionality further allows us to reflect on how relationships might be imagined differently. Online spaces are replete with chances to bring a critical focus to unequal power relationships and to imagine (and try to create) more egalitarian spaces. Embodied activism, as part of a pedagogy toward more empowering online education, is necessary.

In the next chapter, I continue to argue for a complex orientation to embodiment, by focusing on the embodied material labor practices that produce our digital world. My focus on material labor may seem a little outside of a definition of embodiment. However, I believe that the only way to have a full and rich accounting of embodiment is to consider what bodies are doing—how they are working—what costs they pay—in order to make our digital world possible.

Chapter 4

Embodied Material Relationships of Labor and the Creation of Digital Artifacts

The dissertation has thus far focused on the ways that physical embodiment and positional embodiment matter. We need to design for and teacher toward the ways that bodies, positioned in various relationships with societal ideologies and practices, physically interact with digital devices and within digital spaces. In this chapter, I expand on embodiment by highlighting embodied labor practices—the design, manufacturing, use, and disposal of technological artifacts. There are geographical, social, and political labor practices—within the digital economy—that have real effects on physical embodiment and embodied positionality.

The creation and extension of techno-society requires not only information and code, but actual physical *things* and global relationships of labor. These embodied material relations of labor and material artifacts also need to be rigorously considered in order to have a rich and complex orientation to embodiment; we need to critically excavate the material practices and material artifacts of technology as we continue to use and create online educational spaces.

In this chapter, I foreground the embodied material relations of labor that are deployed around the creation of digital artifacts by exploring the life-cycle of a computer or other digital device. I tell a story of how a computer comes to be, from design, to manufacturing, to use, and then disposal, and the ways this computer-life affects both physical and positional embodiment. This story is a gendered story, further inflected by race, ethnicity, and global positionality. I delve into the computer as a global artifact which exemplifies embodied practices by looking at: design processes; manufacturing processes; use practices; and disposal practices. I argue that there are destructive consequences and oppressive inflections to each of these various stages creation ,use, and disposal of digital artifacts. As I highlight the material labor relationships that

go into the creation of a digital device, the embodied effects of these relationships will become clear. I will end the chapter with a focus on both online “games” or educative programs, as well as institutional practices, that can work to ameliorate some of the distressing material labor practices that go into creating digital devices. I begin by focusing on the design process for your average computer.

Design

By delving into the design-world, I aim to show the ways that gender—as well as race, ethnicity, and other factors—shape who gets to be a part of the design world; who is welcome to enter and who is not. The growth of the digital sector has tended to marginalize women and have unequally negative effects in regards to women and creative labor. This first section examines the gendered relationships that are played out in the sort of “behind the scenes” production of software, hardware, and code that go into the design of digital artifacts. Even before the manufacturing of digital devices—the physical artifacts—the very design process of a digital artifact works within and through a matrix of gendered relationships. Gender comes to the fore as a condition and embodied relation of labor, and needs further critical exploration.

In general, according to Etkowitz et al. (2008), women are still rare in the engineering and IT design sectors. According to Etkowitz et al. (2008), in general, when women are getting educated in a way that would allow them to participate in designing software, designing hardware, and coding new products, their education is used as credentialing to get a job as a behind-the-scenes assistant to a male who is actually *doing* the designing of new digital products and knowledge. Says Etkowitz et al. (2008):

More recently, the cultural overlay on physical characteristics has moved to the forefront as an explanation for divergence and the production of gender inequality in science.

“Territorial sex segregation” and “ghettoization,” creating a separate, gendered labor market in science, developed from (1) the rise in the supply of qualified women, (2) employers’ strong resistance to these women entering traditional scientific employment such as university teaching . . . , and (3) new opportunities in scientific work but low status and behind-the-scenes, arising from the need for large staffs of assistants. (p. 408)

In other words, the women who *are* entering engineering and science—in a way that would have prepared them for being one of those designers of new technologies—are ending up in low paying and low status jobs where they do not usually get to design. This gendered-distress in the work place is also born out by the research of Johanna Shih (2006).

Shih (2006) recounts extensive case study research she did on the networks of job hopping and job creation that abound in Silicon Valley. Shih (2006) describes the necessary networks of information that were deployed in order to help women and ethnic minorities in circumnavigating overtly discriminating companies and work environments. As Shih (2006) argues, women and ethnic minorities experience a lot of bigotry in the tech-workplace. Shih (2006) contends that three different gendered mechanisms are at play in the “pipeline” of women into engineering jobs: First, there is a channeling of women and minorities into less prestigious academic tracks—within the academy—so that they may be less prepared to take on design jobs. Second, women and minorities can become “de-skilled” as they receive less access to training while in the work force or even while still at the academy. Third, informal practices and processes—within the workplace—can actively position women and minorities outside of the networking opportunities necessary to be considered for the more prestigious jobs or for other mentoring opportunities (p.180). Shih (2006) further contends that men have greater access to the “sponsorship” model of mentoring—where a person is shepherded through the ranks and given access to opportunities through a homosocial network; whereas women are more often made to take part in the “contest” model of mentoring where they must compete for resources and be evaluated using more formally established criteria. In these ways, women and minorities

are often channeled out of the pipeline of prestigious engineering jobs and into more menial engineering work. In order to try and work against this workplace milieu, women and minorities sometimes try to set up informal networks of information.

Shih (2006) delineates the networks that women and ethnic minorities had to create and protect in order to be able to have any leverage within Silicon Valley. As Shih (2006) describes it:

Notwithstanding the regional discourse on meritocracy, white women, Asian women, and Asian men report facing forms of bias that are well documented in past studies, such as gender or ethnic typecasting and lack of access to firms' inner networks. However, they also report being able to turn the tables on biased employers by job-hopping to firms that they viewed as more egalitarian. Second, I show how the region's reliance on networks did not disadvantage white women, Asian men, and Asian women. This is counterintuitive because lack of access to key networks has been consistently identified as problematic in studies of work and organizations. However, because of the specific histories of these groups' entrance into Silicon Valley, respondents reported being able to create and tap into resource-rich, cross-rank, gender- and ethnic-based networks that could rival the utility of "old white boys' networks." (p. 179)

Shih (2006) contends that women and ethnic minorities, who usually experience discrimination, were able to create networks of information in order to try and overcome these discriminatory practices. However, this strategy has only been marginally successful. For example, in 2003 only 8% of engineers in the U.S. context were women; in Silicon Valley in 2003, the percentage was 17%. The profession is still unequally biased against women and minorities, but this shows that networks of power can help women get into more male-based professions.

Research by Mia Consalvo (2008) also corroborates Shih's work on the entrenched and institutional sexism that exists in the design world. Consalvo (2008) argues that "maintaining women's active participation in the game industry on a consistent basis has met with many challenges. Beyond design elements, factors like marketing disconnects, structural sexism, and resistance to change continue to drive many women away" (p. 177.) This institutional sexism is

shaped by the tacit assumptions and “common sense” notions of expected practice in the industry and marketplace, as well as oppressive discourses in the work place. Consalvo’s (2008) research particularly marks the practice of “crunch time”: the expected 85-hour work week that is ongoing before a product is launched and tends to demand a one-track focus rather than a focus on family or the work of care-giving. Consalvo (2008) also highlights “male speech” patterns that tend to exclude women as part of the acknowledged “team” that exists in the work place. Consalvo (2008) writes:

While certain practices may not arise from sexist (or racist) ideologies, a sexist institution can arise, due to particular practices being valued and sustained, rather than alternate practices. (p. 180)

Consalvo (2008) argues that women are often positioned—through practices and practice-based ideologies—as outside the norm. This “outsider” status can be seen throughout the industry. An article from *The New York Times* shows this point.

Chris Sullentrop of *The New York Times* reported on the Game developers Conference of 2013. He noted that women were starting to emerge as developers, but still lagged far behind male developers of games and other leisure program ware. Sullentrop (2013) interviewed some of the few women designers at the conference to get their ideas on why there are not more women in the profession. Sullentrop (2013) specifically foregrounded

a conference panel that confronted the industry for not doing enough to make women feel accepted—as designers, as players, as conference goers. The indie crowd is still, like the studio system, largely a men’s club. (Of the 10 indie soapbox speakers, 9 were men.) (Sullentrop, “Game Developers”)

Many of the women interviewed by Sullentrop (2013) argued that the lines around gender were very defined: “You’re either doing it, or you’re not,” said Robin Hunicke, a designer who has worked on games like *Journey* and *The Sims 2* and who recently was co-founder of an independent studio. “You’re actively working to broaden participation in our industry, or you’re

in the way.” Other women echoed this point, and further articulated the gender divide by pointing to the small pool of potential female designers. One of the women interviewed pointed to the lack of women game developers which stems from the lack of women players; a lack that exists because too few designers are aiming for female audiences. Sullentrop (2013) interviewed designer Kim McAuliffe who stated: “Every designer starts out as a player, . . . The limited number of playable female characters . . . necessarily limits the audience for female players, she said, and thus reduces the number of female game designers” (Sullentrop, “Game Developers”). McAuliffe also said she was uncomfortable with the large number of games that exerted pressure toward violence. McAuliffe specifically mentioned disliking the proliferation and expansion of first-person shooting games. Says Ms. McAuliffe “I worked on Socom 4,” a military shooter, “but it made me uncomfortable every time I played my own levels” (Sullentrop. 2013, “Game Developers”). Sullentrop (2013) further spotlights the gender divide in the industry by interviewing designer Brenda Romero.

The number of women in the industry is growing, said Brenda Romero, the game designer in residence at the University of California, Santa Cruz, and the creator of acclaimed board games, like Train, about the Holocaust. After all, she said, “2006 was the first year there was a line at the women’s bathroom at G.D.C.” But, she added, industry traditions like the “booth babes” at the annual Electronic Entertainment Expo, known as E3, need to end before women will feel fully welcome.

Ms. Romero’s 12-year-old daughter told her that her dream was to make a video game with her. For now, though, Ms. Romero is unwilling to take her daughter into what she called E3’s “sexually charged environment,” one that she compared to a leering crowd at a construction site.

Appealing directly to the organizers of E3 Ms. Romero concluded the panel by saying, “Please change this, so I can bring her there.” (Sullentrop, 2013, “Game Developers”)

At this point, the boundaries in the industry are so defined that many women do not feel comfortable in these spaces. Women are seen as “booth babes”: bodies to be objectified and used

as advertising gamuts. They are both materially and discursively positioned outside of the design field.

Embodiment is played out in the experiences of these women. Women are categorically seen as “less than” when compared to men: they are seen as less likely to work the long hours; less well-trained; less in-touch with consumers; less likely to be part of the “boys club” where the decisions are made about who gets to design which product; and, in general, women are seen as less likely to be “naturally” gifted with designing products in a world where men are still represent the greatest number of consumers. Also at play is the overt use of women’s bodies as advertising artifacts. The phenomenon of the “booth babes,” reifies women’s bodies as *things* to be used to draw in the attention of men. Women in the design world are placed in a position where they must fight to be “seen” as a designer, and yet they must also fight to dismantle the “scene” of booth babes—women’s bodies as advertising paraphernalia.

While women are making in-roads into the digital design world, it is still largely a boy’s club. Women are unequally affected by discrimination—at institutional and discursive levels—in ways that position them outside of the digital design space. The story of how a computer comes to be and where it goes to die is infused with gender discrimination. This gendered story continues as we excavate the manufacturing process of digital artifacts.

Manufacturing

The average computer is formed or given material shape in a manufacturing plant somewhere in China, India, Taiwan, or Bangladesh. These countries are home to many of these computer manufacturing plants, not just because the cost of labor is cheap, but because these governments tend to have less rigorous oversight of environmental damage *done* by the

manufacturing plants. And, make no mistake, the manufacturing of a computer is a toxic business. As will be made clear, the creation of digital devices wreaks havoc on our environment. It destroys food and water supplies. It causes illness. It causes birth defects. And, because manufacturing plants are intentionally placed in rural areas where there is the creation of food supply, sparse population, and less oversight of water, soil, and air toxicity, there is a greater deleterious effect particularly on rural women living in the global South.

These negative effects are not found only when a manufacturing plant has a malfunction, they are part and parcel of the creation of your average computer. As mentioned in Chapter 1 of this dissertation, both the manufacturing and disposal of digital devices are environmentally damaging. A recent UNU report (2004) found that, in general—that is, if everything goes as planned—the manufacturing of an average computer releases large amounts of toxins into the environment. According to the UNU report (2004) the manufacture of your average computer requires more than ten times the weight of the product in toxic chemicals and fossil fuels. The production of a 24kg computer and monitor needs at least 240 kg of fossil fuels to provide the energy for the manufacturing process, as well as 22 kg of chemicals, and 1.5 tons of water. The manufacture of one average computer system uses the weight of a sport utility vehicle in materials. This process contributes both to pollution in the area and overall global warming.

The chemicals released by the manufacture of computers also lead to significant health risks. The UNU report (2004) contends that the environmental of digital manufacturing is grave. There are possible long-term health effects on workers and neighboring communities due to chemical exposure and emissions from production stages such as microchip fabrication. Chemical exposure is just one of the many hazards of working in or living next to a manufacturing plant of digital objects.

1.8 tons of raw materials are required to manufacture the average desktop computer and monitor. Many of these materials will be emitted into the atmosphere or will end up in landfills—sometimes affecting soil and water quality. In fact, a report by *Forbes Magazine* notes that the trichloroethylene, vinyl chloride, ethylbenzene and xylene, used in the production of semiconductors and microchips can vent through the soil for decades after the producing plant has closed (Helman, 2013). All of these deleterious effects result when the manufacture process is going to plan; if there aren't any breaches of environmental code that release even more toxins into the environment. Yet, as has recently been the case for Apple products, these breaches of environmental code are becoming increasingly more commonplace.

This trajectory toward disregarding current policies on proper disposal of waste that is produced due to the manufacturing of computer parts can be seen in the accumulating articles decrying Apple's lax environmental compliance. Multiple articles published in *The New York Times*, *The Guardian* and the website of the *China Environmental Governance Organization* describes Apple's infractions. Jonathan Watts of *The Guardian* (2011) reports that: "Behind their stylish image, Apple products have a side many do not know about—pollution and poison" (Watts, 2011). Watts (2011) further notes that:

Apple's suppliers have been involved in breaches of environmental regulations. The report noted waste discharge violations in recent years at several Chinese firms that are thought to be part of Apple's supply chain.

Labour conditions were also called into question when at least a dozen workers jumped to their deaths last spring at the Foxconn electronics complex in Shenzhen, which makes parts for Apple and other foreign companies. ("Apple polluting and poisoning")

This report also contends that, "in recent years, more than 3,000 children have been diagnosed with unsafe levels of lead in their blood in a series of heavy-metal contamination outbreaks" that have been linked to the production of Apple products (Watts, 2011, "Apple polluting and poisoning").

A report by David Barboza in *The New York Times* (2011) echoes this same concern for environmental damage done to China through the production of Apple products. Barboza (2011) details a report made by the Institute of Public and Environmental Affairs in Beijing, that states that Apple has been responsible for several incidents of environmental damage. Barboza notes: “The report, which the group said was based on visits to many of the factories’ regions, said that factories that the group suspected were Apple suppliers often “fail to properly dispose of hazardous waste” and that 27 of the suppliers had been found to have environmental problems” (Barboza, 2011). Barboza (2011) further recounts the damage that Apple has done:

Last year, one of Apple’s biggest suppliers was hit by a wave of worker suicides at several of its mainland Chinese facilities. And in May, an explosion and fire at a plant that made Apple products killed two people and injured more than a dozen in the city of Chengdu, in southwest China.

Also earlier this year, Apple acknowledged that 137 workers at a Chinese factory near the city of Suzhou had been seriously injured by a toxic chemical used in making the signature slick glass screens of the iPhone. (Barboza, 2011)

Each of these articles also argues that Apple has a history of moving to rural areas in the global South where the toxic dumping that is created through the production of their products may be less noticed by governmental officials. When suburbia and cities start to encroach on Apple’s dumping grounds, Apple has been known to close down the old plants and move to a more rural area (See articles listed above.) However, while articles about the manufacturing of Apple products are easier to find (given Apple’s careful cultivation of a friendly image), these practices are by no means endemic only to the manufacturing of Apple products.

The manufacturing of a computer is a *toxic* thing, and these toxins disproportionately effect women in rural areas. As companies move to more rural areas, it is the women who live in these areas who suffer most as they try to get clean water and grow food for their families.

In order to understand the complex ways that gender plays a part in the creation of digital artifacts, it is important to acknowledge that women have a different relationships to the environment—to the actual soil and water—than do men. As Dankelman (2009) argues:

At first sight, the relationship between society and the physical environment appears gender-neutral, affecting both men and women in a similar way. But a closer look reveals that it is not neutral at all: the socio-cultural construction of relationships between men and women means that linkages between people and the environment work differently for them. (pp. 458-459)

Dankelman argues that women are more affected—given their various socialized roles—by the changes in environment and labor productions.

In her work, Dankelman sites research by various NGO's and other pro-environmental and feminist organizations that describe the specific effects of changing labor practices and the increased destruction of land/material environments on women's lives. Dankelman (2009) quotes from a report given by The Center for Science and Environment that states:

Probably no other group is more affected by environmental destruction than poor village women. Every dawn brings with it a long march in search of fuel, fodder, and water. It does not matter if the women are old, young, or pregnant: crucial household needs have to be met day after weary day. As ecological conditions worsen, the long march becomes even longer and more tiresome. Caught between poverty and environmental destruction, poor rural women in India could well be reaching the limits of physical endurance. (p. 460)

This report helps Dankelman to establish the unequal effects of changing practices and destruction of the environment on the lives of women. However, Dankelman is quick to point out that “women” is not a homogeneous category; that globalized and technologized practices have different effects depending on gender—and also depending on race, class, and other postionality factors. Says Dankelman (2009):

There are vast economic, cultural, and social differences among women. Distinguishing factors include class, caste, race, kinship, age, and nation of origin. Even within the same village, women of different classes and castes may have very different positions and roles. The same is true for women living in a rural or urban setting. The position of a tribal woman can be completely different from that of her female neighbors; from a

settler's family. These differences are as crucial as those between women and men" (p. 461)

There are differences in how women experience and are affected by changes in globalized environmental practices.

Still, Dankelman points out that, in general, women have the role of running households; the responsibility to make sure the basic necessities of life are provided. Women do this in varying ways, some by literally gathering these resources from the land, and others by going to various stores and procuring these resources. Either way, women have been societally positioned to take on the role of getting resources for their families. Women are the one's who have been societally positioned into the role of "caregiver." As such, women are unequally affected when resources are interrupted or destroyed by environmentally destructive production practices.

Thus, the manufacturing of digital artifacts creates both physical and positional embodied effects. It is women, disproportionate to men, that are negatively affected by the increase in toxins released into the environment. This toxification of the world affects physical bodies, often creating illness, birth defects, lack of food, lack of clean water, and lack of fuel.

Dankelman is not the only one to make the connection between gender, technology, and negative environmental impacts. Research by Thomas-Slayter, Wangari, and Rocheleau (2005) argues that women are the most negatively impacted by environmental decline because, for most countries in the global South, women are often in charge of the livelihood of the whole family: the men can work for themselves, but the women must make sure that mouths are fed. Thus, women are more often exposed to toxins both as part of the food-growing process, and as part of wage-labor. Susan Buckingham-Hatfield (2000) contends that women are not only more affected than men because of their positionality, they are also more affected because of their physical bodies (physical systems that are more susceptible to negative effects from toxins because of

both size and connection with pregnancy), and because they are often positioned as outside of power structures. Women have a doubling of oppression with their increased exposure to toxins as caregivers for the family, and because of the lack of a way out of this exposure because they have little power to change their circumstances. In this way, Dankelman and Buckingham-Hatfield paint contrasting pictures whereby, on the one hand, women are empowered to change their worlds because they are the ones to actually work in the world and know what needs to be changed; and yet, at the same time, these women are positioned outside of societal power structures that would allow them to come up with and implement any plan for change. Veuthey and Gerber (2010) also spotlight the gendered division of power to change the environment; and, therefore, also contend that women are uniquely vulnerable in their coerced exposure to toxins and their lack of ability to change that exposure.

It is not only in the manufacturing of digital artifacts that we see these material embodied relations of labor. We can also see gender at play when we think about the *use* of digital artifacts. Gender shapes the labor that goes on in front of the computer screen—or in front of other digital devices.

Use

In this section, I focus on the practices of labor that go on “in front” of the computer screen, not just “behind the screen” (manufacture, design, etc.). The actual use of the computer intersects with both the physicality of bodies and the positionality of bodies. Again, gender comes into play as a lens that allows us to see the fuller shaping of embodiment. I begin by talking about the ways that ICT (Information and Communication Technologies) devices have

changed the ways we practice “work”; they have intensified the expectations and practices of “labor,” and this has gendered consequences.

ICT use has changed how many hours we spend working; and has changed what counts as work and where we work. A study by Chesley (2011) showed that the use of ICT as part of a “work” practice has a strong correlation to the feeling of increased stress and the need to work at a faster and more intense pace. Although, interestingly, this study also showed that the use of ICT can also lower stress as it allows workers to feel like they are more connected to others and they have more control over their environments. Chesley (2011) puts it best:

Recent scholarship on the use of information and communication technology (ICT) for work suggests that this use may be significantly altering three specific working conditions: 1) the pacing of work; 2) the level of interruptions workers experience, and 3) the level of multitasking behavior in which workers engage. All three of these job conditions are expected to contribute to a more intense work environment that underlies levels of work-based strain and detracts from workers’ general psychological well-being. . . . This analysis indicates that work-related ICT use is indirectly linked to higher levels of work-based strain and employee distress through its influence on faster job pacing and greater levels of interruptions and multitasking. However, there is also evidence that personal ICT use may mitigate these influences, and, further, that work-related ICT use is directly connected to lower levels of work-based strain, a finding that suggests positive influences of work-related ICT use apart from its influence on the job conditions studied. While the findings do suggest that work-related ICT use can have specific negative implications for workers, as a whole the pattern of results does not support a “technologically-tethered” worker hypothesis in which ICT-use is holistically responsible for greater levels of worker distress. (p. 1)

The increased use of ICT for work has a complex story. ICT seems to provide an easy way to form important connections that can relieve workplace stress. On the other hand, use of ICT also seems to lead to an intensification of labor that actively blurs the boundaries of “home space,” “social space,” and “work space.” Research by Carayon (2007) bears out this point.

Carayon’s (2007) scholarship highlights the “activity practices” of workers who use ICT. Carayon’s (2007) conclusion is that ICT use, while increasingly necessary in the globalized workplace, has negative physical consequences that need to be addressed. Due to the increased

use of ICT, Carayon (2007) argues that there has now been a more complete overlap of work spaces and home spaces.

Different facets of work intensification can be defined as (i) having to work harder, (ii) having to work faster, (iii) working long hours, (iv) having more and more to do (work pressure), (v) having to keep learning new things, and (vi) working on increasingly complex tasks. These dimensions of work intensification indicate a change over time in the amount, pace, and quality of work. Work intensifies when there is an increase in the amount, pace, or qualitative requirements of work. (Carayon, 2007, p. 12)

There is a lot of evidence showing that the increase in intensity of work has negative consequences on health and well-being. Carayon (2007) specifically targets the increased pressure to be seen as always-working that creates this loss of health. Carayon (2007) writes:

The work intensification that has occurred in the past decade can be seen in subjective reports of work pressure, increased overtime, increased reports of burnout, tension and strain, a lack of time for family and social activities, and an increased pace of work. . . . The results showed that the introduction of a new technology was the most important factor in raising work intensity, and the implementation of new work organization was the second most important factor. Therefore, new technologies do contribute to work intensification and seem to be a major factor influencing work intensification. (pp. 12-13)

This increasing demand for work in all spheres of life has particular consequences for women. As multiple studies have pointed out, it is often women who, in addition to engaging in the paid work force, take on the lion's share of unpaid "caregiving" labor. An international study by Jang, Avendano, and Kawachi (2012) compared the caregiving practices of Europe and Korea. This research group found that, with the exception of Scandinavian countries that have both a culture and support system for bringing paid caregivers into the home, most "caregiving" was done as unpaid labor, and the vast majority was done by women. Studies by Lilly, Laporte, and Coyte (2010) bear this out in the Canadian context as well. Women do most of the caregiving, they do it often for free, and they care more intensely than men when they do it. This practice of intensified labor—on all fronts, in all spheres, with both private sphere labor and public sphere labor intermingling and overlapping boundaries—means women are at increased

risk for stress, lack of sleep, and the decreased physical and mental health that comes with lack of sleep and increased stress. This same norm toward women giving free labor can also be seen in online communities of play.

Tiziana Terranova (2000) argues that one of the major developments of the expansion of online communication and practice, is the increase in free labor that individuals “give” to companies who profit from this labor. Terranova (2000) contends that the digital economy works as an overlay between a capitalist economy and a “gift economy.” Terranova (2000) argues that:

For most of its users, the net is somewhere to work, play, love, learn and discuss with other people. . . . Unrestricted by physical distance, they collaborate with each other without the direct mediation of money and politics. Unconcerned about copyright, they give and receive information without thought of payment. In the absence of states or markets to mediate social bonds, network communities are instead formed through the mutual obligations created by gifts of time and ideas. (p. 36).

Terranova (2000) emphasizes that the web is not just a space of gift economies, but, importantly, it is a space where the structures and practices of the gift economy sometimes push against—but are more often coopted or re-axiomatized by—the capitalist economy. Terranova (2000) uses the example of the NetSlaves, or other “workers” that offer labor—just for the love of doing it—and yet this labor is taken up for profit by private companies. Says Terranova (2000):

The conditions that make free labor an important element of the digital economy are based in a difficult, experimental compromise between the historically rooted cultural and affective desire for creative production . . . and the current capitalist emphasis on knowledge as the main source of value added. The volunteers for America Online, the NetSlaves, and the amateur Web designers are not working only because capital wants them to; they are acting out a desire for affective and cultural production that is nonetheless real just because it is socially shaped. The cultural, technical, and creative work that supports the digital economy has been made possible by the development of capital beyond the early industrial and Fordist modes of production and therefore is particularly abundant in those areas where post-Fordism has been at work for a few decades. In the overdeveloped countries, the end of the factory has spelled out the obsolescence of the old working class, but it has also produced generations of workers who have been repeatedly addressed as active consumers of meaningful commodities. Free labor is the moment where this knowledgeable consumption of culture is translated into productive activities that are pleasurably embraced and at the same time often shamelessly exploited. (pp. 36-37)

Terranova (2000) foregrounds the complex interactions of “production” work, that is done out of the love and pleasure of *doing*, and yet is used by companies, in an exploitative way, to make money off the backs of those who will not be paid, and as it turns out, will not end up “owning” their own content. Terranova (2000) gives the example of fan-fiction and other fan sites. These sites are often created by users who will not be paid for the creation and upkeep of the sites. Yet media companies often get material gain from the “buzz” these sites create. And, should something on the fan site not meet with the companies’ approval, the companies often sue the fan site (and the creators of the fan site) for copyright infringement. (Owners and producers of the *Twilight* movie series as well as the *Harry Potter* series are taken up as examples of this practice over and over again in the literature.) Companies are getting material gain off the free “gifts” of web users, and yet these “gifters” tend to be denied control over and “ownership” of the content that they produce; as well as being denied any monetary compensation for their work.

Here it is worth noting that one of the few sectors of “web production” where women are increasing their presence is in “free labor” areas. As pointed out by Gee and Hayes (2010) one of the areas where we are starting to see an increased number of women is in areas like fan-site creation; as well as fan-fiction creation. While there is a proliferation of fan sites where women are starting to become producers of web content—not just consumers—it is worth noting that most of the spaces where this increase exists are in areas where women are giving *free* labor that will then monetarily benefit capitalist corporations.

The use of digital technology tends to place women—more so than men—in an intensified labor environment where women are positioned into exploitation; work without pay, stress without relief.

Finally, I want to turn to the ways that digital technology “dies.” I highlight the disposal of digital artifacts, and how this is also a story about physical bodies—gendered bodies. In addition to the manufacture of digital devices, the disposal of digital devices (e-waste) creates toxic conditions for people—especially women—living in the global South

Disposal

This section, once again, draws a picture of the intense environmental damage caused by digital artifacts. Like the *manufacture* of these artifacts, the *disposal* releases toxic chemicals into the water, air, and soil. These digital artifacts create toxic “dumping” at both the production and disposal stages of the life cycle. And, as with the manufacture of these devices, women in rural areas—particularly in the global South—are unequally negatively affected.

The dumping of e-waste (digital artifacts that get dumped into landfills and rivers) has horrible consequences for the environment and the people who live off of the land. Living near an e-waste landfill, according to a UNU (2004) report, correlates to an increased exposure to brominated flame retardants, as well as lead, mercury, cadmium and chromium, which leach into both soil and water supplies. Furthermore, research sponsored by the Ghanaian government and the NGO *Safe World for Women* contends that women and children are at heightened risk for health complications from exposure to these toxins. Dr. Deborah McGrath (safeworld), one of the researchers who worked on the report, argues that living in proximity to e-waste dumping sites is associated with toxic exposure to lead, arsenic, cadmium, hexavalent chromium, and mercury, zinc, and nickel. As McGrath (safeworld) points out,

Mercury and lead are particularly dangerous neurotoxins that bioaccumulate in children’s bodies over time . . . they may suffer from brain and kidney damage, respiratory illness, developmental and behavioral disorders, and eventually cancer. Acute or chronic exposure to toxic e-waste can be fatal.

This report highlights the ways that women are particularly vulnerable to these toxins: pregnant women, and their in utero babies, are at the height of risk for toxic exposure; women and children have endocrine systems that make it more difficult for them to rid their bodies of or negotiate increases in toxicity to the environment.

Another researcher for the report, Dr. Kwei Quartey (*safeworld*) marks out some of the consequences of exposure to e-waste. Quartey (*safeworld*) reveals that women and children are at an increased level of toxic chemical poisoning from exposure to chemicals like:

- Dioxins—which lead to thyroid problems, damage to the immune and central nervous (CNS) systems.
- Polychlorinated biphenyls (PCBs, used in coolant fluids)—which lead to endocrine disruption and neurotoxicity.
- Cadmium—which leads to metal fume fever, lung inflammation, and excess fluid in the lungs. Often, prolonged exposure to cadmium results in death.
- Mercury (in batteries)—which results in chest pain, shortness of breath, coughing up blood, and CNS dysfunction.
- Lead (in the cathode ray tube)—which leads to blood disorders, and damage to the nervous system, kidneys, and brain.

Further research by Frazzoli et al. (2010) adds to this list of toxic chemicals to which people are exposed if they work in or live around e-waste dumping sites. Frazzoli et al. (2010) contend that e-waste sites create dangerous exposure to “toxic chemical elements, polycyclic aromatic hydrocarbons and persistent organic pollutants” (p. 388).

Frazzoli et al. (2010) further recount the hazards of e-waste by spotlighting the “carry over” effects of living near an e-waste dump. Women exposed to toxins from e-waste dumps will pass on the negative effects of that exposure to their children. Therefore, e-waste affects multiple generations, even if families move away from toxic environments. Frazzoli et al. (2010) argue:

Scientific evidence available so far (mainly from China) [focuses on] . . . the concept of health sustainability, i.e. the poor health burden heritage perpetuated through the mother-to-child dyad. Endocrine disruption and neurotoxicity are specifically considered as examples of main health burden issues relevant to perpetuation through life cycle and across generations; toxicological information are considered along with available data on environmental and food contamination and human internal exposure. The risk from exposure to e-waste related mixtures of toxicants of vulnerable subpopulation like breast-fed infants is given special attention. The diagnostic risk assessment demonstrates how e-waste exposure poses an actual public health emergency, as it may entrain significant health risks also for generations to come. (p. 388)

In a very physical—as well as positional—way, woman and children bear the burden of the toxic dumping of e-waste. Women and children are more vulnerable to the exposure because of their societal positioning as workers of the land, collectors of water, and collectors of e-waste byproducts (left over copper and other metals) for resale. Women and children are also at greater risk of exposure because—statistically speaking—women and children have endocrine systems that work at a rate that makes toxic exposure particularly problematic. Furthermore, this risk increases in women who are pregnant—and in their in utero offspring. In these ways, women in the rural global South are positioned to bear more of the brunt of toxic exposure. This exposure to toxins has consequences for and shapes physical embodiment. Women become more likely to suffer loss of endocrine functionality, birth defects in their babies, and other health problems from this exposure. Women living near e-waste dumps—women in less-developed rural areas—are significantly negatively affected by the disposal of digital artifacts. In many less-developed rural areas, women are positioned—within their societies—to be the ones to get water, dig in the soil, and do menial labor chores (like search through old computers for bits of copper that can be sold). Thus, women are more significantly exposed to the environmental damage and toxic consequences of living near an e-waste dump.

Ahan (2008) highlights this point in her research on labor practices for women in the less-developed East (Nepal Bangladesh, Bhutan, Myanmar, parts of India and China). The following

quote shows the ways that exposure to toxic e-waste dump is a gendered issue. In many ways, this quote describes the effects of toxic e-waste dumping; it corroborates my argument that e-waste pins women into more oppressive relationships with technological artifacts than men.

Ahan's (2008) research argues:

Environmental degradation has become a crucial issue in the contemporary world. Although women and men relate to the environment the same way in many ways, they also use plant and animals, land and water in different ways. Whether the air, water or land is clean or polluted may not have the same affect on men and women because of their different activities and socio economic role. Impact of environmental degradation are divergent for various social groups and for different contexts . . . women have to bear the outcome of nature's maladies disproportionately.

It is well established today that environmental degradation affects the Third World countries most adversely because of the vicious circle of poverty. In the Third World countries women constitute half of the entire population and they are the poorest of the poor—not merely in wealth but in every other index of development. So naturally women are the worst victims of environmental degradation as they depend upon the renew-ability of natural systems to provide them food, fuel, water and shelter for existence. Environment has both direct and indirect bearing on women. . . .

Water collecting and carrying fall exclusively within the domain of women and girls. They are responsible for collecting water and for controlling its use. It is the women who have the knowledge of the location, reliability and quality of the local water resources. Women are in close contact with nature not only as users or consumers but also as producers and managers of environmental resources.

As farmers women produce foods and agricultural products. Their tasks in agriculture and animal husbandry as well as in the household make them daily managers of the living environment. Women particularly rural and indigenous women play a major role in managing natural resources—soil, water, forests and energy—as they have profound knowledge of the plants, animals and ecological processes around them.

Women's work responsibilities include managing the most basic and natural of all resources—food, fuel and water. When natural resources were abundant, women did not have to work so hard. But now with the depletion of resources, women with limited access to resources are required to manage. Through management of natural resources women provide sustenance to their families and communities. So, they are more concerned about environmental degradation than men. (pp. 6-7)

The disposal of digital artifacts disproportionately negatively affects women. Disposal destroys the environment. It destroys living bodies, homes and communities. Disproportionately,

it destroys the bodies of women, and the children that these women bear. These are things we need to foreground as we aim for more socially just and engaging online educational spaces. We need to take these material relations of labor into consideration, and then create opportunities for social intervention and political organization as part of online educational coursework and efforts to work toward more socially just societies and practices. The concluding section of this chapter explores some of the interventions that can be made as we come to connect the oppressive gendered relationships of technology with our desire to create engaging and socially just online educational spaces.

Conclusion: What Can Be Done?

Given the negative effects of the manufacture, use of, and disposal of digital artifacts, what can be done? What can we do, as educators and designers, to *do* online education differently; to engage in social action for change, or at least create awareness around these unequal power relationships?

First, we can design a moment of critical reflection into our online educational spaces and practices. We can do this by creating online spaces that function to bring up critical questions around gender, labor, and materiality, and we can also do this as a pedagogical technique devoted to eco-egalitarian issues.

Increasingly, there is research that suggests we can embed activist values into online worlds, online games, and online “communication” spaces. I highlight some of the interventions of the online game world—simply because they have had more time and money to devote to thinking about these issues and, thus, are ahead of online educational spaces in this matter—and recount what they have done to design criticality into a space. Within online game worlds,

significant resources have been put to use to develop activist mentalities that are designed *into* games. Research by Belman, Nissenbaum, Flanagan and Diamond (2011) shows how one can design positive activist values into “tacit” understandings of the game world; and that the activism of online worlds can transfer into activist values in the real world. Using a framework that they call *Values at Play*, Belman et al. set up a design strategy for creating activist values in digital spaces. They encourage designers to actively set up scenarios in-game where participants are called on to consider value-laden questions, and then are rewarded for making positive and complex choices. Belman et al. (2011) show that this kind of work can have positive effects in the real world, where users of value-directed games come to be more positively activist within the real world. This example from the game world can be used for fodder as we create online educational spaces.

We need to design ethical questions and activist moments into our online educational spaces and into our pedagogical strategies. This move toward reflecting on the eco-egalitarian issues of online education (or other online spaces) can also be done at the level of pedagogy. Research by Lopez (2013) illustrates this point.

Antonio Lopez (2013) decided to re-create his Media Culture course in a way that would highlight eco-egalitarian issues. Rather than just teaching about the definitions of media, or how to be media savvy, or how media changes the nature of knowledge and communication, he decided that he would expressly highlight ecological and environmental impacts of media, and use this lens as a way to talk about how media works, the culture of media, and the effects of media on our lives. As Lopez (2013) sees it, the problem is that environmental issues have not been explicitly linked to social justice issues. He tries to intervene in that practice by

foregrounding the ways that media, technology, the environment, and social justice problems interact with each other. Says Lopez (2013):

As an educator, I am particularly focused on shifting my core discipline towards a sustainability framework. Unfortunately, the ecological crisis generally has not been linked to social justice issues taken on by media studies and cultural studies. For example, in my survey of dozens of undergraduate media textbooks, media education texts, media studies guides and media literacy curricula, none of these texts had the words “ecology,” “environment” or “sustainability” in their index or content. This is not surprising given that the historical divide between the biological sciences and the social sciences is well reflected in the history of media studies. . . .

A cursory look at the relationship between media and the environment reveals that they are in fact deeply connected in two distinct ways. First, media gadgets and the server farms that network them together create a massive ecological footprint. Gadgets (cell phones, laptops, tablets, personal computers) are produced with toxins and plastics that can’t be recycled, and as a result of their built-in obsolescence, rapid manufacture and disposal, they cast a toxic shadow across the planet. Additionally, servers and the so-called data cloud are coughing up CO2 emissions equivalent to the aviation industry, and will likely double this amount in ten years. Secondly, media promote unsustainable cultural practices, such as unlimited economic growth and consumerism, which are at the heart of our ecological crisis. (Greening a Digital Media Class)

Lopez (2013) attempts to design a class around provoking students to consider the interconnectedness of media culture and environmental problems. He has four objectives for his course. He wants learners to be able to:

- reconnect an awareness of media with their physiological impact on living systems;
- recognize media’s phenomenological influence on the perception of time, space, place and cognition;
- understand media’s interdependence with the global economy, and how the current model of globalization impacts living systems; and
- become conscious of how media impact our ability to engage in sustainable cultural practices by encouraging new uses of media that promote sustainability. (“Greening a Digital Media Course”)

Lopez (2013) actively encourages students to reflect upon and act on environmental damage and oppressive relationships of power—as part of the course. We can do similar things as we create more engaging and egalitarian online courses.

Additionally, we need to critically analyze and engage with how our e-waste footprint affects others, and consider how we can do things differently so as to shrink our e-waste footprint. A complex orientation to embodiment *necessitates* an active understanding of the environmental, labor, and gender issues at play; and provokes changes in behavior. Research by Moore (2012), corroborates this desire to keep the materiality of labor and power relationships at the fore. Moore (2012) argues that we need to re-think relationships of labor and institutional practices as the “re-materialization of geography and labor,” That is to say, only as we think about where our artifacts come from and where they go when we are done with them, can we create more sustainable and equitable practices.

Perhaps we need to consider whether the current practice of designing online spaces in ways that *necessitate* a computer that is less than three-years old, should be considered “best practices,” or egalitarian. More than that, as Dauvergne and LeBaron (2012) argue, we need to do our due diligence in following up on the practices of those to whom we turn for disposal of our digital artifacts. Dauvergne and LeBaron (2012) argue that many e-waste recycling businesses “corporatize” the disposal of e-waste in ways that both allow for the opacity of recycling practices and take away attention from the lives of the rural women (and others) who are most negatively affected by e-waste dumping.

We can do more to push against the automatic disposal of digital artifacts that exists on most campuses and in most educational institutions. More can be done to highlight and call for

social justice in this area. Online educators are uniquely positioned, as users of digital technology, to talk about these issues and advocate for change.

In the next chapter, I conclude the dissertation by turning an eye to practical concerns: the implementation of a complex orientation to embodiment in the design practices and pedagogical strategies of online educational spaces. I have argued for the need of a complex orientation to embodiment in order to create more engaging and socially just online educational spaces. In the concluding chapter, I aim to excavate some practical examples of how this could be (or has been) done in online courses. These examples will allow me, once again, to both argue for and show how a complex orientation to embodiment would change the way we do online education, and lead to more engaging and egalitarian (socially just) online courses. I then also conclude the dissertation with a broader appeal to change current trajectories away from an acknowledgment of embodied materialities, and re-orient toward a complex understanding of embodiment.

Chapter 5

Complex Embodiment: New Ideas, New Programs, New Platforms in Online Learning

Conclusion

My focus for the last three chapters has been to argue for a complex orientation to embodiment and give examples of how that orientation might change how we negotiate, critique, and create online educational spaces. I have used examples of games, as well as some examples from online classroom spaces, to show how online education might orient toward physical embodiment, positional embodiment, and embodied material relationships of labor and ecology—all in order to create more engaging and socially just learning environments. I now conclude this dissertation by exploring a few programs or “experiences” that are online and designed to be educational in nature. I use these as concrete examples of how embodiment is taken up, focused on, in all its complexity, as part of the educational—and classroom—experience. I review some of the pros and cons of these educational platforms, and I address some of the ways these examples can be used to jump-start more engaging, more egalitarian—more embodied—orientations to online education.

I spotlight three platforms/programs specifically meant for educational purposes. First, I highlight *Second Life*—and its education islands. I focus specifically on the islands that are meant to be associated with schooling practices or schools as institutions. I explore the ways that this digital space creates engagement and more social awareness—more socially just spaces. I also note places where it fails—or where it could have done better and creating a complex orientation to embodiment. I then look at *Environmental Detectives*. This is a program that is focused on grade levels 7-16. It is a program that overlays pre-programmed information, GPS

data, multi-media topic-specific information, and the ability to connect between users and “expert” sites, into one package that allows students to *become* environmental engineers in their geographical area for a specific time problem-solving activity. It is focused on a given dilemma or question, and gives students the opportunity to solve an environmental problem in their own community. Again, I talk about how this program creates engagement and more socially just spaces. I also talk about the things that this program could do to be more complex or expanded in its orientation to embodiment and community. Finally, I explore the use of Youtube diaries as an educative form. Specifically, I explore the Youtube campaigns designed to educate around gender issues. I’m particularly intrigued by the *This is What a Feminist Looks Like*, *Gay Stereotypes*, *I Despise Thee*, and *Lesbian 101* Youtube video diaries that are designed to educate on gender issues and break down stereotypes. I examine how these online videos—designed as educative tools—both exemplify a complex orientation to embodiment, and also where they fall short.

I critically analyze each of these three platforms by attending to the ways that they take a complex orientation to embodiment. I explore the ways the various programs take up physical embodiment, positional embodiment, and material and geographical relations of embodied labor and ecology.

After offering an application-oriented review of programs and platforms that exhibit a complex orientation to embodiment, I then conclude this dissertation with an exploration of why a complex orientation to embodiment is particularly necessary in light of current anti-embodiment paradigms and practices circulating in both campus-based and online educational spaces. I give examples of anti-embodiment processes and systems, and then highlight ways that an orientation to embodiment could make a productive difference in these spaces. I contend that

a complex orientation to embodiment can create a better trajectory for both online and campus-based educational spaces. In this way, I both reference back to the work of the previous chapters, and highlight potential areas of continued focus.

I begin by foregrounding the three online platforms or programs which center embodiment. I begin with a focus on *Second Life*.

The *Second Life* of Education

Second Life is a multi-user virtual environment (MUVE) that *can* be used as an online educational space. It can be used for more informal educational experiences, but it is also used for online courses. Residents of *Second Life* create avatars, build worlds, visit spaces, interact with both chat and verbal communication, meet friends they already know in RL, and also interact with people from over 100 different countries. The potential for *SL* as an educational space is enormous. So, too are the number of classes that are currently being taught in *SL*. Rather than focusing on one course that is currently being taught in *SL*, I focus on some of the positive ways that this program showcases a complex orientation to embodiment—within its educational spaces—as well as where this program falls short. My description of coursework and educational experiences in *SL* will be a composite view of some of the sites that are out there, and not an exploration of one particular “island” or course experience within *SL*.

I first explore the ways that *SL* encourages an awareness of physical embodiment. While students may or may not actually *move* their physical bodies while they inhabit *SL*, they become aware of physical embodiment as they design their own avatars, and as they use their avatars to interact in the space. Avatars (as well as all of the buildings, landscapes, and “durable goods” created in *SL*) are subject to the gravity and meteorological events that exist in *SL*, in much the

same way as they exist in RL. As a “newbie” avatar, you still must gain a sense of movement through space, as you learn to navigate walking up and down stairs, learn how to “gesture” with your avatar; teleporting and flying are also learned “bodily” skills. There is also—built into the experience an understanding of physio-temporal contingencies. *SL* is a flexible space, in that one can chose to interact with others in a myriad of different ways. Chatting using text is open. Gesturing to others is a possibility. Voicing one’s thoughts is an option. These options rely both on real time interactions, as well as leaving messages for residents that are not “in” at the moment, but who will be in at a different time.

Furthermore, there is a deep sense of physical embodiment engendered when physicality is specifically focused on as a site of critique and reflection. When teachers use *SL* to learn about bodies, the physicality of embodiment becomes particularly salient. I have seen classes on anatomy (where you can take a virtual trip through both the whole body and the white blood cell), and also classes on architecture (where design-for-all concepts are talked about and tried out in the virtual space) where physicality of embodiment is centered. In these ways, *SL* does a productive job of bringing physical embodiment to the fore. However, *SL* does not really provoke movement into one’s RL community. And, while teachers could coerce or require movement through both one’s RL community as well as movement through one’s *SL* community, as part of the course experience, this is not built into the program or most coursework in *SL*. In order to bridge the gaps between RL and *SL*, pedagogical techniques designed to foster both RL and *SL* movement would have to be deployed. Pedagogical techniques, aimed at provoking movement and exploring social justice issues, would need to be used in order to make the *SL* classroom experience both engaging (something I think it does

inherently) and egalitarian or oriented toward social justice (something that it has the possibility of doing, but that requires the interventions and specific intentions of students and teachers).

SL is also a space where issues of positional embodiment are easily brought to the fore. Residents must take a meta-approach to embodiment as they design their own avatars. This creates a moment for residents to reflect on what they want to look like, and perhaps, reflect on why they might want to look that way. This moment for reflection also emerges as residents interact with other residents who have been designed to look a certain way. When someone appears in *SL* as a white person, as a blind person, as a female, or as some sort of human-animal hybrid, it is because the resident has chosen to create an avatar body that has a particular appearance. This choosing of how one's physical body appears to others brings to the fore a sense of the power relationships and institutionalized (normalized) narratives that exist around how a body *looks*. One is forced to consider how a body is "read" by others, in-world, as one chooses how to design the avatar body. Issues of how bodies are positioned within a societal structure come to the fore.

While this moment of reflection around how the look of a body gets translated into variable power relations *does* seem to be built into the *SL* experience, the ability to critique the circulation of power that equates one body with one set of powers, resources, and norms, and a different body with a different set of power, resources, and norms, requires a teacher who is focused on positional embodiment. *SL* is rife with opportunities to talk about bodily norms, power relationships, economic structures, resources, access to empowering connections and skills-training, etc. *SL* also allows for a moment of visual connection to sort of physical embodiment that gets connected to variable power relationships and structures. However, it takes

a teacher with a pedagogy focused on positional embodiment issues to concentrate on how and why positional embodiment matters.

Finally, *SL* also falls short in its ability to explore material embodied relationships of labor—the ecology of things, spaces, and people. As pointed out—both on *SL*’s information page and by the Education Technology blogger Terry Anderson—*SL* requires a lot of digital gear.

You need to have a powerful graphics card in order to really “get” the intense rendering of bodies, objects, and spaces in *Second Life*. The system takes up some serious memory capacity.

Anderson (edublog) notes that:

[The] SL client takes a lot of power. I noticed that it regularly consumed over 90% of the cycles available on my machine, used nearly 12 as much internal memory as Microsoft Word. Bandwidth requirements also seemed high especially when teleporting (10 second delay) but proceeded quite smoothly with few delays as I walked through the site. Given these requirements, I learned to reduce the number of applications I had opened before running SL client to avoid contention and possible crashes. (edublog)

So, having the latest and greatest computer system becomes important. This is a program that requires an expensive computer (not a less expensive and more ubiquitous mobile phone or tablet device), and also requires a fast broadband connection (rural schools may have a difficult time with this.)

While it is true that a teacher may choose to bring up the embodied relationships of labor and space that are built into something like *SL* being accessible, the opportunity to do this seems less designed into the program. However, for a teacher who is motivated and has the pedagogical techniques, *Second Life* offers a space to not only reflect on the real life embodied labor relationships that make something like *SL* possible, it also provides a space to observe and reflect on labor relationships—and the ways they are both embodied and material—within the economy of *Second Life*. I think, here, about Julian Dibbell’s (2007) book *Play Money: Or, How I Quit My Day Job and Made Millions Trading Virtual Loot*, and the ways that virtual economies often

network into real economies, real bodies, and real labor practices. In order to excavate these relationships, a teacher devoted to social justice projects is important. Equally important, though, is to note that *SL* *does* do a good job of translating political action campaigns across both virtual and “real life” spaces. This means that teachers and students can *do* something to affect social change (within both the real and virtual spaces) while they are online. In order to create more engaging and socially just online educational experiences, both design and pedagogical techniques are important. *SL* offers student engagement and the possibility for creating socially just online learning space (that can be devoted to engaging in social justice action projects), but this requires both the rich space offered in *SL* as well as pedagogical strategies oriented to bringing a complex notion of embodiment to the fore.

I turn now to another example of an “online” educational experience that uses a complex orientation to embodiment. I analyze the educational experience of *Environmental Detectives*.

***Environmental Detectives* and Engaging the Community**

Environmental Detectives is an augmented reality educational experience, created by designers at MIT, for the high school and early college student. While this educational experience does not require that students be in an online class, the program works by having students go out into the community, and learn and interact by using digital devices. This program is not necessarily a strictly online program. In fact, most of the “testing” of this program was done using campus-based courses. However, because the program relies on “online” connectivity, I still think this can be used as a good example of an online education that is both engaging and (can be) socially just or at least aware of social justice issues.

The idea behind *Environmental Detectives* is to give students the opportunity to really feel like an Environmental Engineer, while at the same time learning about and engaging with their communities and other class members. In many ways, this program showcases a complex orientation to embodiment. Let me first give a description of this program. Much of my information for this description comes from MIT's description of the program (education.mit.edu).

Environmental Detectives was the first augmented reality game created by MIT's Teacher Education Program; this teacher program is specifically designed to help teachers bring games and augmented reality experiences into the classroom. The game is targeted at high school students, but has also been tested and used by early undergraduate students. In this game, students take on the role of environmental engineers. The goal of the game is to locate the source of a toxic spill or some other environmental disaster and then come up with a plan for the clean up of the disaster. Finally, students then also have to submit a report and a plan to the "president" (or the mayor, or some other governmental body) detailing what happened and what should be done about it. The students must detail any health or legal risks for the community. The students' report must prepare the executive (mayor, president, whomever) to be able to work with the EPA for the betterment of the community. The program also suggests that teachers allow students to make a presentation to their peers as a way of sharing their data and their reports.

Environmental Detectives contains a multimedia database of resources which students can use to learn more about chemicals and toxins. Students are able to consult experts, as part of the database, in order to glean information. Students are able to get information about the health risks associated with exposure to the toxin, how it flows through ground water, relevant EPA regulations, remediation strategies for cleaning up the toxin, and the political and economic

consequences of EPA violations. Students are also encouraged to take actual samples of soil and water. Because time is of the essence, in this game, students must choose how much data to gather on their own, how many experts to consult, etc. Students are also encouraged to interact with each other and check each other in order to improve validity of findings.

The game relies on GPS data of a region overlaid with the coding of the game. The game asks students to go through their communities and test water and soil. The game works in real time, so, while students are testing, one of the samples will come up positive for a toxin. The students then, as mentioned, need to figure out what to do about it. They need to design a plan that is aligned with the community and geography where *they* live.

This platform allows students to go through the experience of being an environmental engineer. Students are given an “environmental problem” scenario, that maps onto the geographical location of the student. The students are each given a hand held device that is GPS enabled, and they are able to use this device, and the data stored in the device, to get instructions about the scenario. The environmental task for each group of students/environmental engineers is always mapped onto the geographical location of the students. In this way, the students are encouraged to interact with their home surroundings. Although, here it is important to point out that the program only has scenarios that map onto certain locations—locations for which the satellite maps are available, and GPS is able to interact with the “known” map of the geographical region. While designers are trying to make this program increasingly scalable, at this point this program can only be used in certain locations. However, for students who live in locations supported by this program, the map overlay is supposed to be phenomenal.

In order to complete their environmental work (finding the problems and coming up with solutions), students are also given a kit so they can take water and soil samples, do a little soil

drilling, and basically collect data that would allow them to create a robust analysis of the environmental “problem” around them. Students are encouraged to use both quantitative and qualitative methods for discovering, analyzing, and solving the problem, as well as when they write their reports and showcase their solutions to fellow students. One of the tasks that is encouraged is for students to interview community members to get some background on the area. This is supposed to help the students/engineers gain valuable experience about the impact of potential environmental damage, and help consider the ways that community members live in and use a space.

This program was tested out by multiple college and high school students. According to some of the directors and designers of the project—who then studied how this platform was used by students—most students enjoyed this platform because it allowed them to interact with each other and expert information; the platform allowed them to take on increasing levels of autonomy and “real world” experience; and it created the opportunity for students to get out and move around their communities (Klopfer & Squire Working Paper). *Environmental Detectives* does several things well.

Environmental Detectives first shows a complex orientation to physical embodiment. This educational “game” encourages students to get out and move their bodies; movement is encouraged. It encourages students to be aware of how their bodies inhabit their surroundings. When students participate in this learning activity, they must go out into the community and interview people in their community about the ecological space. The program encourages the use of the physical body, even while going through a “virtual” experience. It also encourages a hybrid approach to learning, where students are moving through real time and space, while also interacting online.

This AR educational experience is also very flexible; allowing for awareness of physio-temporal contingencies. Student groups are encouraged to go at this problem from multiple perspectives, and at their own pace. While bodies are encouraged to get out into the community, there is no one way to *be* out in the community. This educational experience also allows students to go out at different times; allowing students to adjust this program to fit their own schedules. This program does a good job of orienting to physical embodiment, but, perhaps, falls a little short in its ability to allow students to make an accounting of and act on positional embodiment.

Environmental Detectives does not have any mechanism—built into the experience—for students to talk about the ways that bodies are positioned into the social and institutional structures in different ways. While the program does encourage students to go out into the community, and interact with community members, there is no insurance that students will become aware of social justice issues and be channeled into acting on those issues, which is built into the educational program. However, this is where teachers can have a strong influence on the experience that students have with the program.

In their working paper, Klopfer and Squire point out that different groups of students had different experiences using this program depending on how the different teachers structured the activity (Should the activity allow students to compete with each other or collaborate? Is the most important point to come up with a solution to the expressed problem, or to go through and process the experience?) and also on how the different teachers guided the final presentations and “winding down” or completion of the program experience. Some teachers took the time to ask their students about how the solutions would fit in with the communities and neighborhoods. This is where possible connections to positional embodiment could be opened.

Because *Environmental Detectives* encourages students to interview community members, get a history of the “affected” region for the problem scenario, and consider the community when they are plotting a “solution” to the problem, this program has the potential to make students aware of the myriad ways that positional embodiment can often be plotted in relationship to geographical space. Positional embodiment has material consequences. A proactive teacher should be able to generate discussions around how spaces reflect social and institutional norms. The experience of interviewing community members and actually plotting out where buildings and ponds, etc., lay in the community also makes students aware of how people live, where they live, and how spaces affect the experience of different people. I could envision a teacher talking about how physical spaces create a system where some people have access to resources and others do not. I could envision a conversation about how physical spaces are designed in a way where some bodies might feel “impaired” by those spaces. I could also envision a teacher who encouraged students to get involved in some sort of political action project, due to the experiences of using this program and going through this environmental toxin scenario.

Environmental Detectives does an outstanding job of encouraging students to make connections between material consequences, geographical location, and embodied practices. Again, depending on how the teacher guides this experience, students could become more aware of human impact and interaction with the environment. Seemingly built into the program is an awareness of environmental damage. Teachers could also use this program to generate discussion around e-waste. While it is fun and fascinating to use digital devices to go through the learning experiences that *Environmental Detectives* allows, it is still important to recognize that the digital devices in use also add to environmental/ecological problems. The use of these digital

devices requires certain relationships of labor, and these relationships have consequences for physical embodiment, positional embodiment, and materiality. Depending on the pedagogical strategies of the teacher, this could be brought to the fore.

Environmental Detectives is an educational program which relies on the design of digital artifacts interacting with the built environment. Inherent in the program is the opportunity to move one's body and go out into the community. The game is designed to be flexible and aligned with the needs of different students, different teachers, and different communities. This program shows the importance of designing to encourage movement, as well as designing for flexibility—design-for-all. While this program shows the importance of design for online educational spaces, this program also highlights the ways that pedagogical strategies are crucial. The teacher motivated to teach about social justice issues could use this program to productive effect, but attention to embodied positionality is not inherent to the program.

Environmental Detectives can be used simply to teach students about collecting data and making presentations. Or, this program can be parlayed into deep and engaging discussions about the environment, the community, policy decisions, institutional bearing, and social justice issues. This program can be a starting point for political activism, but this program relies on a teacher—with social justice pedagogical strategies—to parlay this AR educational experience into something more meaningful. In order to create more engaging and socially just online educational experiences, both design and pedagogical techniques are important.

I turn now to one final example of online educational experiences that utilize a complex orientation to embodiment. I analyze the recent phenomenon of posting Youtube videos—video diaries—to create information around gender issues. I highlight the *This is What a Feminist*

Looks Like, Gay Stereotypes, I Despise Thee, and Lesbian 101 movements to educate viewers about gender stereotypes and patriarchal power.

***Youtube* and Gender Identity Education**

The *Youtube* video collections I feature here are not explicitly designed for classroom or coursework use. However, they are explicitly designed to be educational. They are designed to spotlight gendered subordination and gendered oppression, and push back against that oppression. They are designed to subvert common stereotypes of gender “deviance.”

I begin by exploring the collection of videos organized around the *This is What a Feminist Looks Like*, project. This project, supported by “FeministMajority,” first started as a paean to Women’s History Month. The original *Youtube* video features actors like America Ferrera, Amy Brenneman, Larry David, Kate Walsh, Allison Janney, Ade Edmondson, and others who talk about why they call themselves “feminists.” The video highlights issues like equal pay; mainly though, it tries to subvert stereotypes around feminism. In some ways, this PSA makes feminism a less radical position. In other ways, it creates openings for more people to think of themselves as feminists.

The original *Youtube* video sparked a movement where both “ordinary” individuals, as well as prominent executive members of women’s groups like NOW, etc., sent in personal accounts of “looking like” a feminist. Some of the videos from high school students are particularly intriguing as they talk about the hardships of identifying themselves as feminists at a time when feminism seems to be going out of vogue, and feminist issues seem much more a part of the “adult” world. Often, these videos from young people tend to focus on what it means to dress differently and have a different relationship to dating. There is a desire to define the self as

apart from traditional femininity and feminine concerns, and yet also define the self as fitting into the broader cause of equality.

Importantly, these videos aim to show what a feminist “looks like,” so physical bodies are highlighted in these videos. The idea is to show—to display—bodies in a way that works against common notions of femininity, but also works against common stereotypes around feminism. This display of the physical body as a point of political action can also be seen in the other two video collections: *Gay Stereotypes*, *I Despise Thee*, and *Lesbian 101*.

In *Gay Stereotypes*, *I Despise Thee*, Denactor (Denni) creates a series of videos talking about the stereotypes around homosexuality that he encounters. He discusses why he thinks these stereotypes exist, and how he is an example that subverts the stereotypes. In fact, in a few of his videos, he comments that “gay stereotypes are why it took me so long to come out.” Denactor sees himself as fitting outside of normative “gay-ness,” and tries to work against these boundaries by providing visible proof—via his videos—of how his life stands in contrast to the expected norms of gay identity. He has a large group of followers who tend to comment on his videos. There is a communal sense to this space, in that others not only comment, but link to videos of their own, or videos that do something similar. This group has produced a large range of *Youtube* videos debunking “gay stereotypes.”

In these videos, as with the videos devoted to feminism, physical bodies, and physical spaces are important. The physical bodies and physical spaces shown on the videos are meant to act as proof that the stereotypes are wrong. Like the groups and individuals highlighted in McRuer’s scholarship, these individuals are using their own bodies to counteract societal discourse and ideologies of normalcy.

Finally, one last example of this video-to-subvert-stereotypes movement comes from *Lesbian 101*. This is a group of women who post *Youtube* videos designed to subvert stereotypes around lesbianism. These videos also have a confessional quality, whereby the subjects not only speak out about the stereotypes, but talk about how their lives fit in (or do not) with the social structures at their schools. These women talk about rumors that get spread, reactions of friends and teachers, reactions of administrators, and their feelings about their own identity.

These videos stand out from some of the others mentioned because there is a running theme of showing photographs as part of the video diary. Sometimes these photos are meant to show evidence that subverts stereotypes around lesbianism. For example, one young woman had multiple photographs of herself playing softball—badly—so as to subvert the stereotype that lesbians are all good at softball. Other photographs are meant to show the body before coming out and after. Some photographs show young women who have taken on—what they call—the “butch but not” identity. These young women move from long hair to short hair, skirts to pants, but still maintain an interest high-heeled boots. What becomes clear in these videos is not only the way these women are trying to use their physical bodies to subvert stereotypes, but the intense gendering that exists over every-day objects. For example, these videos portrayed the wearing of black steel-toed boots as “emo,” but the wearing of brown steel-toed boots as “butch.”

These collections of videos around gender identity play with a complex orientation to embodiment in interesting ways. On the one hand, it could be argued that these videos—as an educational experience—do not really get at physical embodiment. These videos do not promote movement, nor do they promote, necessarily, moving through one’s community. These videos do

not advocate for a sense of tempero-spatial contingency. However, these videos prominently highlight physical embodiment.

These collections show that physical bodies can demonstrate flexibility and dynamism in identity. The physicality of bodies—and the materiality of spaces that bodies inhabit—are centered in these videos.

Creation of and critical reflection on these collections of videos constitutes a highly educative experience: one focused on physical embodiment; and a flexible and multivariied sense of embodiment. While there is nothing inherent to these educational videos that drives toward the movement of bodies, these videos intrinsically draw attention to physical embodiment through the use of physical bodies as a point of political action. Teachers committed to social justice, and using pedagogical techniques designed to foreground physical embodiment, could easily use these videos to create engagement with issues of identity and the creation of more socially just schooling spaces.

Where these videos evince a rigorous attention to complex notions of embodiment is in the area of embodied positionality. These collections highlight the ways that physical bodies are positioned differently within societies and institutions. They center the complex networking of physical bodies and access to resources, recognition, and power. These videos actively call for a critique of and resistance to oppressive discourses and practices that align some bodies with competency and other bodies with deviance. I can envision classroom teachers asking students to critique and reflect on these videos, as well as creating their own video entry around these issues.

These collections of videos do not engage with material labor practices in a significant way; and in this way they fall short of the full complexity of an orientation to embodiment. While there is some reference to women's labor, women's pay, and pinked professions in the

This is What a Feminist Looks Like collection, this is the extent to which labor is acknowledged as an embodied and material issue. Here, too, pedagogical techniques devoted to talking about embodied labor relationships and ecology could foreground the labor impact of making these videos. Teachers could draw attention to the fact that none of the people in these videos got paid (even the celebrities in the original *Feminist Looks Like* video did it—so the website claims—as a public service). What does it mean for a society when prominent issues—issues around identity and how bodies fit within their societies—are relegated to the care of people who are championing these issues without getting paid?

I could also envision a teacher asking students to consider the resources necessary to view and create a *Youtube* video compared with the devices and resources necessary for interacting in some place like *Second Life*. Because *Youtube* allows videos to be uploaded at a slow speed and with a low byte-count, even people using out-dated computer equipment and who are constrained by a slow internet speed can create and post *Youtube* videos (as long as you have an internet connection, a recording device, and a way of uploading information from that device). While this still involves a lot of resources and equipment, it is significantly less than it takes to interact in *Second Life*, and even less than it takes to be a part of many synchronous online school courses. Teachers could talk about the various ways that access to and use of digital resources both aligns with access to power, and access to the privilege of not living with e-waste. Other opportunities to examine embodied relationships of labor also exist with these *Youtube* projects.

More can be done to make all of these platforms more oriented to complex notions of embodiment. However, each of these platforms—*Second Life*, *Environmental Detectives* and *Youtube* educational videos—focuses on embodiment in unique and variegated ways. Each of these platforms offers the potential to foreground physical embodiment, embodied positionality,

and embodied relationships of labor and ecology. Each of these platforms showcase the ways that online education can be made more engaging and socially just through a focus on embodiment.

In this dissertation, I have not advocated for the use of one educational resource, platform, or program above another. Resources of different schools are variable and dynamic. Programs for educational use easily become outmoded. Platforms are used and then discarded. Rather, this dissertation has argued for a new paradigm of online education—a turn to embodiment. In that vein, I now highlight some of the anti-embodiment practices of current schooling institutions, and then argue that a complex orientation to embodiment would help us to re-think and make interventions into oppressive and destructive practices.

Shifts in Paradigms

This is an important moment for re-thinking online education. On the one hand, schools are increasingly moving away from embodied practice, moving away from attunement with embodied positionality, and moving away from centering embodied experience and interaction with communities and spaces. On the other hand, technology is becoming more human. We are more fully cyborg, and machines are more fully interactional, autonomous, flexible, learning, intelligent, personal, embodied, and anthropomorphic. These overlapping and contrasting societal forces create an atmosphere where there is a greater need to bring more focus to embodiment, and more resources with which to center that focus. Here, I center embodiment, provide a few more thoughts on the consequences of embodiment-focused design and pedagogical strategies, and sound a call to action for a shift toward centering embodiment in online education, by first exploring the shift away from embodiment in the current educational

environment, then exploring the increasingly human shift in technology, and then the implications of these shifts for a more embodiment focused intervention into online education.

Right now, in our educational institutions, there is an ideological trajectory, as well as an increasingly common practice, of moving away from an embodied orientation to schooling. Our schools are becoming less physically healthy places.

Just as the FDA and Michelle Obama have introduced stricter regulations for school lunch programs, districts and schools are making the choice to disassociate themselves from both these regulations and the federal money that comes with compliance with these regulations. For example, *The Huffington Post* reported on Niskayuna School District in New York which decided that the new regulations would force the school to spend more money in order to meet the new requirements of larger portions of vegetables and fruits. The school board also scoffed at the new regulations, contending that the new requirements that call for smaller portions of simple carbohydrates and meats would be off-putting to students. The school board argued that students would no longer take part in the national school lunch program, for fear that this would mean that the school would lose money because students would not buy the school lunches, but would go somewhere else for food, thus depriving the school of one of its sources of funding. In order to get more money—attract more dollars from students—the school district decided to source their lunch programs from private companies. Private companies would be invited to come in, sell the kinds of foods kids like to eat, and the school would get a large portion of the profits from the companies.

The Huffington Post highlighted the fact that these practices are starting to separate the wealthy districts from the poorer districts. While *all* school districts want more money, the wealthy districts are the only ones who can afford to turn down federal money that goes to the

federally mandated free lunch programs. In Niskayuna, only 8% of the students qualify for free or reduced-price lunch; as opposed to 48%, which is the national average. Wealthier districts can afford to dump federal dollars in order to search for private companies to deliver food; however, while this move may be intended to bring more money in to the district, it does it at the cost of student health.

Numerous studies show that allowing private food companies to sell food to students comes at the cost of the health of the students. A study by Briefel, Wilson, and Gleason (2009) revealed that, while the nutritional value of lunches from the School Lunch Program was not where it should be—this study was done before the new FDA guidelines are to take effect in 2013-2014—the food offered by the school lunch program was far healthier than the restaurant or vending machine options concurrently offered in the schools. Students who ate school lunches consumed 174 kcal of low-nutrient, energy-dense foods, but students who got food either from home or from private vendors (the a la carte food options, or vending machines) consumed almost double that. The Briefel, Wilson, and Gleason (2009) study targets any food consumed during school hours that is not part of the NSLP food options, but another study specifically focused on the negative health outcomes of having vending machines in schools.

Research by Sohyun et al. (2010) analyzed data from the “Youth Physical Activity and Nutrition Survey” in order to understand the correlations between school offerings of food options, private company food offerings, and student health. The study found that, if there were ever private companies offering food options, these were the food options chosen by students. The authors contend that this choice has to do both with social capital within the school as well as taste preferences. Purchasing your own food was associated with social power or social capital within the school. Additionally, the authors opined that the food offered by companies was the

kind of food that students tended to prefer—fattening, salty, sweet, and nutritionally lacking. Sohyun et al. (2010) found that the largest factor in determining bad health choices for students was the presence of vending machines in the schools. Just having a vending machine in the school was correlated with students snacking on unhealthy items, during school hours, from 2-5 days a week. Vending machines have negative health consequences, and yet are often a siren song for most school districts. The FDA and NSLP guidelines require that lunches meet certain requirements, but vending machines are outside the purview of federal law. Schools can receive federal dollars for the school lunch programs, and yet also get money from corporations who own the vending machines. For most school districts—especially for the ones who cannot afford to turn down federal money for food—the vending machine option offers another source of funding without compromising eligibility for government money. Schools are choosing to find funding sources, even at the expense of the health of their students.

Health is not just a matter of nutrition and finding nutritional food options, health is also a matter of physical exercise. In this area, schools are also, increasingly, falling short. While there have been numerous studies showing that recess and physical activity are correlated with higher test scores, higher attendance levels, and student self-reporting of higher satisfaction with their own performance and school experience (Ratey, 2008), schools are still cutting recess and gym class in order to spend more time on test preparation. Trost and van der Mars (2010) argue that faculty and administrators are cutting recess and gym time in order to spend more time preparing student for standardized tests, in order to spend more time on subject areas like Math and Reading that are spotlighted as part of a state, or district level program to improve test scores, and, sometimes, recess and gym are curtailed as punishment for bad behavior by students. This move away from recess and gym time has increased with the increasing number and increasing

stakes of standardized tests in school. More emphasis is being placed on achieving high scores on high stakes tests than on the health of the students. This is particularly damaging because, as Yance and Yancey (2010) argue, there are not just positive consequences correlated with physical exercise or activity, there are also negative consequences associated with inactivity. Forcing students to stay put (docile and unmoving) in order to do one more test drill actually leads to increased health problems for students.

The high stakes around standardized tests not only leads to less recess and gym time, it also leads to unhealthy levels of stress. Valerie Strauss (2012) of *The Washington Post*, and Karen Thomas (2001) of *USA Today* both wrote articles about the consequences of the increasingly high stakes around standardized tests and the effects on both student and teacher health. The stress correlated with taking these tests leads to headaches, insomnia, and stomach upset. In some cases, the stress can lead to more damaging ulcers and chronic pain.

Policies and practices around schooling are erasing the importance of embodiment. Policies and practices are centering the need for money, the desire to break away from federal dollars, the desire to do better on standardized tests, the desire to punish children—all—rather than focusing on embodiment and the ways our embodied lives and experiences interact with schooling and educational policy. The above paragraphs have highlighted the elision of physical embodiment as part of current practice in education, but positional embodiment, too, is suffering an erasure.

“The Civil Rights Project” of UCLA spotlights the research of Liliana Garces (2012) around loss of affirmative action mandates and the effects on minorities and graduate schools. Garces (2012) argues that the loss of affirmative action protocols results in larger educational gaps between minorities and White students. Garces (2012) contends that, when race and other

identity positionalities are not considered as part of the scholarship and admissions process, then we roll back any gains that minority students have gained through the past 60 years of civil rights activism around schooling policies. It is not just in admission policies where we see a lack of concern for embodied positionality, it is also in the ELL practices and policies for K-12 institutions.

Kim Girard (2005) documented both an increase in the rise of immigrants and English Language Learners—in both larger cities as well as suburbia—and the loss of federal dollars for programs to support these students. Additionally, Girard (2005) reports that ELL students are moving into rural areas (about 44% of ELL students live in rural areas) where both ELL certified teachers and enough money to carry out ELL programs is hardest to find. In Girard's report, districts are centering other academic concerns (new books and test prep materials) above the needs of ELL students. However, in Arizona, the move to take money away from ELL is not just a matter of reallocating money to different areas of schooling, it is a matter of siphoning money away from ELL programs as part of underfunding education for minority students in general. There is an active move to erase any cultural and linguistic differences among students; a move to erase embodied experience of identity.

In addition to, famously, getting rid of ethnic studies programs across the state, Arizona has increasingly practiced a re-classification of students so that they will not get any money for ELL help. Kerry Fehr-Snyder (2010) reports that:

Two federal investigations have concluded that Arizona is violating the 1964 Civil Rights Act by shortchanging thousands of students whose first language is not English. . . One of the complaints alleges that the Arizona Department of Education has reclassified “many thousands” of children as proficient in English even though tests indicate they aren't. The U.S. Departments of Education and Justice concluded this deprives students of services they need to succeed. (Fehr-Snyder, “Arizona is Violating the Rights”)

This policy move aims to redirect money normally spent on ELL programs into other areas, at the expense of ELL students.

In the above examples, the positional embodiment of students was negated in favor of more money for tests, or more money for sectors outside of education. The above examples have also highlighted the erasure of embodiment from bricks-and-mortar educational spaces, but we can also see this move in online educational spaces.

I have argued in this dissertation that some scholars go too far in their critique of online education when they create a dichotomy that pairs campus-based programs with embodiment and online courses with disembodiment. While I still argue that, at no time and in no way are we ever disembodied, I am confounded at the lack of concern for embodiment exhibited by many online programs and initiatives. As pointed out by the “Illinois Online Network” (2013) when institutions deploy online programs, they often do not consider embodiment and the divides that result from embodied positionality. There are technology divides where some students may have access to upgraded devices, and others may be trying to take a class using an older, but web-enabled, cell phone. These divides often result in an inferior experience for students who do not have access to the latest and greatest laptops. There are divides in speed of connection. Some, more urban, environments have almost ubiquitous access to high speed internet, at least for the middle and upper class individuals who can afford it. Other students either cannot afford high speed access, or may be trying to access the courses from more rural areas that do not have the high speed connection necessary to fully participate in the course experience. Additionally, there are divides in technology literacy, for both students and teachers, which allow some people to feel comfortable learning, speaking, and debating in online spaces, and others to feel hampered by their lack of familiarity with the environment. There is the promise of increased access to

education for minority students, including adult learners, but there are rarely mechanisms or policy choices intended to increase the diversity of the student population who take online courses.

These divides and issues are difficult for even the most personalized and attentive online education program to confront. These differences become erased completely in the realm of MOOCs. At least as they are currently understood and practiced, MOOCs offer more open access to courses; MOOCs are *open* online courses that allow both students affiliated with a university, as well as the simply curious, to take part in classes. However, MOOCs are also *massive*, to the extent that one embodied experience, physicality, or positionality gets elided into the non-specificity of the online *user*. MOOCs are a symptom of neoliberalist ideologies which position the user as in charge of finding something that fits, and relieves institutions of any responsibility for caring about differences among students. While this may not always be the case—MOOCs are ever-evolving and we may not know exactly what a MOOC is yet—as they are currently practiced, MOOCs exhibit a lack of a complex orientation to embodiment.

These moves away from embodiment—in all educational spaces—are happening at the same moment that technology is becoming more attuned to embodiment, more fully human in its design and overlap.

Pre-dawn of the millennial age, Edward Tenner (1997) wrote a very insightful book about the interventions—both positive and negative—that technology has made in our lives. In the introduction to the book, Tenner (1997) is careful to point out that humans are bad judges of the ways that technology will change and shift over the course of a decade (let alone longer than that.) And yet, in the same breath he uses to caution about sweeping predictions, Tenner (1997) scoffs at the idea of machines ever becoming self-correcting; he laughs at the idea of

technologies “learning” from errors in a way that would make them autonomous from increased human labor and intervention. This “prediction” is particularly unfortunate because one of the most obvious ways that technologies have become more human, in the past 13 years, is their increased ability to “think” and “learn”; the explosion of artificial intelligence. Google’s self-driving car is a Prius that has various sensors and processors so that it can “learn” how to be safe on even the most congested of roads; it can “learn” how to find it’s way to a certain point on a map; and more importantly, it can get back to a place that it “knows” if it gets lost. Google cars have already driven millions of combined miles—all accident free, which implies that Google cars may be smarter—or at least safer—than one driven by actual humans.

I read recently about @TicBot, which is a string of code, acting as a Twitter account, that will follow people who are following it/him/her, unfollow people who unfollow it/him/her, respond directly to people who ask it/him/her a question, and will interject questions and comments into conversations had by followers on other accounts. @TicBot simulates what it is like to interact with someone who has Tourettes Syndrome, because sometime the comments are a sensible response to actual conversations, and other times simple lines or words from previous conversations are interjected without making sense within the context of the conversation. The code was created to both dispel common misconceptions about Tourettes, and also as a way of understanding the processing of the human brain, by tracking the behavior and mutations of the code needed to produce sensible conversation engagement, or a tic of word or phrase. According to the creators of the code, and as one can glean by glancing over the feed, many people interacting with it/him/her @TicBot, do not know that they are interacting with a machine—or code—rather than a person. It is Turing’s experiment all over again.

In fact, the very algorithms used by Amazon.com and Netflix rely on the fact that code can “learn.” Every time you make a purchase—and every time people deemed to be like you make a purchase—that information is analyzed in a way that refines what these companies “know” about you. They use this information to suggest other offerings, and depending on whether you click on their suggestions or not, the algorithm makes changes to be better get to know you. This “learning” takes place based both on what you click on, and what you don’t. Because the bulk of my purchases are done on Amazon.com (food, clothing, housewares, sporting equipment, medicine, gifts, media), Amazon knows me better than many of my extended family members. The algorithm has learned a lot about me; not only about what I like and dislike, but about when my mother is about to have a birthday, and when I will be out of bathroom cleaner.

In addition to the increasing intelligence and learning capabilities of technology, the march toward cyborgism (cylon-ism?) continues with the march toward becoming ever more physically embodied. Technology increasingly interacts with our bodies, and progressively takes on aspects of physical embodiment. The software package ROAR—developed by engineers at the University of Pennsylvania—teaches robots to get better at recognizing sounds, recognizing noise, an increasingly teaches robots to response to aural cues. This means that, in the future, not only will Siri be better at understanding your query, but machines will be able to use audio cues to help them understand and complete tasks. ROAR requires different stages where a machine first learns to recognize ambient noise, and then tune it out; next recognize speech and learn how to response; and then finally recognize important audio signals that may contain important information to help with whatever task is being asked. In other words, this program teaches robots to be better at determining which sound waves contain meaningful cues and which ones

count as simply noise. This is something that human brains are good at, and that robots are getting better at. In addition to gaining competencies with “human” sensory processing, technology is increasingly standing in for or becoming a part of physical bodies.

Advances in telemedicine mean that computers and robots stand in place of physical doctors in many hospitals. Both Philips and Logitech design robotics systems where doctors can both consult and “see” patients from any where in the world. Thus, through the use of robotic surgical devices, expert surgeons in Chicago can operate on a patient in a rural town in southern Illinois. Doctors with particular expertise can see patients and consult with other doctors without having to go to the expense and stress on the patient that is entailed by a transfer from one hospital to another. Hospitals particularly in rural areas, are increasingly staffed with robots who stand in for (embody) a doctor. The robot moves from room to room, and through the use of screens, sensors, and cameras, a human doctor can speak with, question, and engage with patients. The human doctor may be nowhere near the physical hospital, but the robot “embodies” the doctor and allows patients to get top-notch care in locations where they would not normally have access to such care.

The embodiment of technology can also be seen in the ways that technology increasingly becomes a part of our bodies. Synthetically designed T-Cells can now be produced and delivered to fight certain forms of metastasized cancer cells. There are now synthetically designed T-Cells that fight heart disease and certain gastrointestinal tumors. Government labs are currently experimenting with “viral vaccines”; where cells are designed to perform like a virus, but provide just enough “threat” to act as a way to vaccinate bodies against certain diseases. This development is especially important as certain segments of the population are unable to or fearful of getting vaccinated through traditional methods.

While the move toward humanness and embodiment in technologies can, perhaps, more readily be seen in the fields of engineering and medicine, we can also see this move in education. New physical education requirements in many districts focus pedagogy and curriculum on personal fitness rather than team sports, so heart-rate-monitors and step-counters are becoming normalized as part of the required materials for many Gym classes.

In online classrooms, there has also been a turn toward embodiment technology. Many online classes now take place in avatar-rich worlds like *Second Life*, *There*, *Sims*, and other graphically-rendered digital worlds. Even in less avatar-rich spaces, online educational programs are expanding affordances for webcams and microphones. Many online classes not only happen synchronously, but they happen using technologies that allow students and teachers to see each other and hear each other; thereby augmenting the online experience by allowing people to take advantage of visual and aural bodily cues. Teachers and students use these cues to moderate tone, ask certain questions, refrain from asking certain questions, and—overall--feel more comfortable about broaching delicate topics. Online classrooms are no longer a text-based only operation.

With new technologies becoming standard as part of schooling experiences, a pedagogy focused on embodiment and embodied experience can flourish. Online classrooms become even more mobile as students in far-flung spaces can take their fellow classmates and teachers with them as they explore their home communities and personal locations. I currently teach an online class where students show videos and post pictures and talk about experiences happening in China, Korea, Switzerland, and the U.A.E. , that all add to our discussion in unique ways. The online classroom, through increased attunement to the mobility of bodies, becomes both a

unified gathering space for multiple students, as well as a distributed space, where someone's neighborhood in Guatemala can be seen and heard and talked about by students living in Illinois.

At a time when schools are moving away from a complex orientation to embodiment, technology is becoming more aligned with and determined by embodiment. Social discourses and institutional practices breed a trend toward making students into nebulous objects that are known and cared for only as test-taking and capital-contributing subjects. This trend exists in the very moment when technology is making embodied education—particularly embodied online education—more possible. In many ways, this dissertation is a call to action; a call to change this trajectory away from disembodied education, and a call for the use of technology to make education more embodied.

We need to shift our paradigm of what online education looks like. Rather than designing for and teaching with a vision of online education as education that happens in a vacuum—somewhere in the electrical currents and signals that unite amorphous figures into something called “a course”—we need to shift our paradigm toward a complex orientation to embodiment as part of how we teach in online spaces. We need to care that our students are physically embodied, and we need to design teaching moments that allow physical bodies to interact with spaces in meaningful ways—as part of the online teaching experience. We need to act toward the fact that our students are differentially positioned vis a vis technology; and know that positional embodiment matters for how our students will interact with technology, and interact with classmates and teacher through the medium of online communication. We need to be aware of our technology footprint, and the embodied and material effects of that footprint made by digital artifacts; and we need to communicate the importance of caring about the global power relationships and environmental impacts imbricated with our use of digital artifacts to create an

online educational experience. Focusing on embodiment allows us to be more aware of diversity and inequity; it allows us to challenge our students to engage with each other and issues created by or made more visible through the use of technology.

A complex orientation to embodiment would foreground the need to think about how students are accessing courses. This orientation pushes us to consider the ways bodies have different points of accessibility. If physical embodiment, positional embodiment, and embodied labor relationships were considered, in any of these educational scenarios, there would have been more of a push to care about the health and wellness of our students and teachers, more play and movement, more care for diversity and access, and more of a push to find ways of using older devices or slower speeds in order to give access to all and in order to resist the drive for more digital devices—adding to the environmental damage done through the creation and disposal of digital devices.

The ways we do online education have shifted and will continue to shift; even what counts as online education is changing. However, concerns over creating a rigorous educational experience that engages both students and teachers will continue. There will continue to be a need to think about how diverse populations access and interact with online courses. Committed teachers will continue to care about creating a more socially just society, and using classroom spaces to reflect on society and then push for action to create a better society. Our connection to others (other people, other nations, other regions, other bodies) will continue to be paramount as we exist in this increasingly globalized labor market. Our planet will continue to suffer if we do not take steps to decrease our pollution footprint. For these reasons, a turn to complex notions of embodiment are paramount, and will continue to be paramount as we move into the future.

We need to think more deeply—and with a greater sense of materiality and spatiality—about how bodies interact with digital technology. By having a complex orientation to embodiment, we bring to the fore questions around materiality, identity, race, class, gender, sexuality, nationality, diversity, resources, relationships, space, and time. This focus orients how we think about engagement and social justice in our creation of and negotiation of online educational spaces. We become more aware in our design strategies and pedagogical practices of important gaps and areas for work.

I started this dissertation with the example of the Udacity debacle. Such a debacle, and many like them which have happened—and which will continue to happen—could have been forestalled if the designers and implementers of that program had been more oriented to complexity in embodiment. More work needs to be done to make a complex orientation to embodiment a hallmark of all online education endeavors. This dissertation acts as an argument to that effect.

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