

MATERIALIZING MAKERSPACES:
QUEERLY COMPOSING SPACE, TIME, AND (WHAT) MATTERS

by

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This dissertation project explores makerspaces as non-traditional composing networks where makers work with (and against) unconventional digital and physical materials such as vinyl, cut paper, plastic filament, insects, Xacto blades, pipe cleaners, reclaimed wicker baskets, DNA, Python code, memes, and Raspberry Pi's. Choosing materiality over multimodality as the best frame for understanding the material-discursive composing practices of makers, I build a queer- and feminist-inflected new materialist research methodology that orients attention toward embodiment, affect, and the production of difference in composing networks. Using playful, game-based data collection protocols, in conjunction with more traditional data sources, as well as three-dimensional analysis models crafted from foam board, yarn, safety pins, and paper, I document and analyze the material and affective dimensions of composing to build case studies around two diverse maker networks. The first case details participants' making and composing experiences as part of a connectivist MOOC designed to increase STEM/STEAM literacies for underserved youth and youth educators. The second explores high school students' experiences in "pop-up" makerspaces that are oriented toward 3D fabrication and prototyping; circuitry, robotics, and computer coding; and upcycling discarded objects and everyday waste for new audiences, purposes, and contexts. Both case studies address the following research questions: Who and what gets to make? Who and what gets made? What drives composition (as process and product) in the network? These questions are essential for understandings issues of representation, access, and equity in contemporary maker networks. The findings of this dissertation materialize "making" as more than a boot-strapping rhetoric that sponsors middle

class white male literacies. They underscore the collective values, stances, and practices that are necessary for composing networks to become networkings which are capable of materializing a diversity of bodies and objects. This project turns Writing Studies toward a more material, embodied, and affective understanding of composing, and points to the need to rethink normative composition pedagogies that work to foreclose diversity, creativity, and experimentation. I conclude this project by articulating a queer material rhetoric I call composing sideways: this rhetoric makes space for lateral thinking, feeling, and composing practices which focus on composing the here and the now, and resisting vertical transfer as the most important pedagogical outcome for a writing classroom.

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In Partial Fulfillment of the Requirements for the Degree
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by

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For my first teachers—Mom, Dad, and Suetta Scarbrough

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I adapted the origami data collection protocol to account for people and things that mattered to me during the making of this dissertation. First, I folded an origami fortune-teller and labeled it with the places, tools, objects, materials, people, and practices of dissertation writing (see table 1). With my partner, I played the fortune-teller game according to the instructions provided in Chapter 3, and I logged the results of game play. Then, as did my research participants, I used the game play log to write two short experience narratives about the material dimensions of my dissertation writing. Like my participants, I limited myself to ten minutes per anecdote.

Table 1
Stephanie’s Fortune-teller Labels

Places	Tools/ Materials/ Objects	People	Practices	Number of Hours Per Day Writing	Disorientation Level
Will’s Office	Laptop	Will	Crafting and Making	4 hours	4
My Bedroom	Paper	Kerri	Intuiting		
Coastal Fog	Google Documents	Nikki	Writing		
Purple Blossom Yoga Studio	Yarn	Rob	Revising Coding Collaborating Talking Playing		

My first turn with the fortune-teller produced the following: Coastal Fog, Kerri, paper, and revising with 3 hours of writing per day (which is a gross underestimation) and a level 4 of disorientation. Then I stitched these together in the following anecdote:

Kerri and I often met to write at Coastal Fog, a swanky new coffee shop in uptown Greenville. Most days, my head hurt terribly, and she listened to me vent about it and the seemingly impossible tasks of simultaneously working, writing, and navigating the healthcare system and the academic job market. I loved writing on the mezzanine, but descending the spiral staircase made me dizzy. Still, I went down for another latte. It was the little things that mattered--a steamed milk heart in my cup, a rare Pokémon spawning nearby, a cocktail of muscle relaxers and seizure meds to dull the throbbing in my temples, and a hand-drawn card with a piñata on the front accompanied by the words “Hit Me With That Stick” and a Post-it note on the inside of the card that read ‘BTW: You are the piñata, speaking to anyone who would dare challenge your awesomeness.’ Like swinging at a piñata, writing these chapters was, at times, playful and fun. Revising—not so much. I printed out drafts, cut, pasted, rearranged, and reframed. Eventually, with the help of Nikki, Will, Matt, and Pam’s comments, as well as mapping and collaboratively brainstorming with Kerri, we found the throughlines, or what Barad calls “how matter comes to matter.”

On my second round of game play, I worked with this combination: my bedroom, Google Docs, Will, and intuiting, with 4 hours of writing per day (still, a gross underestimation) and a level 4 of disorientation. In my narrative, I wrote:

Some days I didn’t leave my bedroom. My mother always called to check on me, and Rob brought breakfast, lunch, and dinner to my desk. He shushed the children, packed lunches, gave baths, dried hair, carted children to school, washed dishes, walked dogs, bandaged cuts, and made life outside Google Docs go on. I remember that I was so proud of Chapter 2. I thought I had managed to say something smart about writing, new materialisms, and embodiment until I read Will’s end comment. It read, “...I finish it and I’m like wow, those were words...so many words. Those words worded real hard, too! They outworded other words that worded themselves yesterday...Wow, words :-)” I tried over and over to rewrite that chapter and make my points clearer, but I was too close to the reading. It took time to forget Ahmed’s mesmerizing recursive style and to forget the insider discourses that were keeping some really useful ideas locked down and out of circulation. I’m not sure I ever managed not to “word out,” especially in Chapter 2, but I know that Will is right, generally and particularly, when he says my prose should better match my politics.

Yes, I am grateful for the experiences I’ve narrated here that helped to make this dissertation project possible. And it’s important to remember that these stories, like those you’ll read in Chapters 3 and 4, are fragmentary, contingent, and incomplete. They are always in the making. Of course there are countless other people, places, tools, practices, and materials which

also mattered in the making of this dissertation. I'd love to tell you about them over coffee or while we write, play, or crochet.

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CHAPTER 1: Material Concerns in the Making

Introduction

Since 2012, I have worked with the National Writing Project (NWP) to follow the maker movement, a social groundswell that promises a return to craft, handiwork, and everyday innovation that automation in mid-20th century forward to Modernism took us away from us. I joined a group of NWP teacher leaders to think together about how “making,” with its focus on tinkering, playing, experimenting, expressing, iterating, and collaborating, could transform the ways we teach in an era of standardization, testing, and uniformity. Through this work, I’ve had opportunities to visit para-curricular maker spaces like the YOUmedia lab at Harold Washington Library Center in Chicago and the ART LAB at the Smithsonian in Washington, DC. There, I engaged with young makers, particularly young makers from working class communities, young makers who composed in multiple languages such as Spanish, Arabic, HTML, and Python, young makers of color, and makers with a diversity of gender expressions. Working across genres, modes, and materials, they produced a mind-boggling array of things: digital stories, augmented reality posters, virtual reality hardware, video games, electronic textiles, digital music, and yarn bomb installations, just to name a few.

While the things themselves were interesting, I was even more intrigued by the palpable excitement that these makers brought to their composing activities. They were often in what Ernest Morrell calls the “tiger crouch,” a position of intense interest as their brains and bodies were transfixed by composing tools, composing processes, composing tools, and other composers. Similarly, I was impressed by the rhetorically sophisticated ways that these young people approached making as they talked to each other about their intentions as well as the affordances and constraints of different tools and materials. Not only did I get to hang out, mess around, and geek out with these young makers,¹ I also spent time with their mentors, informal educators who taught me about teaching as a practice of following and inspiring instead of one

¹ Mimi Ito coined the phrase “hanging out, messing around, and geeking out” to describe young peoples’ out-of-school, peer-to-peer literacy practices. It is often abbreviated using the acronym HOMAGO.

that seeks to correct, coerce, and control. They taught me about open curriculum design and how to structure indeterminate learning pathways that could build on students' interests, and they taught me about digital badging, an open assessment infrastructure that could sponsor diverse and equitable composing.

When it came time to settle on a dissertation study, then, I knew I wanted to go beyond anecdotal observations of makers and makerspaces. I wanted systematically to study both youth makers and their adult mentors to better understand what produced such energy and excitement as well as what that energy and excitement could produce. In addition to the makerspaces I had visited, I also had the opportunity to work with K12 educators in the Tar River Writing Project, East Carolina University's local site of the NWP, to design, build, facilitate, and participate in two new maker networks. The first, called *Remix, Remake, Curate*, which I'll describe in Chapter 4, was primarily online and engaged K-higher education students, K-higher education teachers, museum scientists, and spoken word poets in making science and poetry to increase science literacy. The second, called *Pop Up and Make*, which I detail in Chapter 5, was primarily a face-to-face maker network in a local high school which included a 3D fabrication lab, a robotics and computer coding lab, and a lab for upcycling used furniture and other discarded objects. For three years, co-designing and co-facilitating these spaces had me, too, in the "tiger crouch." Thus, I wanted the reflective space to both look back on what we made together as well as an opportunity to better understand the magic behind the making, particularly for socio-economically diverse makers. This dissertation study, then, examines the material-discursive composing practices and relationships in these two makerspace networks, one that is hybrid (online and face-to-face) and the other that is primarily face-to-face. Through traditional and playful and game-based research methods which I designed and discuss in Chapter 3, I uncover a host of affective experiences beyond the largely positive "happy stories" about makers and making that I thought I would find. The findings of this dissertation study help writing studies to approach a more material, embodied, and affective understanding of composing, and they point to the need to rethink normative composition pedagogies. Thus, I conclude this project by

articulating a queer material rhetoric that I've named *composing sideways* which, following the makers in this study, makes space for lateral thinking, feeling, and composing movements.

But first, the remainder of this chapter will provide a backstory for the maker movement and maker education more broadly while introducing critical concerns such as the *de facto* techno-elitism that have plagued the movement. I discuss writing studies' flirtation with the maker movement, including Joyce Locke Carter's address at the 2016 College Composition and Communication Annual Conference, and argue that we should be careful in adopting maker rhetorics as we risk making "making" only about middle class white males' composing literacies, interests, and practices. Finally in this chapter, I explain why multimodality is an inadequate frame for studying composing activity in maker networks. This inclusion was prompted by the many discussions I had at the Graduate Research Network forum which I participated in at the 2016 Computers and Writing conference in Rochester, NY, where several peers and mentors suggested I ground my discussions of "making" in multimodality to contribute to timely and relevant digital scholarship in the field. Instead, I situate "making" in the theory and practice of cultural and material rhetorics, which I outline in Chapter 2, and build my own queer new materialist research design, which I detail in Chapter 3, that allows me to document and theorize embodied, material, relational, and affective composing practices in maker networks.

Situating the Maker Movement

Over the last five years, much of the Western World has been enchanted by the idea of *making*—people from all walks of life and varying degrees of knowledge and experience engaging a host of production-centered activities. Oscillating between a fierce Do-It-Yourself independence and a communal Do-It-Together solidarity, *makers* have been recognized as such when they coalesce around shared tools, interests, and/or issues to build, hack, unmake, remake, tinker and play with a host of objects—digital and physical, high tech and low tech, discrete and systematic, personal and political. These networks or *makerspaces* might be face-to-face, digital, or hybrid and arise out of and co-produce a movement-in-the-making, giving space for "makers"

to compose, learn, share, and connect. *Makerspaces* might include knitters' collectives online at Ravelry.com or in local communities at yarn shops, print or book arts studios that require that makers have previous experiences or portfolios of work to participate, open-access hack labs with tools for metalworking, electronics, robotics and coding that partner via digital technologies with other studios and makers, and dedicated or "pop-up" spaces in schools, after schools, community centers, and museums to facilitate embodied, hands-on learning. For those of us in Writing Studies, makerspaces are a noteworthy phenomenon because they sponsor alternative composing practices, materials, ideologies, and bodies, and the study of these spaces can help us respond to calls to make our academic composition spaces more relevant, engaging, connected, accessible, and productive for students in Writing Studies and Rhetoric (Sirc; Shipka; Sheridan).

Those who identify as makers tend to wear their passions on their sleeves, to flaunt an undeniable maker moxie and ride together under the banners of creativity, innovation, and dissatisfaction with a pre-built environment and a ready-made existence. With a good deal of help from high-profile maker-entrepreneurs and acolytes like Mark Hatch, Chris Anderson, and Dale Dougherty, the latter of whom branded *making* through the publication and distribution of *Make Magazine*, as well as the orchestration of travelling Maker Faires across cities worldwide, *making* as a recognizable phenomenon has, relatively quickly, moved from the fringe to secure a prominent place in Western popular culture. Full of promise and possibility, contemporary rhetorics of making that stem from and shape this phenomenon call people to engage the material world with an unfettered and unbridled sense of agency—often individualized and always humanized. They are called to remake both objects and identities, and in doing so, to fundamentally change the rules of engagement in our late-modern consumer culture. For example, Mark Hatch's *Maker Manifesto* calls on makers to perform a set of maker-related activities that include: make, share, give, learn, tool up, participate, support, and change. Explicating the kind of metamorphosis that making can engender in a body, he writes, "Embrace the change that will naturally occur as you go through your maker journey. Since making is fundamental to what it means to be human, you will become a more complete version of you as

you make” (2). With the metaphysical and spiritual undercurrents of maker rhetoric, it’s easy to get caught up in this new maker hype, to re-imagine the raised fist of resistance as a hand with a crochet hook, a wrench, a circuit board, or a spool of 3D printer filament and to believe that a simple act of production can create a more livable life. Many of us in the field want to believe in the power of individuals working collectively to compose new selves, new communities, and new relations as a way of ushering in more democratic futures, and my own engagement with making over the last four years, both personally and professionally, has also been full of such promise, gilded in the ideals of equity, diversity, and full participation.

These are the values, discourses, and imaginaries that people tend to get excited about, and that excitement has spread from homes, communities, and informal learning centers into our classrooms, schools, and pedagogies. Commonly referred to as Maker Education, this maker-centered approach to learning theory and practice foregrounds production-centered work such as designing, experimenting, tinkering, producing, performing, and, most important to our field, writing. Maker education models are built on the premise that learning happens best when learners are able to manipulate materials, ideas, objects, and, I would add, rhetorics. By engaging John Dewey’s constructivism and Seymour Papert’s appropriations of Dewey in a more explicit theory of constructionism (Halverson and Sheridan 497), maker education foregrounds object-oriented, goal-directed, embodied approaches to learning. According to maker educator Gary Stager, “Making is predicated on the desire that we all have to exert agency over our lives, to solve our own problems. It recognizes that knowledge is a consequence of experience, and it seeks to democratize access to a vast range of experience and expertise so that each child can engage in authentic problem solving.” The aims that Stager outlines here feel very familiar to those of us in writing studies who have long seen our writing classrooms as spaces where we promote access to and participation in academic, public, and professional conversations, creating production-centered spaces where students use language to solve problems and build knowledge by making, unmaking, and remaking texts, as well as reflecting on those experiences to understand when, where, how, and why language does or doesn’t do work in the world.

Neoliberal and Entrepreneurial Maker Rhetorics

While there is much to be excited about in porting these access-oriented, equity-focused maker education initiatives into our writing classrooms, we must also critically consider the problematic rhetorics associated with the maker movement, specifically entrepreneurialism and neoliberalism. While maker rhetorics signal community participation and collectivity, their entanglements with entrepreneurialism can also promote both individualism and competition in ways that can work to undo more progressive social movements at the heart of the movement. As Kristiina Brunila & Päivi Siivonen demonstrate, neoliberal ideologies foster the creation of identities that are “self-responsible, enterprising, flexible and self-centred” (56). I am concerned that makers and maker rhetorics that materialize in this neoliberal ideological frame are at risk of further commodifying literacy education (Brannon et al., “The Ebay-ification”), rejecting commitments to the “public good,” promoting meritocratic systems where “success” is configured as achievement gained through individual talent and ability, and ignoring imbalances of power, social privilege, and the cumulative effects of oppression, particularly intersectional oppression. I therefore worry that contemporary maker rhetorics tend to reproduce makerspaces in the popular imaginary as white middle class projects that sponsor male literacies and financial independence, preparing them to take advantage of the next potentially profitable venture.

A brief history of the recent phenomenon of makerspaces shows us that this concern is well founded. The earliest American physical makerspaces (to be recognized as such) like NYC Resistor, HacDC, and Noisebridge were cooperatively owned entities built on German hackerspace models which focused mainly on computer programming and software hacking. Many of these spaces first dealt in discursive making through coding languages and came to physical making later, tinkering with rapid prototyping as a means of fabricating circuit boards and silicon chips as this group was well aware that their discursive making was always wrapped up in and dependent on the physical computing components through which programming languages operate (Sherrill; Cavalcanti). As independent organizations drawing people together into a community of practice (Wenger), these spaces were animated by the values of

transparency and sharing—breaking open the “black boxes” of how technologies work and publicly circulating knowledge and products that could be repeatedly iterated, remixed, and improved upon through a sense of collective intelligence. The silicon sympathies and histories that circulated in and around these early makerspaces, which were theoretically open, in reality, attracted a large number of white males who had the financial capital to buy and sustain membership in these independent cooperatives as well and the literacy resources to gain full access to the ways of knowing, doing, being, and composing with programming languages and computer hardware. Thus, we should take account that makerspaces (again, at least those that get recognized as such) and the maker movement more broadly have grown out of a *de facto* techno-elitism, and as Buechley’s gender and race analysis of the covers of *Make Magazine* prior to 2013 reveal, 85% of the photos included white men or boys playing with high tech toys.

In the 2016 chair’s address at the College Composition and Communication Annual Convention, Joyce Locke Carter called on scholars in our field to embrace the entrepreneurial aims of making:

The second mode of engagement that’s outward looking ... is making—not just making in class, which we all know how to do. But innovating, making products and services, developing apps, reinventing publishing, any number of value-added activities...When I talk about making, I’m flipping the power and flipping the epistemology, and saying that when you make, you dictate what will happen. You create new things that hopefully challenge the status quo (which is also the goal of advocacy), and while some, if not most, efforts end in failure, some will be quite disruptive. For us, this means pushing the bounds of disciplinary norms, unleashing our creativity without being constrained by norms of propriety and what’s been done before. In other words, creativity that changes the frame, dictates the terms. (389-390)

Carter’s words point to a maker mindset that unravels the traditional logics of Composition as an inoculation for those who can’t already write (Downs and Wardle) or a space that serves other fully legitimized disciplines, reconceptualizing it a space where things are created that have material impacts beyond a single assignment or semester. What’s more, Carter implores the field to stop with the “sad women in the basement narratives” (Miller) that describe the pitiful state of a feminized, adjunctified, disempowered discipline. Instead, she implores us to consider our

existing reserves—knowledge, connections, expertise, identities—and march together with the maker movement as agents of our own making.

Like the rhetorics of the larger maker movement, I am caught up in Carter's notions of resistance—the in-your-face, punk-style (as underscored by Carter's intro and outro blasting of the Ramones) and the disruption of business-as-usual or boring-as-usual notions of Writing Studies. She reminds us, "Punk is not a helping discipline; it doesn't want to reform, but rather re-form. Yes, Re Form, Re Make. Re Make through your innovation and your disruption" (405). I applaud this timely appeal, one that speaks not just to reason and logic but to our emotional need to be relevant—to matter through our manipulation of matter. Yet, I am also suspicious of the idealism that focuses on the individual agency of conference-goers, faculty in rhetoric and composition who are asked to seize that intangible will to power, to make something from nothing without accounting for the specificities of material and embodied networks through which things emerge. In Carter's exemplars, *The Digital Writing and Research Lab at The University of Texas*, *Parlor Press*, *ELI Review*, Carter credits particular innovators, and these credits read like a who's who in Writing Studies including David Blakesley, Les Perleman, Donald McQuade, Joe Moxley, and Jeff Grabill. Among her litany, the numbers of men nearly double the numbers of women, and while students, mostly unnamed, are mentioned, their role in making is ancillary, leaving me to wonder how much of this kind of making is available to those who are more tethered to classroom contexts and large numbers of undergraduate students. Similarly, I wonder about the electronic nature of the litany of things that were made by these innovators, products that are categorized under (e)Publishing, Software and Coding, Higher Education, and Manufacturing, which foreground human-computer interaction. These products are eerily similar to the early origins of independent makerspaces, and there is real danger, I fear, in reinscribing making in this tradition inside the field of composition as we close down the possibility of making with other materials, other tools, and other bodies—those that aren't imbued with the sleek and sexy powers of masculinity, notoriety, and digitality.

It stands to reason that the kinds of making that Carter draws to our attention, as well as

the academy's sudden interest in making and makerspaces more generally, might have something to do with a re-gendering and re-classing of making through its associations with both digital technologies and entrepreneurialism. Traditional making such as food preparation and storage, the production and maintenance of cloth and textiles, as well as child-rearing and homemaking are known in Western cultures as "woman's work." These kinds of making generally involve more direct contact between bodies and the materials and objects of making, and they often don't result in the production of discrete commodities that can be valued and sold. In 2015, the United Nations reported that women take on the majority of unpaid labor worldwide, but this work is largely "invisible" (118) as it happens in the private spaces of the home or in public sectors as volunteer work. By equating making with digital tools and enterprise culture, however, the links between women and making are weakened. Instead, making becomes the province of men who compose with high tech and digital tools. These tools add a layer of distance between composing bodies and composing materials, as I demonstrate in Chapter 4 with the composing robots such as 3D printers. This distancing act turns making away from the embodied, relational, and affective processes of composing towards more specialized, intellectual, and cerebral acts of creation. Given the academy's long history as a male-dominated institution which has privileged a life of the mind while ignoring the life of the body, this distancing act might explain the materialization of making in the academy and in Carter's address as something finally worth serious scholarly attention.

Remaking Writing Studies: From Multimodality to Materiality

While Carter's keynote address is perhaps the most high profile example of the field's engagement with *making*, writing studies scholars like Geoffrey Sirc, Jody Shipka, Kristin Arola and Anne Frances Wysocki, Jason Palmeri, Daniel Anderson et. al, Kathleen Blake Yancey, Jonathan Alexander and Jackie Rhodes, Susan Delagrange, and Johndan Johnson-Eilola, among others, have long been committed to exploring the potential for extralinguistic making and the composition of alternative texts in the writing classroom. Under the broad umbrella of

multimodality, these scholars have worked to broaden what counts as legitimate modes of meaning-making, to decenter the primacy of alpha-linguistic composing in writing studies, and reclaim past ways or develop new ways of approaching and teaching, researching, and assessing multimodal text-production.

In a survey of multimodal composition practices at work in the field, Anderson et al. describe multimodality as a concern for production-centered activity that grows out of a New Literacies framework. They write:

In particular, the work of scholars in The New London Group (1996), Gunther Kress and Theo van Leeuwen (1996, 2001; also Kress, 2003), and Cope and Kalantzis (1999) explore the understanding of alphabetic writing as one modality among many that individuals should be able to call on as rhetorical and creative resources when composing messages and making meaning. These scholars argue for a theory of semiosis that acknowledges the practices of *human sign-makers who select from a number of modalities* for expression (including sound, image, and animation, for example), depending on rhetorical and material contexts within which the communication was being designed and distributed. (59)

Yet, as Alexander and Rhodes argue in *Multimodality: New Media and Composition Studies*, these rhetorical gestures towards a more capacious notion of writing studies have not necessarily been realized because the strong tradition of print literacies practices has limited what gets done inside a framework of multimodality. They write, "...our embrace of new and multimedia for composing often ignores the unique rhetorical capabilities of different media, including the distinct 'logics' and 'different affordances' of those media. Put simply, we often elide such considerations—consciously or not—in order to colonize the production of multimedia texts with more print-driven composition aims, biases, and predispositions" (19). As such, the field's monogamous engagement with print continues to foreclose more promiscuous engagements with other kinds of media and prevents us from grasping and leveraging the potentiality of composing, as Yancey puts it, "in a new key" (321).

Our failure to realize the disruptive potential of multimodality might, however, offer us other rewards, new possibilities for composing outside of modes and outside of texts. In *The Queer Art of Failure*, Judith "Jack" Halberstam argues that failure can help us unmake particular

kinds of logics and trajectories. Halberstam writes, “Failure is something queers do and have always done exceptionally well. ... In fact, if success requires so much effort, then maybe failure is easier in the long run and offers differing rewards” (3). Thus, the failure of multimodality to remake composition might help us understanding differently the ontological underpinnings of composition and account for the materiality of modes that aren’t, like Hayles’ cybernetic information, “floating through the thin, thin air until...[they are] connected up with incorporating practices” (83). So while the framing of Anderson et al. names and points to the specificity of material and discursive locations where composition happens and argues for a more capacious notion of what counts as writing, an argument desperately needed in the field of writing studies at the turn of the 21st century, their scholarship also underscores two key limitations of multimodality that impair its usefulness for making. First, their rendering of multimodality reproduces the trope of the masterful composer who has dominion over the modes of his making, and second, it underscores a textual preoccupation with signs and signifiers at the expense of the materiality of things and bodies.

First, the notion of multimodality of Anderson et al. clearly foregrounds an agentive composer who chooses from a host of static and pre-existing semiotic resources to design texts that take advantage of visual, aural, and embodied modes of representation. In this paradigm, the always-already-empowered composer has a discrete set of expressive modalities to combine, arrange, and rearrange to create a textual expression, and these modes bend to the will of the composer who is a creative subject with an enlarged palette. And second, the creative composer is given liberty to make as long as that making is relegated to the making of texts: semiotic communications composed of signs and symbols. This textual orientation is one that limits the potential of composition as a world-making or self-making endeavor as what gets made must always stay within the bounds of a recognizable genre or media frame.

Such a text-dependent view of making and composing, articulated by Alexander and Rhodes, has also been critiqued by Powell et al., Wootten, Palmeri, and Shipka. Noting how Writing Studies, as a discipline, acculturates its members into seeing all the world as a text

capable of being read, Marilee Brooks-Gilles writes that we share a “tendency to fetishize texts, to turn everything into a text that can be read, and to sometimes objectify those texts in a way that disconnects them from their relationship to humans and to place/space” (Powell et al.). This more recent claim echoes Judith A. (Jay) Wooten’s claim in the 2006 Chair’s Address to the assembly at the College Composition and Communication Annual Convention during which she took up the field’s turn to multimodality, specifically visual literacy and what she calls the “tyranny of the image” (239). In her introduction, she stated, “I speak not of what we call the natural world—grass, trees, clouds, etc.—but of our relationship with the natural world and the manmade world and the ways we reveal that relationship in language and images. We don’t read real trees, but we read Joyce Kilmer’s “Trees”...We read photographs of trees and animals in advertisements” (236). This passage, and the remainder of Wooten’s address, illustrates the field’s early anxieties about multimodality, a turn that she worried would only be accessible to some faculty and some students on the cutting edge of the field. To shade the glare from the shiny newness of multimodality, Wooten reminded the assembly that meaning-making practices have always been multimodal:

‘Multimodal literacy’ is another fairly new refocusing, renaming. What about literacy hasn’t been multimodal? Like forever? Mary Louise Pratt brought into focus Guaman Poma’s 1200 page letter to Philip III of Spain, written in Peru in 1613, in “Arts of the Contact Zone,” an address at the Responsibilities for Literacy conference in Pittsburgh way back in 1990. Guaman Poma included four hundred pages of drawings in that letter entitled *New Chronicle and Good Government*. He used a pastiche of Spanish and Quechua. It was multimodal. (241)

This legitimization of the seemingly new concept of multimodality for writing studies works as a backward justification through the scholarly traditions in our field, connecting new social practices to the phenomenon that preceded them. This rhetorical move sanctions the new because of its dialectic relationship with the old, a practice that Palmeri later engages in his and Dubisar’s argument for the value of multimodal remix in the composition classroom and most prominently in his book *Remixing Composition: A History of Multimodal Pedagogy*. Palmeri argues that composition’s “multimodal turn” is really no turn at all as rich work in image, sound, movement,

and hypertext has always been part and parcel of Composition Studies. Instead of parsing out and unnecessarily dividing modes, Palmeri demonstrates how orality and image have almost always been part of writing and writing instruction. With rich examples of classroom practice, he invites writing teachers to remix the extant traditions—expressivism, cognitivism, social constructionism—to create a composition of one’s own. Taken together, these critiques illustrate that multimodality is not a new phenomenon or a new way of doing the business of Composition. Instead, the focus on multimodality has served to name and articulate a rich history of practice that has, as Alexander and Rhodes note, mostly “serve[d] the rhetorical ends of writing and more print-based forms of composing” (19).

In *A Composition Made Whole*, Jody Shipka similarly picks up this line of thinking, showing in her analyses how composition is enacted through a network of always already multimodal processes of invention. Picking up the work of Paul Prior and Patricia Dunn, who forwarded theories of composition as acts of semiotic remediation through a host of discursive and embodied acts of making, Shipka writes, “To label a text multimodal or monomodal based on its final appearance alone discounts, or worse yet, renders invisible the contributions made by a much wider variety of resources, supports, and tools...it masks the fundamentally multimodal aspects of all communicative practice” (Loc 1052). Shipka’s case studies of composing uncover the multimodality inherent in making while also mounting one of the most poignant critiques of multimodality for the field of writing studies. She argues that multimodality, imagined by many in the field of Writing Studies as a new phenomenon enabled by computer technologies, betrays our human history of composing with a plethora of tools, materials, and sign systems and prevents more capacious understandings of composing practice. She writes, “my concern is that a narrow definition of technology coupled with the tendency to use terms like *multimodal*, *intertextual*, *multimedia*, or *media-rich* as synonyms for digitized products and processes will mean that the multimodal, yet-to-be-imagined hybrids will be (provided that they have not already been) severely limited by the texts, tools, and processes associated with digitization” (Loc 328). As Shipka notes, writing studies’ recent turn to multimodality seems to trade a fidelity

to the page for a fidelity to the screen, and closes off possibilities of what, how, and with whom we might compose.

This trouble with multimodality is most clearly present in Shipka's story about the ballet shoes that she shared with colleagues as an example of multimodal composing during a faculty development workshop. The ballet shoes, on which a student had hand-transcribed with permanent marker an academic source-based essay, were chided by a faculty member who was clearly disoriented by the presence of such "silly objects" (Berlant) in a classroom. Shipka attributes his reaction to a different way of seeing the text as a "final product" (Loc. 193) of composing as opposed to an artifact littered with the multiple effects and compositional affects of the composer's contingent and relational choices that are familiar to the discipline, such as how to evaluate and incorporate source material, as well as those that seem to many beyond our areas of expertise, such as how large to write each letter of calligraphy and account for the bleed of ink on the silk fabric. Shipka wonders then whether multimodality, with an orientation toward digital production in a computer-mediated world, can ever account for the ballet shoes:

How might it [Yancey's articulation of multimodality] position, whether rhetorically, materially, or technologically, texts that explore how print, speech, still images, video, sounds, scents, live performance, textures (for example, glass, cloth, paper affixed to plastic), and other three-dimensional objects come together, intersect or overlap in innovative and compelling ways? (Loc. 289)

In this passage Shipka points to the materiality of composing as the biggest challenge to the ways we understand composition through the frameworks on multimodality. Once our compositions are unflattened beyond the frame of a text or a screen, once they extend into space, into *our space* as composers and compositions teachers, they beg for different kinds of relational understandings. Their presence before us underscores Kress's argument about the use of multiple modes for meaning-making. He argues that multimodality is not in itself a theory; instead, it is a descriptive account of how societies use a multiplicity of material means to communicate rather than a set of principles on which the activity is based. Kress argues thus that multimodality must be grounded in the material study of the affordances and constraints of particular modes, the

ways they lend their agency to or thwart our efforts in organizing and represent the world as we experience it.

Sadly, it seems, this distinction has largely been overlooked in the uptake of multimodality as a theory of/for action in writing studies. Thus, Shipka's question about how multimodality positions the ballet shoes and their composer is not one that multimodality can approach without serious entanglement with materiality and matter. It requires paradigms that consider both the ontological existence of objects and the complicated, often unpredictable nature of their rhetorical velocity (Ridolfo and DeVoss)—the ways that objects exhibit agency, both allowing and resisting the ways composers repurpose, reuse, and re-circulate them in differing contexts across space and time (Rand). Current paradigms for multimodality makes them ill-suited for understanding Shipka's student's ballet shoes or the composition of any “material-discursive” objects (Barad 66) like the ones that are produced in makerspaces as three- and four-dimensional objects. In practice, multimodality fails to account for the “rhetorical and material contexts” of composing (Anderson et al. 59) and participates in the continued liberal humanist tradition that locates man (certain men, anyway) above and separate from the materials of his making and figures the agency of the composer as something that originates from within the body. Thus, invoking and inverting Wooten's call to *read not the trees but about the trees*, I argue that writing studies practitioners must work *to engage the trees*—to listen to and speak of what we call the material and embodied world, adopting a new lens for approaching critical questions about who and what gets made.

Investigating Maker Networks: Research Questions and Contexts

Each time we hear making invoked as a framework for composing (in) our discipline, I argue that we should ask questions that interrogate assumptions and bias in maker rhetoric from a critical materialist stance. In a time of sexy digital rhetorics, where new media and new literacies scholars are steeped in understanding the style and delivery of web texts, Nancy Welch and Tony Scott argue that we've fallen into a “technological fetishism” of sorts (568), one that

focuses our attention on a neo-Aristotelian understanding of digital texts as divorced from the extra-discursive realities of body, labor, and relationships that exist beyond them. Building from Marxist notions of object-fetishes that obscure the histories and contexts of those objects, Welch and Scott call for a *critical* materialism that moves beyond older materialist approaches to examining “everyday life” in order to “assess critically how a society’s story about itself has been composed, to glimpse competing and excluded narratives” (574). Specifically, we must ask the kinds of questions that position us to interrupt both neoliberal and entrepreneurial approaches to making, questions that can help us better understand the conditions of making and how makers and makerspaces materialize. To approach these questions, I borrow from work in cultural rhetorics to reconceptualize *makerspaces* as *maker networks* in a move which underscores the cultural constellations (Powell et. al) of tools, materials, bodies, practices, and places. Arguing for the practice of constellating as a way of understanding the relationality of rhetorical practice, Malea Powell writes that a “constellation ... allows for all the meaning-making practices and their relationships to matter. It allows for multiply-situated subjects to connect to multiple discourses at the same time, as well as for those relationships (among subjects, among discourses, among kinds of connections) to shift and change without holding a subject captive.” As a metaphorical practice, constellating allows me to pay attention to the embodied and material structures, practices, objects, orientations, and relationships that materialize/are materialized in maker networks. It allows me to consider how makers and objects emerge and re-emerge through material relationships, rejecting notions of “rugged individualism” that include bootstrapping oneself into an information economy marked by coding or programing. Instead, I ask of the constellations that allow for emergence, “How do maker networks materialize, and what might we learn about composing from those networks?” Exploring this question involves answering several additional questions such as:

- Who and what gets to make?
- Who and what gets made?
- What drives composition (as process and product) in the network?

The larger research question explores the ontological nature of how networks become *networkings*. As a concept, *networkings* are about the unfolding relationships among fluid, dynamic, and amorphous nodes in network that enable materialization of both things and discourses. The subquestions of this research study focus attention on the materialities of making and composing in particular networks and how those material constellations come to cohere.

The two maker-centered research sites that I examine for this dissertation project were designed using models of connected learning (Ito et al.). As a heuristic for building educational experiences that are production-centered, connected learning leverages peer-to-peer learning relationships and encourages learners to pursue collective interests together by making, sharing, learning, and reflecting. In addition, connected learning experiences are openly networked, allowing learning to thread through multiple contexts which link home, classroom, community centers, museums, after-schools, and other para-curricular programs through both online and offline platforms in order to create continuity and community. Since makers in both research sites use digital media to make, share, and connect while also making, sharing, and connecting in face-to-face settings, these sites are hybrid, extending across physical and digital spaces while threading through formal and informal learning contexts.

The first research site is a massive open online collaboration, or cMOOC, funded by the National Science Foundation to increase STEM/STEAM literacy for underserved youth and youth educators. This maker network, which I'll refer to as *Remix, Remake, Curate*, was active between 2014 and 2016, engaging six spoken word poets, six museum scientists/science educators from the North Carolina Museum of Natural Sciences, and twelve classroom educators working in K-higher education context as facilitators. These formal and informal educators designed and delivered fifteen weeks of maker-centered, intensive, online science programming for over 1,500 youth and their adult mentors in both formal and informal learning contexts. The facilitators collaborated in both online and offline environments, gathering for face-to-face design retreats and debriefing meetings at the museum and other locations, and collaborated in synchronous and asynchronous digital platforms such as Twitter, Google Plus, Google Hangouts,

and Google Documents. Data collection in this maker network, which I'll describe in detail in Chapter 3, took place from January until May of 2016.

The second research site is located in a high-needs metropolitan high school and includes both students and teachers who worked together in “pop-up” makerspaces. With funding from the LRNG Innovation Challenge (www.educatorinnovator.org/lrng2014/), the school designed six total spaces which open during the school's mid-day free choice period called SMART Block for making with a variety of tools and technologies. The spaces I chose to examine represented the diversity of students, of materials, and of approaches to making that is lacking in our Writing Studies' current uptake of making. These included 3D fabrication and prototyping; circuitry, robotics, and computer coding; and upcycling discarded objects and everyday waste for new audiences, purposes, and contexts. These pop-up spaces were opened in September 2015, and each space served between twenty and fifty students for two to three days out of the school week. Additionally, teachers shared artifacts they made in these spaces on Instagram and Twitter. Data collection, which I'll describe in detail in Chapter 3, took place at the high school in May 2016.

The makerspaces that I selected to study in this dissertation project are what I refer to as “academic adjacent” in that they were sponsored by formal and informal educational institutions and were inhabited by people who identified in these spaces as classroom and para-curricular educators, as well as students across a wide spectrum of institutional types and grade levels from elementary school to university. As I noted in the chapter introduction, I was involved in their participatory design and delivery as a maker, a participant, a facilitator, and a writing studies researcher. I served as co-principal investigator and project director on both the NSF and LRNG grants that funded the development of the sites. As such, my dissertation research design does not intend to elicit objective, outsider accounts of making and makerspaces; instead, it is consistent with the ethics, practices, and commitments of community-based research whose goal is to enact social change both within the academy and beyond (Grabill; Cushman; Moore).

If we are, as Geoffrey Sirc argues in *English Composition as a Happening*, to reanimate composition and reclaim its relevance and disruptive potential in a neoliberal social, economic,

and academic landscape, we might look outside our own classrooms, taking inspiration from other spaces of composition as many compositionists have done before me (Beaufort; Haas and Takayoshi et al.). Additionally, if we do desire to port the maker movement—its rhetorics, structures, tools, materials, practices, identities, etc.—into our writing studies classrooms, as Joyce Locke Carter has suggested, then we should better understand what we’re importing and the implications of that borrowing for classroom practice. Thus, this dissertation study explores makerspaces as non-traditional composing networks where makers work with and against unconventional and unexpected objects such as vinyl, memes, cut paper, social media platforms, infrared sensors, cameras, plastic filament, insects, Xacto blades, pipe cleaners, reclaimed wicker baskets, DNA, Python code, and Raspberry Pis in both face-to-face and online settings. Thus, this study will provide a more capacious view of what it means to compose together with all of our available means and a diversity of bodies across digital, analogue, and hybrid spaces, and to better understand how composers compose and are composed by their participation in maker networks. Through the documentation and analysis of these non-traditional composing networks, this study can help the field imagine what Shipka envisions in *Toward a Composition Made Whole*, rejecting dutiful and monogamous pairings with one mode, one tool, one material, one set of collaborators, one set of outcomes, and one notion of success that is all too often predicated on the flawless coherence of a composed text. Finally, this study aims to disrupt neoliberal, entrepreneurial, and hegemonic notions of making and makerspaces by focusing on maker networks that include a diversity of genders, sexualities, races, nationalities, technical abilities, and institutional power positions, tracing the collective emergence of maker networks, maker identities, and makerspaces.

Preview: The Makings of a Dissertation Project

In this chapter, I have provided a brief orientation to making, outlining some of the cultural baggage that making brings with it as a paradigm for re/composing Writing Studies as a more equitable, responsible, and relevant discipline. I’ve situated making and makers’

composing practices as part of a larger conversation in the field around multimodality and argued that multimodality has largely failed to disrupt business as usual in composition for two reasons. First, we are unable to let go of the figure of the agentic composer who selects, manipulates, and overcomes the materiality of composing tools, objects, and practices despite their tenacity and resistance. Second, we hold fast to the textualizing practices in our field that reduce the materiality of our meaning-making to something called a text, a construction that allows us to forget its physicality and fetishize its symbolicity. Given these limitations, I've argued that material rhetoric provides a more suitable framework for researching making, and I have laid out a set of research questions about materiality and materialization. I outlined two academic-adjacent maker networks, one that is primarily digital and the other that is primarily face-to-face, that I have investigated by tracing the relational constellations of composing tools, objects, bodies, places, and practices that emerged therein.

In Chapter 2, I trace the uptake of materiality in the field of writing studies and introduce new materialist theory as an extension of materiality studies. By including the work of both queer and feminist scholars, I extend our field's "thinking with Latour" (Nathaniel River and Paul Lynch) about network materialization to theorize difference and the role of emotion, affect, and orientation in networks. Specifically, I outline a methodology that focuses on five interrelated tenets of new materialist theory for studying emergence in composition networks. First, I introduce a material-discursive rhetoric that accounts for both the semiotic and the materials dimensions of rhetoric. Then, following Jane Bennett and Karen Barad, I argue that composing matter and materials are not, as Aristotle and Descartes have had us believe, instrumental, automated, or teleological. Then, I outline the normative and normalizing tendencies of networks, using Robert Payne's conceptualization of the "exploit" which throws these normative practices into relief. Next, borrowing from queer/feminist new materialist theorists Robert Payne, Mel Chen, Katherine Stewart, Sara Ahmed, Jack Halberstam, Ann Cvetovich, and Samantha Frost, I theorize the affective economies at work in makerspace network emergence and proliferation. Finally, I argue that a new materialist framework for writing studies research

and practice acknowledges that being and knowing are intra-active processes and researchers are always already part of a phenomenon of study. Taken together, these tenets reframe the research questions about who and what gets to make and who and what gets made, and they allow for the conceptualization of both orientation and affect as key factors in network materialization.

In Chapter 3, I build on the work of John Law and Caroline Dadas with “messy methods” to outline a playful approach to community-based research. Here, I provide a detailed account of the ways I engaged in data collection through game play, making origami fortune-tellers with research participants to queer our knowledge-making relationships. Next, I detail data analysis methods, which include the creation of spreadsheets and hand-built data analysis models that, following Nick Sousanis’s work, both flatten and unflatten data, making not just on a page or screen but in three- and four-dimensional ways to acknowledge the embodied experiences of people who compose and make meaning multi-dimensionally, across timespacematter. I describe the open coding processes that allowed emergent codes to materialize from the “small narratives” of participant experiences, paying particular attention to the ways that affective concerns—particularly those of failure and pleasure—impacted the emergence and rematerialization of the makerspace as a phenomenon.

In Chapter 4, I offer a description and analysis of the *Remix, Remake, Curate* maker network, a mostly online maker network that engaged six spoken word poets, six museum scientists/science educators from the North Carolina Museum of Natural Sciences, and twelve classroom educators working in K-higher education context as facilitators in the design and facilitation of maker-centered, culturally relevant science literacy programming over two years. I address the research questions in this context and demonstrate how this academic adjacent maker network is driven by one primary affect: fear of failure. I describe how failure functions as an orienting affect for the research participants, driving the materialization of the network and the emergence of new nodes and relationships between those nodes. I also demonstrate how two student-composed “exploits” (Payne 151) reveal the normative practices of education and describe the norming protocols that were developed to deal with such exploits.

Likewise, in Chapter 5, I offer a case study of “pop-up” makerspaces in a high-needs metropolitan high school and include both students and teachers who work together to compose with diverse materials in a primarily face-to-face setting. This case offers rich descriptions of composing in a 3D fabrication and prototyping maker network; in a circuitry, robotics, and computer coding network; and in an upcycling network where discarded objects and everyday waste are recomposed for new audiences, purposes, and contexts. Findings from this analysis point to the importance of pleasure as a controlling affect for young makers. Their composing networks are materialized through the pursuit of friendship, play, safety, and adventure. Here, network materialization happens through their lateral pursuit of spaces, tools, objects, and other composers that provide novel and pleasurable experiences.

In Chapter 6, I explore the implications for these findings for writing studies theory and practice, arguing that we should embrace a more materials, embodied, and affective understanding of composing. I describe how a focus on networked normativity extends the field’s engagement with circulation studies as well as how these two case studies uncover the misaligned motivations and orientations that students and teachers have toward composing. In addition, I argue that digital rhetorics must continue its entanglement with cultural rhetorics if both are to be mutually accountable to each other and the field of writing studies. Finally, based on the results of this research, I outline a queer materialist rhetoric for writing studies called *composing sideways* that prompts lateral movements in feeling, thinking, and composing. *Composing sideways* is a heuristic that is useful to both writing program administrators and writing teachers as it prompts them to make space inside their programs and their classrooms for affective relationships with composing tools, composing materials, composing places, and other composing bodies. The remainder of the chapter illustrates how *composing sideways* can prompt us to resist vertical transfer as the most important pedagogical outcome for a writing classroom and instead make space for writers and writing teachers to “stitch in” as they compose the relationships, spaces, and objects that come to matter in the here and the now.

**CHAPTER 2: Thinking Beyond Latour:
A Queer/Feminist New Materialist Research Methodology**

And when I am formulated, sprawling on a pin,
When I am pinned and wriggling on the wall,
Then how should I begin
To spit out all the butt-ends of my days and ways?
And how should I presume?
--T.S. Eliot

One of the problems inherent in Writing Studies scholarship is that a vast majority of our methodologies are predicated on isolating texts from their unwieldy contexts so that they can be analyzed and interpreted. Writing Studies' approach to multimodality, which I critiqued in Chapter 1, is one such example. Multimodal scholarship, while focused on a multiplicity of communication and meaning-making forms, often looks at how those forms are put to work inside a singular text or a set of texts. While multimodal scholarship does consider how different modes aggregate meaning as well as how those modes work to complement and/or disrupt each other, the unit of study is largely confined to the text or a set of texts and the intra-textual relationships developed within that frame. Since most Writing Studies programs grew out of English departments where literary analysis is the bedrock of scholarship, it's no wonder that our approaches to research design are isolationist in nature. Invoking T.S. Elliot, we might say it is when our texts are *formulated, sprawling on a pin*, that we've learned meaning-making ought to begin.

As a writing teacher and a writing studies researcher, however, I've always been more interested in the *days and ways* of composing. Texts are the *butt-ends* of the messy activities of meaning making. They are what shakes down or gets left behind at the end of the day when the composing bodies have gone on their way. It is those *days and ways* of makers in contemporary academic-adjacent makerspaces that I want to better understand, but the entanglements of composing time, space, bodies, objects, and practices are way more difficult to *formulate* and *pin*. Thus, in this chapter, I build a methodology that is *not* about isolating, pinning, and sticking but instead is about how meaning and meaning-makers get *unstuck*, how they move and take a host of others with them. To accomplish this, I draw on theories of movement from writing

studies, from literacy and media studies, from feminist and queer scholarships, and from new materialisms to build an interdisciplinary framework for explaining how meaning moves *with*, *around*, and *through* material bodies in a composition network. By tracing such movement, and by attending to the intensities and flows of meaning-making as movement, I am able to approach the research questions that guide this study. What's more, if the field of writing studies can take up ways of moving as ways of knowing [in] a composition network, we might be able to attune ourselves differently to those butt-ends of composing activity. We might be able to reimagine texts and other made things as lively objects, momentary shakedownings that are always in-the-making, fragile but also full of potential energy. Finally, we just might be able to feel how they are already wriggling, vibrating, and resonating on our metaphorical knowledge walls.

But before we go together, you and I, into these moving currents, we should pause to consider that certainly I am not the first person in writing studies to be more interested in composing movements than in static, composed objects. Jody Shipka, for example, expresses a similar frustration with Writing Studies' methodologies. She notes textual analysis has long tended to "'freeze' writing, to treat it as a noun rather than a verb" (13), and she reminds readers of Deborah Brandt's apt metaphor of the party as a way of understanding what we lose when we focus only on the text. Employing textual methods to understand process, Brandt notes, is like "coming upon the scene of a party after it is over and everybody has gone home, being left to imagine from the remnants what the party must have been like" (as qtd. in Shipka 30). For Shipka, social semiotics provides a methodology for understanding the meaning-making party. It provides her a way to trace the activities of composing that are often elided by the gravitas of the text, revealing that movements as seemingly inconsequential as browsing the shelves at a local big box store to overcome writer's block are essential to the weird and wonderful processes of composing. Social semiotics also helps Shipka to rescue multimodality from both the digital and intra-textual traps, showing how all writing is multimodal writing as it is arranged in space and visually engaged, often remixing spoken words and gestures into linguistic grammar.

For my own investigation of maker activity, however, social semiotics falls short. As a

theory of what signs can make happen in social and cultural settings, it is effective at showing how people move meaning through discourse across communication modes. What it lacks, however, is an explanation of how meaning moves with, around, and through composing objects and bodies. It isn't able, for example, to explain how signs, bodies, and objects can "hang together" producing distributed configurations of meaning that are both material and discursive in nature. In addition, it fails to account for the embodied and emotive experiences that bring these configurations together and push them apart. It is these public feelings—culturally invested meanings and emotions—about composing objects, bodies, practices, that moves a composing network. Thus, this chapter orients toward new materialisms, particularly queer- and feminist-inflected new materialisms, to help us approach the embodied, emotive, relational, and differential processes of composing.

Before jumping headlong into *new* materialist scholarship, however, it makes sense to first orient readers to the idea of materialism by considering how materiality has been figured as a concern for writing studies. Thus, I will first review writing studies' historical engagement with materiality, considering how social epistemic ideologies have produced writing studies' late 20th century "material turn." Next, I will consider how new materialisms have been taken up through a limited engagement with new materialism, namely Actor Network Theory, introduced by Bruno Latour, John Law, and John Callon. Finally, I present five key tenets of a queer and feminist new materialism to build a methodology that accounts for the affective production and circulation of meaning and matter in composing networks.

A Material Turn in Writing Studies

Materiality has a long history of uptake in the field of writing studies, and in fact, one might argue that rhetoric's central concern is the nature of the relationship between materiality and discursivity. Take, for example, C. H. Knoblauch's taxonomy of the four "rhetorical statements"—metaphysical/ontological, objectivist/experiential, expressionist/imaginative, and sociological/dialogical—which offers the "competing possibilities for naming

the world, each responsive to the insufficiencies in the others, each indeed beginning from those insufficiencies to further the dialectic” (128). Each of these ideologies/epistemologies is engaged in a relationship with the material conditions of existence, Knoblauch argues, but each figures that relationship in different terms. The metaphysical/ontological world view, as forwarded by classical rhetoricians like Aristotle, holds that a pre-given, teleological, and hierarchical reality exists outside of language; thus, truth claims can be verified by how well rhetoric’s forms index this material world. In response, objectivist/experiential logics, whose wellspring is associated with the early modern or “Enlightenment” era, reject the finding of truth through language and argument and assert that truth can be found only through the empirical study, documentation, and taxonomization of the material world. These truths are produced through a body that stands outside of the knowable object. In such a system, rhetoric is not a knowledge-making practice, but a rational thought system of representing and communicating, the natural order of “dead-matter,” as Descartes named it. In the expressionist/imaginative framework, rhetoric’s relationship to materiality is to liberate a pure human consciousness from the relational limitations of culture and society. In this paradigm, a Romanticized natural world is free from sociological trappings of culture and society and can be exploited as a means of self-actualization, if the rhetor tries hard enough to sound his “barbaric yawp” (Whitman 87). The fourth of rhetoric’s epistemological turns, Knoblauch argues, is the sociological/dialogical, which posits that our everyday experience is socially and materially constructed through our discourse practices, and those discourse practices can be analyzed, critiqued, and changed to build new futures. James Berlin terms the sociological/dialogical the “social epistemic” and asserts that the ways we know are wrapped up in our social, cultural, linguistic, and historical relations. Berlin writes, “Both consciousness and the material conditions influence each other, and they are both imbricated in the social relations defined and worked out through language” (489).

As this brief history of rhetorical ideologies illustrates, materiality has always figured significantly in our understandings of the goals of rhetorical study; however, the field’s more recent “material turn” runs parallel to our ideological fascination with social-epistemic ways of

knowing, doing, and being. In the early 1980's Michael Calvin McGee called on rhetoricians to broaden the notions of what counts as rhetorical study by paying attention to our experiences of rhetoric—the ways it impacts individuals and groups and the ways it constructs subjectivities, allowing for the discursive positioning of individual in society. He writes,

Though it is the only residue of rhetoric one can hold like a rock, it is wrong to think that this sheaf of papers, this recording of “speech,” *is* rhetoric in and of itself. It is surely “object,” and the paper and ink scratches are “material.” But the whole of rhetoric is “material” by measure of human *experiencing* of it, not by virtue of our ability to continue touching it after it is gone. Rhetoric is “object” because of its pragmatic *presence*, our inability to safely ignore it at the moment of its impact. (23)

In other words, McGee seems to argue, like the objectivists, that our experiences of rhetoric—the ways that rhetoric moves us along, the ways it stops and makes us think, the ways it abuses and heals our bodies—are just as real as the bundle of papers on which words are written. McGee's work presaged the question, what does rhetoric do to and with us? And this is the question that writing studies scholars have worked over the last three decades to approach by investigating rhetoric's impact on the discursive production of difference—differences in culture, bodies, spaces, temporalities, texts, and objects, picking up both the materiality of rhetoric and the materiality of its interfaces in oral, print, and digital forms.

In 1999, for example, Seltzer and Crowley's collection *Rhetorical Bodies* urged the field to pay more attention to “rhetoric's intense materiality, temporality, and consequentiality” (ix), particularly the production of (human) bodies and the contexts of production, circulation, and consumption of texts. Authors in this collection took up the rhetorical production of normative and nonnormative individual, social, and national bodies (DeVenne; Crowley; Hardee; Dickson; Scott; Wells); the boundary-marking practices of delineating and investing meaning in public and private space (Hass; Blair); as well as the material concerns of writing, making, and text preservation (Faigley; Sharer; Hollis). Selzer and Crowley note that scholarship around issues of feminine embodiment is notable a strain of material feminist rhetoric that stretches back through Crowley's own scholarship working to trace the ways rhetoric mediates power—investing and

divesting bodies with agency. She notes, “Distinctions and boundaries are never disinterested: when someone is named a witch, a factory worker, a rustic, or an illiterate, someone else profits from that distinction” (363). Thus, it behooves us, as we turn our attention to making, maker rhetorics, and maker networks to consider who benefits and how from naming someone a maker.

In addition to Crowley, other material feminists—Cheryl Glenn, Nan Johnson, Eileen Schell, Susan Miller, Susan Jarratt, Vicki Tolar Collins, Wendy Hesford, Kristie Fleckenstein, Tessa de Laurentis, Nancy Welch, Laura Micciche, and Lynn Worsham, among others—have worked to reclaim women’s bodies and embodied ways of knowing, doing, being, working, and mattering in writing studies theory and practice. While Cheryl Glenn, Nan Johnson, and Susan Jarratt have undone and refigured masculinist histories of rhetoric remarking boundaries of what counts as rhetoric and who counts as a rhetorician, Eileen Schell and Susan Miller have focused on Composition as a site of material struggle, arguing that the working conditions in English departments can best be read through a materialist feminist lens, one that pays more attention to the modes of production as opposed to postmodern concerns with resignification and representation which, they argue, do little to free women from exploitative labor patterns. Collins has argued for renewed attention to the materiality of texts in feminist historiography, laying out a descriptive method for archival research that pieces together the social, cultural, institutional, and economic contexts of women’s writings and texts. Also in this strain, Hesford, Fleckenstein, and de Laurentis have demonstrated how women’s bodies are constructed through the (re) telling of rape stories, arguing for a focus on the “sociological, political, and material forces that facilitate and sustain rape” (Hesford 196) as well as ways to read these narratives that “do not erase the materiality of violence and trauma by turning corporeal bodies into texts” (Fleckenstein 193). In addition, Nancy Welch’s and Lillian Brannon’s work has kept us attentive to rhetoric’s democratic function, helping us find ways to collaboratively resist an ever-encroaching neoliberal ideology that threatens our very notions of public space, public discourse, and public education. Welch’s argument that “[p]eople *take* and *make* space in acts that are simultaneously verbal and physical”(477, emphasis in original) highlights the embodied nature of rhetoric, the continued

production and co-production of discursive-material space, and the affordances of physical bodies that can compose collective resistance.

Further theorizing how bodies align, move, and reposition themselves in response to emotional intensities, Lynn Worsham argues that emotions are the sticky stuff that binds bodies together—“a right braid of affect and judgement, socially and historically constructed and bodily lived, through which the symbolic takes hold of and binds the individual, in complex and contradictory ways, to the social order and its structure of meanings” (216). Scholarly attention to the intersections of embodied emotion studies and writing studies is evidenced in Micciche and Jacobs’s collection *A Way to Move: Rhetorics of Emotion & Composition Studies*, which explores the materialization of emotion in the body and its role in producing new material configurations in the individual, social, and disciplinary body. The materiality of emotions in writing studies has also been taken up by writing center scholars such as Nicole Caswell, Jackie Grutsch McKinney, and Rebecca Jackson as well as by writing and race-studies scholar Carmen Kynard, producing new understandings of how emotions shape our working lives and responding practices, unveiling a host of anxieties and pleasures that structure our work in writing studies.

Queer scholars, disability scholars, and queer crip scholars in writing studies—William Banks, Jonathan Alexander and David Wallace, Jonathan Alexander and Jackie Rhodes, Jay Dolmage, and Robert McRuer—have advanced these concerns about the relationship of bodies, desires, and texts, looking at how heteronormativity operates to “straighten” the body and regulate desire through the acts of composing. Banks (2003) argues that our fetishization of the academic essay has marginalized personal writing in composition courses, writing which should be rethought as both embodied and critical. He writes, “when we ignore the ‘embodied’ in discourse, we miss the ways in which liberation is always both social and individual, a truly symbiotic relationship” (22). Similarly, Jay Dolmage, a disability scholar, argues that academic and professional writing normalizes the bodies of writers as they learn to compose texts that resemble and reinscribe the proper dimensions of the able-bodied male, a claim that queer crip scholar Robert McRuer also makes. In 2009, Alexander and Wallace traced the enfolding of

queerness into the field, noting that early queer scholarship focused on confronting homophobia, as well as making queer bodies and texts more apparent in the classroom, and urges us to take up queer theory as a way of “embracing the power of the queer to question, interrogate, and perhaps even unseat heteronormativity in rhetoric and composition” (W317). They point to queer theory’s potential for reorienting material practices in the field towards other ways of knowing and being that substantially engage sexual difference. Rhodes and Alexander continue to explore the disruptive potential of alternative sexualities rendered through alternative media to unmake categories of normal and to queer both genre and form. They ask the field to cultivate a receptivity that will allow us to consider, “What kinds of representational acts figured multimodally and through multimedia contribute substantively and *materially* to understanding queerness in rich, varied, capacious, and (perhaps most importantly) challenging ways?” (“Queerness,” 200, emphasis added). Here, Rhodes and Alexander also consider the production of digital bodies, exploring the ways in which technology, sexuality, and identity are composed and circulated on the web.

Not *just* a concern for queer and disability scholars, the changes in text production and circulation ushered in via web-mediated tools and connectivities have captured the field’s attention over the last twenty years as we worked to understand the materiality of digital texts and the ways those texts shape readers and writers. James Porter has argued for a revival of Aristotle’s 5th cannon of delivery in contemporary writing studies pedagogies, prompting us to pay attention to the ways we construct bodies and identities, think through distribution and circulation, provide for access and accessibility, as well as to anticipate user interaction and the economic entanglements of copyright and intellectual property rights when we compose for the web. Welch and Scott argue similar lines, noting that we’ve become too obsessed with the sexy style and delivery of web texts, ushering in a “technological fetishism” (568) that reinscribes a neo-Aristotelian focus on texts that obscures both histories and contexts. Instead, they argue, the field must continue to remain attuned to the social and material effects of texts so that we can “assess critically how a society’s story about itself has been composed, to glimpse competing and

excluded narratives” (574). Welch and Scott’s criticism illustrates the point I made in Chapter 1: multimodal rhetorics are too often taken up in self-referential ways which elide their materiality and movement across online and offline spaces.

Many digital rhetoricians and compositionists do, however, foreground the materiality of digital texts and the embodied material practices digital composers engage. Laura Gries, for example, develops a methodology for iconographic tracking of images across various web platforms, seeking to understand how images accrete meaning through their circulation and use patterns. Concerned with the ways authors can pre-empt and shape those post-production use patterns, Ridolfo and DeVoss ask digital composers to consider the rhetorical velocity of their texts—ways that others might remix and remake their compositions as part an ongoing delivery. Adam Banks’ *digital griot* is figured through the discursive-material practices of crate-digging, mixing or mashing up discourses and tracks, and scratching or scrubbing as a means of disrupting sound and creating new rhythms that move African American communities through hip hop. Susan Delagrange invokes Joseph Cornell’s glass-enclosed shadow boxes as thinking tools for digital compositionists, considering the ways that the curation of objects forces new ways of seeing and ordering the world, transgressing pre-given taxonomies through the embodied act of seeing and re-seeing bodies relationally. Similarly, in *Remixing Composition: A History of Multimodal Writing Pedagogy*, Jason Palmeri urges compositionists to reclaim a usable past, one that was never composed only in words but instead littered with queer materialities always already available for composing a composition of one’s own.

As Palmeri’s history evidences, it is important to bear in mind that the material concerns often linked in scholarship to digitality (or its shadow twin multimodality) such as remix, rhetorical velocity, and hypertext are not essential qualities of the “digital” and are pre-figured in a host of other non-digital compositions and ways of composing. As noted earlier, Vicki Tolar Collins, working with late 18th-century feminist writings, identified accretion patterns indicative of the rhetorical velocity of feminist writings, patterns that can be traced with attention to the material aspects of composing, circulation, and delivery. In *Rhetorical Delivery as Technological*

Discourse, Ben McCorkle follows the materiality of various historical and contemporary media interfaces—the illuminated manuscript, the printed book, the radio, television, and “pages” for the web—analyzing the ways that newer forms of media contain traces of older media’s materiality, casting old and new media in synergistic material relationships. Similarly, Angela Haas argues that the material-discursive activity of wampum beading and weaving employs hypertextual practices that “have extended human memories of inherited knowledges through interconnected, nonlinear designs and associative storage and retrieval methods—long before the ‘dis-covery’ of Western hypertext” (77). Haas reminds us that even the word “digital” has been colonized, invested with associations that invoke white, western, hegemonic, neoliberal associations with computers, but there are other ways and other traditions in which to figure “digital”:

All writing is digital—*digi- talis* in Latin, which typically denotes “of or relating to the fingers or toes” or a “coding of information.” Given this, we should be reminded of writing known to us through history that was executed with the use fingers and codes—from the Mesopotamian Cuneiform, to the Egyptian and Mayan hieroglyphs, to the Chinese logograms, to the Aztec codices, wampum belts, and Western hypertexts. (242)

Her work, in line with other cultural rhetorics scholars, such as Malea Powell, Qwo-Li Driskill, Andrea Mukavetz, and Marlilee Brooks-Gillies, underscores the importance of considering the specific material configurations of a variety of meaning-making practices—those that involve quahog clam shells, river cane, talking circles, and yarn—in addition to those that involve silicon chips, silica sand, gold, and iron ore.

So while this rehearsal of the ways writing studies has taken up materiality is necessarily abbreviated, it underscores the continued scholarly trajectories that Selzer and Crowley identified and called for in 1999: attention divided across the concerns of human embodiment, concerns of production, delivery, and circulation of texts, and the intersectionality of embodiment and composition/post-composition, particularly from feminist and queer scholars in the field. Next, I’ll outline writing studies’ flirtation with *new materialisms*, particularly Actor Network Theory (ANT),² and I’ll demonstrate here what Chimamanda Ngozi Adichie calls “the danger of a single

story” as the field’s preoccupation with Latourian logics has created heteronormative approaches to understanding the material bodies composing and being composed through sense-making networks.

Flirting With New Materialisms in Writing Studies

More recently, writing studies scholars have begun to play with particular strains of *new materialism* considering rhetorical practice that is nonhuman, nonsymbolic, and non-discursive. This is serious play as it forces writing studies to (re)consider what might matter to the proper study of rhetoric in the 21st century and how meaning might be ordered beyond the “human social structure” (Bennett, xvi). According to Laura Micciche, whose recent essay in *College English* opens a broader conversation about the uptake of New Materialism for writing studies, the term “new materialism” is “a capacious enough naming to account for various movements aimed at foregrounding a relational ontology among bodies: ecosocial theories, material feminism, affect theory, complexity theory, digital humanities, animal studies, and actor-network theory” (489). A renewed interest in ontology echoes rhetorical concerns taken up in the classical era as we (re)consider not only what it means to know, but rather the relationships among being, knowing, and acting ethically.

The acknowledgment that non-human bodies have the capacity to make things happen, to act as agents, is perhaps one of new materialisms’s most subversive ideas. This expanded notion of agency is attributed to Bruno Latour who outlined an approach to socio-technical research called Actor Network Theory. In Actor Network Theory (ANT), Latour defines *actants* as symbolically-saturated individuals or collectives, human or non-human bodies, ideologies or constructs, even other networks that make things happen *unintentionally and noncasually*. Actants, Latour argues, leave traces in networks. Latour argues that objects are central to the movement of our social systems and map the ever-growing relationality of networks as they gather up actants, both human and non-, into a “net” to accomplish its “work.” Constructed in conjunction with Michel Callon and John Law, ANT is a conceptual framework first employed to

understand who and what gets made in the practice of science. Born from a dissatisfaction with sociological methodologies and methods which have historically sought to uncover the structures that order the social world, ANT rejects order from without, and seeks to embrace the chaotic nature of materialization by following the active behaviors or “tracings” of actants in a network. In an attempt to articulate the profound interiority of all networks, Latour writes, “[A]NT is not about traced networks but about a network-tracing activity” (“On,” 67), underscoring the notion that those who trace networks (researchers such as myself) are also being traced by the network as it gathers up human and non-human bodies.

ANT does not account for distinctions between subjectivity and objectivity, positions traditionally vested with more or less agency in a system. Instead, ANT is a method that works to “flatten” micro- and macro-processes of *how things come to be* by putting them into conversation with each other. Instead of creating hierarchical structures of meaning, ANT allows those interested in meaning-making to consider the movement and proximity of all nodes—things, bodies, discourses, place—on an infinite plane. In *Intensive Science and Virtual Philosophy*, Manuel DeLanda follows Latour, positing that top down structures that work to explain systemic relationships elide the critical importance all actants in a system. Through flattening, DeLanda argues, we can finally give non-human actants their due attention. In other words, we can understand a host of “others”² in our writing networks *not* as “tools” or “materials” only made interesting through human use, but as actants who co-compose the composing network.

While we tend to think about theories as ways of explaining phenomena, Latour notes that AT, is not an explanation of *how* activity happens. He writes, “In itself AT³ is not a theory of action no more than cartography is a theory on the shape of coasts lines [sic] and deep sea ridges; it just qualifies what the observer should suppose in order for the coast lines to be recorded in their fine fractal patterns” (“On,” 9, emphasis is original). Instead, ANT is a rough method for following activity and is useful for those of us interested in documenting how networks connect,

² I use “others” here not to remind readers of the human and non-human bodies in this network. It is important to remember the agentive potentiality of tools, objects, technologies, microbes, and a host other non-visible, non-apparent others that co-composed this making network.

³ ANT is the Americanized Actor Network Theory. Latour himself hyphenates Actor-Network Theory and thus refers to it as AT.

assemble, and materialize matter and meaning. As a review of research in writing studies demonstrates, it has been useful for scholars seeking to understand the ontological processes of becoming, whether we are interested in the becomings of a writer, the becomings of a text, the becomings of rhetorical practice, the becomings of an object, or the becomings of a network.

Arguing for why Latourian logics are so important for writing studies, Nathaniel River and Paul Lynch assert that Latour offers us a way to move beyond the rhetorical trap of representation, one that continues to haunt the field. Quoting Raul Sanchez, River and Lynch proffer that there is “more beyond the veil of language” (6), structures of meaning that act beyond discursive meaning making practice (6). To embrace a more capacious understanding of rhetoric, then, River and Lynch prompt scholarship that moves beyond this veil, scholarship that “commit[s] to seeing things through, to go all the way in following the networks” (6). Instead of constructing writing as a tool that represents the work of the world, River and Lynch argue that Latour’s notion of “composition” allows us to participate in both unmaking and remaking the world, a notion that Lynch further explains in “Composition’s New Thing: Bruno Latour and the Apocalyptic Turn.” There, Lynch points to the world-making value of the logics from Latour’s “Compositionist Manifesto,” in which the author asks for a commitment beyond unmaking the material conditions of the world through academic critique. Instead, Lynch implores us to vest composition with power to (re)make the material conditions of experience by ever-enlarging our networks of actants—releasing our disciplinary and academic controls so that composition can outgrow contemporary boundaries to include other kinds of objects, other kinds of bodies, other discourses, other life-worlds. As Latour himself writes, a new Composition “grants activity to the semiotic actors turning them into a new ontological hybrid, world making entities” (14). Figured as a savior for the failing project of Writing Studies, River and Lynch’s introduction positions Latour as a figure who grants us access to the material nature of writing and of meaning-making; it is through his body (of work) that we might understand the interaction between the signs and the things.

The authors featured in River and Lynch’s collection take up Latourian logics of non-

human agency and world-making potentiality in a multiplicity of ways. While these authors refigure what matters for proper study of writing, taking up thorny issues such as context (Rickert), object circulation (Gries), and digital memory (Tirrell), the essays in the collection fail to contribute substantially to a rematerialization of classroom practice. In other words, they don't propose that we substantially alter the teaching of writing, nor do they reimagine who makes or what gets made in writing studies classrooms. While Casey Boyle argues that we should think about research as the process of tracing arguments that build cases, as opposed to claims, and Marilyn Cooper argues for teachers to embrace a notion of writing as truth-building, rather than truth-representing, the work of these chapters does little to follow networks beyond the objects that can easily be (re)cognized and (re)signified as "texts" whose meaning is (re)encoded in the triadic representational terms of knower-known-representation. This failure is, I think, attributed more directly to the historical constraints of writing studies with its focus on alphabetic text production than to Latour's construction of ANT. In fact, Latour writes:

What happens when a circulating object leaves the boundary of a text? The traditional answer is that there is a yawning gap in between the text and the context. At the interface a dramatic trial is supposed to abruptly intervene through which the circulating object is assessed either by checking its referential fit or its social interest. Not for AT which does not believe in this distinction since it has extended meaning productions to all productions. ("On," 15)

In other words, in writing studies, when we take up objects that don't fit into the frame of texts, we still attempt to deny enfolded and knowledge-making potential of a body materializing before us. We work instead to reframe that object into a discursive sign that signifies and represents in ways that we can understand through hermeneutic study.

Perhaps more troubling for the impact of this collection is Lynch and Rivers' confession that "thinking with Latour" has resulted in a particular kind of scholarly lacuna: a failure to proportionally attract and include scholars of color and women among its contributors. Lynch and Rivers note the failure to attract these bodies is a failure more broadly for the collection to compose both race and gender. To their confessional, I'll add, there is a failure to account for

or trace the marking of difference in networks, including, but not limited to, assemblages of sexuality, (dis)ability, ethnicity and their intersections. As such, Latour's uptake in the field of writing studies has failed to help us understand how power operates in networks through the marking of boundaries that create difference. In fact, the collection itself largely attracted white male scholars who use Latourian/DeLandaian logics to justify the "flattening" of bodies and thus reject the politics of difference. So while for Latour and Delanda, all bodies matter, we are left without ways to account for the unequal distribution of power through particular kinds fleshed and non-fleshed bodies. ANT, then, focuses more on the material power of the network itself than the bodies/nodes that it creates, marks, and works in/through.

This trend is perhaps most evident in writing studies' uptake of another strand of new materialist thinking: Object Oriented Ontologies (OOO). As an iteration of speculative realism, OOO rejects a simple correlation between cognition and existence. It posits that people and their experiences and relations are no more important than objects and their experiences and relations and breaks a causal link between being and knowing (Bryant, Srnicek, and Graham). Despite criticism from Herndl and Graham who argue that OOO has little value for the field of writing studies, calling it is a largely a-rhetorical theory, wrapped up in a "ludic postmodernism," (51) others like Alex Reid, Scott Barnett, Casey Boyle, Nathaniel Rivers, Thomas Rickert, and Sid Dobrin have found OOO to be a useful lens for thinking through new approaches to gaming studies, composition studies, and ambient rhetorics. Similarly, Ian Bogost's *Alien Phenomenology: What It's Like to Be a Thing* attempts to put OOO into practice in service of a rhetoric of things—to use anthropomorphism *counter-intuitively* as a way to move beyond our limited understanding of being as *human* being. The tricky part, Bogost explains, is that things have a nearly unintelligible way of knowing, being, and relating in the world. So while we've mapped out ideas about human experience and relations through post-colonialism, feminism, and queer and critical race theory, we've not seriously considered what it's like *to be a thing*. Unlike other strains of phenomenology like Edmund Husserl's that ask, "What does the object make of me?", OOO, in its most recent instantiation a la Bogost, seems to say, "Get over yourself. No one

cares. What does the object make of itself and other objects in its sphere? And how do we figure that out?" In discussing his preference for leaving behind the critical theory and the regimes of knowledge it has produced, Bogost quotes Nick Srnicek:

Do we really need another analysis of how a cultural representation does symbolic violence to a marginal group? This is not to say that this work has been useless, just that it's become repetitive. In light of all that speculative realism provides the best means for creative work to be done, and it provides genuine excitement that there are new argumentative realms to explore. (132)

For Srnicek and Bogost, OOO proposes a challenge to feminism and other critical theories because philosophies of being, in their interpretation, don't address questions about the worldly baggage of identity politics. In his critique of critical theory, Bogost argues that theoretical discourse endlessly linked to other theoretical discourses creates "daisy chains" (81) of theory that are removed from the realities of things and objects in the world. In other words, he seems to say the humanities are drowning in the production of words about people. But instead of taking up concerns with embodiment in a new materialist paradigm, Bogost chooses to focus on bodies without flesh and forward a rhetoric of objects. With a focus on the exploration of things, their thing-iness, and thingy relations, Bogost gestures towards a way to make rhetoric great again. He calls us to explore the lives of objects as a new frontier for writing studies.

In this call to object-iveness, I hear resounding notes of manifest destiny, of colonization, and of both discursive and physical violence to the enfleshed bodies who are also actants in composition networks. Angela Hass and other decolonial feminists argue that colonial metaphors implicitly invoke harm as they call on an indigenous history of violence, rape, and pillage which occurs at the site of a border ("Towards"). Laura Micciche makes a similar claim against Sid Dobrin's work, citing the erasure of bodies when we erase the human actants in composition. She writes, that these scholars, "substitute talk of bodies, identities, and differences with the materiality of texts. In the grips of this approach, writing becomes an effect of tools and technologies, an activity that is unteachable, a ghostly production, and the province of theory and men... (491)." To deny the "reality" of discursive practices, as Bogost does, or the presence of

human bodies, as Dobrin does, it to reify metaphysical distinctions between the social world and the material world and between the human and the non-human world. These binaries do little to help us understand the intra-activity of different kinds of bodies, with and without flesh, that co-compose a composition network.

Technofeminist scholars like Donna Haraway, Judy Wajcman, and Katherine Hayles have long rejected this binary either/or way of considering enfleshed and non-fleshed bodies. In fact, these scholars consider how objects and bodies fuse to create cyborg bodies. Cyborg bodies reject simple classifications as they are neither fully human nor fully machine. Instead, cyborg bodies are choreographed concerts of organic and inorganic being. Haraway, Wajcman, and Hayles argue that cyborg bodies should not be feared as precursors to the end of humanity. Instead, they should be embraced as important interventions in a male-dominated understanding of technology and hu[man]ity. The cyborg, Haraway argues, has the potential to disrupt gendered hierarchies through a queer politics of pleasure and confusion. Ambiguity, then, is a productive state as we can never be quite sure where the human part begins or ends in a cyborg body.

Furthering this foundational work in technofeminism, queer/feminist new materialist scholars Karen Barad, Jane Bennett, Mel Y. Chen, Sara Ahmed, Jack Halberstam, Ann Cvetkovich, and Katherine Stewart work to complicate the taken-for-grantedness of objects as things that are stable, persistent, and unphased by the “worldly baggage” of social systems. They complicate human relationships with objects and demonstrate that there’s a cyborgian element to all of our becomings as cultural bodies because both enfleshed and non-fleshed bodies emerge from specific material phenomenon. These scholars show us how we might take up the study of rhetoric as a material-discursive phenomenon that acknowledges the performative nature of all matter. To approach a queer- and feminist-inflected new materialism, then, we must reject Bogost’s and Dobrin’s simple binaries and false choices about what might now matter and be exciting to the study of writing and rhetoric. My hope in outlining these theories toward a methodology for alternative composition spaces is that we can close the text/object gap that Latour references and focus on the movements of human and non-human bodies as well as the

affective currents that swirl around and through them.

WTF: Women, Trans, and Femmes Making New Materialist Theory

To touch [on] these countercurrents, I now articulate a new materialist framework that queers the study of composing networks. New materialisms shift our thinking about making and the processes of composition away from the particular concerns with discrete texts and discrete composing bodies. Instead, it focuses on ontological aspects of making and composing— theorizing how both meaning and matter, rhetoric and objects, bodies and identities emerge and reemerge intra-actively in composing networks. This paradigm includes the following five tenets, which I've parsed for intelligibility but whose animating power is in their intra-activity.

Tenet 1: Meaning and Matter

Meaning and matter emerge together, and with a new materialist orientation, writing studies scholars can study both. In the contemporary academy, it is normative practice for scholars in different disciplines to take up different kinds of questions, objects, and knowledge production practices. For example, scholars in the physical sciences have traditionally taken up questions around objects and their relations, questions like, “What are the properties of light?” or “Can crystal patterns repeat not only in space but also over time?” Scholars in the humanities, however, might ask, “Why do tropes of lightness and darkness appear differently across different cultures?” or “How might we best mitigate the impacts of mineral extraction and e-waste in Asia?” Because of academic siloing, scientists asking questions of “What, when, and how?” haven't traditionally engaged humanities scholars asking “Why and for whom?” And if these engagements do take place, they often take the form of humanities scholars reacting to scientific practices with questions of *meaning* being taken up after questions of *matter*.

Even inside our own discipline of writing studies, as I noted earlier in this chapter, we've seen an increasing divide between scholars who study object relations and those who study human relations. In the 2013 Computers and Writing (C&W) welcome address, Jill Morris

articulated the tensions between those who privileged objects and technologies and those who privileged individuals and cultures, arguing that the former had made the latter feel unwelcomed at the conference. She asked participants who thought that concerns of identity mattered to the study of writing and technology to make their beliefs visible by stamping their name tags with a multi-colored symbol. Despite keynotes that focused on disability rhetorics, critical race in the technology industry, and indigenous knowledges on the web, Morris' sentiment was echoed in 2014. Kristin Arola, acting conference chair, once again urged participants to cross-pollinate outside their focus areas and echo chambers to embrace the diversity of work in the community. Acknowledging the tensions, Jonathan Alexander prefaced his and Jacqueline Rhodes' 2013 presentation with the caveat that Sara Ahmed's work in queer phenomenology, scholarship which takes up the relations between objects and people, might be a bit disappointing for hard-core object-oriented ontology camp—if, in fact, any were in the audience.

Physicist and philosopher Karen Barad argues that this kind of siloing, across or even inside disciplines, is the wrong approach. Barad argues, "...the notion of consequences [of scientific research] is based on the wrong temporality: asking after potential consequences is too little, too late, because ethics of course, is being done right at the lab bench." In other words, we can't afford to ask retroactively of science and technology "Why?" or "For whom?" Those questions of ethical responsibility, the kinds of questions that humanists are good at asking and exploring, must inform and guide scientific and technological research practice. We must ask at the outset, even in our own discipline, *What kinds of bodies matter and how are we producing, reproducing, or failing to produce them there "on the bench," in the code, in our discipline?*

New materialists like Barad are interested in the concept of materialization as a process by which matter and discourse come to exist together over space and time. The term materialization underscores the corporeal and embodied dimension of being, and Barad often uses the phrase "*matter comes to matter*" (152) as a way of joining ontological concerns with epistemological and ethical concerns. This process is "entangled," meaning that objects, bodies, signs, and meanings cannot be bracketed off from one another. In *Meeting the Universe Halfway*,

Barad writes, “To be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack an independent self-contained existence. Existence is not an individual affair. Individuals do not preexist their interactions; rather, individuals emerge through and as part of their entangled intra-relating” (ix).

These assertions about meaning and matter and the entanglements of bodies underpin Barad’s theory of *agential realism*. As a rhetorical approach to becoming(s), agential realism refuses to ignore the production of difference. Instead, drawing on Foucault, Barad posits that materiality is regulated through exercises of power, and discursive practices are material structures that sanction what might be said, when, where, and by whom. Thus, meaning and matter are always already material *and* discursive. A material-discursive rhetoric, then, does not bracket off the things, the bodies, and the signs. It understands them to be co-productions of specific material encounters and works out their mutually constitutive effects.

For writing studies, this means that we don’t have make a false choice between meaning and matter. Instead, we can consider the entanglements of makers, making, and made objects, and maker discourses. We can examine how meaning and matter produce, reproduce, and fail to produce the fleshed and non-fleshed bodies in a composing network. For example, in Chapters 4 and 5, I examine the struggle that ensures around “making,” in the science literacy MOOC. I show how for some, making is an entrepreneurial endeavor. Inside this entrepreneurial frame, maker rhetorics surface the tools, objects, and bodies that have market value and can be easily commodified. On the other hand, the discourses of collectivity and collaboration that other participants engage materialize making practices and relationships. They construct makers as those who can empathize, share, and cooperate. Similarly, in Chapter 5, I consider who gets recognized as a maker in the high school makerspaces and how certain tools get coded as technical or non-technical based on their associations with particular kinds of users. These examples illustrate Barad’s point that all rhetoric is both material and discursive as discourse serves as the “cutting” mechanism for who and what comes to matter in a composing network.

Tenet 2: Lively Matter

All matter, is lively, agentic, and performative. Materialization operates from the premise that matter itself is alive with an animating potentiality. While Barad touches on this idea, Jane Bennett develops a comprehensive theory of “vibrant materiality” (viii). She argues that matter and materials are neither, instrumental, automated, nor teleological, as Descartes would have us believe. Instead, matter is always in a state of becoming, being figured and refigured performatively through its collision with other kinds of matter. Both Bennett and Barad reject anthropocentric, teleological, subject-oriented understandings of agency. They argue against an essentializing notion of what a body can do; instead, they argue, agency is the animating potentiality of matter. In other words, bodies can only “do” in conjunctive intra-action with other bodies. There is no singular act of agency in new materialist paradigms.

According to Bennett, a vibrant materiality includes “the capacity of things—edibles, commodities, storms, metals—not only to impede or block the will and designs of humans but also to act as quasi-agents or forces with trajectories, propensities, and tendencies of their own” (66). Borrowing from Driesch and Bergson, Bennett reclaims the creative force of matter while also rejecting the teleology of the organism and animating “ghost” or a disembodied “soul” as previously figured by Kant. Instead, she argues, matter needs no soul, no animating, “free floating” force. It is matter itself that acts, and it acts in unpredictable ways.

Bennett picks up on Deleuze and Guattari’s insistence on the aleatory or contingent nature of matter and rejects the humanist supposition that matter possesses a fixed or “adamantine ... a rock bottom reality” (58). For Bennett, all matter is the result of “emergent causality,” (33) meaning that production of matter that comes to matter (to use Barad’s term), has many possible shared and co-responsible causes. Becoming, existing, and mattering does not require an aggregating, active, hard drive or intentionality. Instead, these material-discursive processes require a kind of passive receptivity—a willingness to be spun, oriented, molded and shaped by a host of others.

In line with queer/feminist scholars Judith Butler, Donna Haraway, and Karen Barad,

Bennett argues for an understanding of matter and meaning as always in a state of *becoming*. Bennett explains these contingent processes of becoming through what she refers to as a “vortical logic” (119). This logic is not one of stasis but is instead predicated on endless movement. Bodies (human and non-) form, Bennett explains, through material-discursive crash encounters. Matter crystallizes temporarily into things and bodies, but those bodies reform and remix (if only ever so slightly) upon contact. Bennett writes:

It [materialization] is one vortical process, though it can be parsed theoretically into stages: first a “fall” or conative impulse of matter-energy, then an aleatory swerve that produces crash encounters between protean bits, then a stage of confused turbulence, then a congealment or crystallization of matter into bodies, then a decay, decline, and dissemination of the form. And finally: a new fall, a fresh serve, a different configuration of turbulent forces, another set of formations, a different rate and sequence of decay and decline. (119)

Bennett’s vortical logic of the ways bodies materialize underscores the instability of even the most rigid systems of control. Certainly, bodies, things, and rhetorics can and do persist, but Bennett’s notion of existence refutes teleological design and instead forwards an understanding of passive agency that results from being receptive to new kinds of material encounters and configurations. For Bennett and other new materialists, matter is not internally pre-programmed with a natural tendency to become a certain kind of thing with a final end state. Thus, we might think about material becoming as *enfolding* as opposed to *unfolding*. Enfolding signals an ongoing process of allowing—allowing oneself to be enveloped and to get swept into the fray. Inside the vortex, all matter becomes “entangled,” and humanist notions of rugged individualism and singular being and agency are impossible to support.

From this vortical logic, we can grasp the idea that we, as humans, are certainly a particular kind of material entanglement. We are different in the specificity of our composition, but not ontologically superior. And these entanglements—with a host of carbon and non-carbon-based bodies—shape our becoming, our being, and, our persist(exist)ence. As Mel Chen argues in *Animacies: Biopolitics, Racial Mattering, and Queer Affect*, a theory of vibrant materiality works toward a lateral, queer relationality among different kinds of bodies. Specifically, Chen, a

linguist by training, argues that Western rhetorics create and sustain heteronormative taxonomies and material relations between bodies. These material-discursive structures privilege humans-over-animals, animals-over-trees, trees-over-rocks and in our own human social spheres, white-over-black, men-over-women, straight-over-gay, and able-over-crip. To dissolve these racist, heteronormative, patriarchal, and ableist relations, Chen argues, we need a new understanding of animacy. She writes, “New materialisms are bringing back the inanimate into the fold of Aristotle’s animating principles, insisting that things generate multiplicities of meanings while they retain their ‘guttily’ materiality...” (5). When she refers to these animating principles, Chen is considering new actants and assemblies of agency in our meaning making systems—monkeys, molecules, toys—that have historically been left out of our understandings of rhetoric as the Quintilian art of man-speaking-well.

Thus, to queer the conventional terms of what we consider as part of our composing/compositional networks, we should take up queer animacy as a means of rethinking distinctions between the animate/inanimate while paying attention to the interanimation of all matter.

“Animacy” Chen writes, “is a specific kind of affective and material construct that is not only non-neutral in relation to animals and humans, and living and dead things, but is shaped by race and sexuality, mapping various biopolitical realizations of animacy in the contemporary culture of the United States” (5). Queer animacy permissions us to examine our embodied responses to bodies and things that are both similar to and different from our own and provides a rhetoric for speaking about our experiences with others in ways that elevate and honor all bodies in a sense-making network, not just those that are traditionally marked with power and privilege.

Writing studies needs Bennet and Chen’s theoretical approaches to unmake the trope of the rational, intentional, human composer that continues to hold sway in the field. All matter both composes and is composed, and we should stop thinking about the compositional process as a one-way street with composers masterfully molding materials from a fixed subject position. Instead, considerations of vibrant matter ask us to consider how objects act back on or compose the composers themselves—their bodies, their orientations, and their compositional horizons

of what's possible to (re)make. The concept of vibrant materiality is especially important in studying makerspaces. It prompts us to consider how the figure of the composer and the rhetorics around composition are disrupted by the materialization of new composing materials, tools, technologies, practices, places and bodies that are colliding and rematerializing in these networks.

In a new materialist paradigm, rhetorics of the body need not be confined to human or carbon-based bodies, and agency need not be the province of man who is animated by a soul and who acts with directed intentionality. New Materialists Diana Coole and Samantha Frost write,

an ..emphasis on corporeality [material embodiment of humans and nonhumans] further dislocates agency as a property of a discrete self-knowing subject inasmuch as the corpus is now recognized as exhibiting capacities that have significant effects on social and political situations. Thus bodies communicate with other bodies through their gesture and conduct to arouse visceral responses and prompt forms of judgement that do not necessarily pass through conscious awareness. (20)

Refuting long-held notions of liberal humanism and rational choice, new materialists trace how *meaning and matter* materialize over time and space during the embodied phenomenon of composition. Material forces are moving, creating, making, and unmaking; thus we might think of writers, makers, and composers as playful choreographers of materials. The most effective composers might not be those who make materials bend to their intentional will; they might, in fact, be those who are open to a diversity of material encounters. They might be those who are open to touching, feeling, giving, listening, writing, saying, doing, and undoing with a glut of others—both human and non.

Embracing vibrant materiality and granting animacy to a host of bodies also helps us better account for a multiplicity of causal explanations and implications of that action in a network. These theoretical approaches stop the blame game that can ensue amongst writing stakeholders because we come to understand that composing capacities, tendencies, capabilities, and orientations are not innate or essential; instead, they are the results of unstable, intra-active tendencies. Composers, texts, objects, writing programs, computer software,

classroom materials, are in perpetual, intra-active motion, and each body or thing is shaped by the friction of its encounters with the others. Through this lens, we might reconceptualize composer identities as always in-the-making and texts and objects as provisional and momentary arrangements *performing* instead of *being* any essential kind of thing that we can pin down, isolate, dissect, and assess. In our composing networks—whether they are maker networks or more traditional writing classroom or writing program networks—these scholars push us to reconsider contingency, passivity, and shared responsibility of materializing meaning and matter. We might begin to understand makers and made things, not by what they *are*, but by what they can do in concert with others.

As I demonstrate in Chapters 4 and 5, these maker networks illustrate a theory of composition-as-collision. At each site, a host of tools and materials, both digital and physical, a host of bodies, both human and non-, and a host of ideologies are at work composing and being composed by the maker networks. It is clear that these crash encounters are producing new kinds of texts, objects, and composers that don't fit neatly inside disciplinary boundaries nor inside academic or nonacademic composing paradigms. From the litany of things, to the production of identities, to the emergence of place in both digital and physical platforms, it is also clear that agency is not located in a single composing body but instead is distributed across a host of makers, tools, technologies, texts, and objects.

My intention in writing up each of the two case studies is to pay attention to this shared agency, noting how it moves and where it sticks in the network performances I observe. I work to describe the vibrant material collisions in each space and to show how the vortex gathers up particular kinds of matter and shakes it down into host bodies that matter. As you read, please remember that this is not how these makerspaces *are* nor can we predict how they *will be*. New composers, new economic pressures, new educational mandates, new materials, and new understandings gleaned from this research will enter and leave the fray. We can't know the kinds of affordances or constraints these new crash encounters might materialize.

Tenet 3: Networked Normativity

Composing networks are regulated by normative structures that dictate who and what gets made, who and what gets to make, and how much. Despite the open-ended, indeterminate possibility I discuss in tenet #2, there are material forces that work to close down possibilities in a network. Bennett refers to these forces as “suspensory powers” (72). Suspensory powers are material forces that exert pressure on the creative vortex and reproduce a sense of stasis. When things persist, we assume there is a period of inactivity, but this might be a false assumption. Perhaps certain material forces are continually being caught up in the vortex of materialization, appearing and reappearing in the crystallizations of bodies and things. Possibility, then, arises from the temporal and spatial openings between re-materialization. Discussing Bennett’s notion of suspensory controls, Mina Tomic writes,

The forms that emerged drew much focus on the small spaces in-between/the interstices, where surfaces of the same or the different materials would end and just before they meet. Jane Bennett speaks of the notion of negative gaps in the course of organic growth that acts by selectively “relaxing” its “suspensory power”, the intervals of space that serve only for the potential possibilities of becoming. Like in the spaces between building blocks that are never seen. (9)

This notion of negative gaps and in-between spaces points to a queer space of material agency—a space where the absence of coherence and form creates the potential for change. Yet, as Tomic notes, these spaces are difficult to perceive. In our attempts to synthesize the world, we learn to see things, objects, and people as whole and wholly finished. If the gaps, rough edges, and seams are apparent, we either look the other way or we try to fix them because they are worrisome, unusual, *abnormal*. It might be said that normativity works best when we turn away from the gaps.

Illustrating the idea of normativity as a kind of seamlessness, material media theorists Heather Horst and Daniel Miller discuss how digital tools and platforms are very quickly normalized and taken for granted by different cultural groups. They write,

...we have the impression of being immersed in some Brave New World that has washed

over us in a couple of decades...Yet perhaps the most astonishing feature of digital culture is not the speed of technical innovations, but rather the speed at which society takes all of them for granted and creates normative conditions for their use. Within a few months a new capacity is assumed to such a degree that, when it breaks down, we feel that we have lost both a basic human right and a valued prosthetic arm, and part of who we now are us humans. (107)

For Horst and Miller, seamlessness crosses digital and physical space as well as carbon and non-carbon-based bodies. Seamlessness, then, is that condition which affords normativity, and it is only when the seams show and the gaps are exposed that we come to see these logics of normativity in operation. For Horst and Miller, digital normativity includes the unquestioned use of digital tools in our daily lives. Yet following Selfe and Selfe, we know that a critical stance is necessary if we are to understand the materialization and normalization of digital interfaces. We must absolutely question who and what gets to make with digital tools, who and what gets made, and how much making is allowed for certain kinds of bodies. We need to interrogate networked normativity and better understand how normativity works as a suspensory control in digital and digitally-inflected networks.

In *The Promiscuity of Network Culture: Queer Theory and Digital Media*, Robert Payne explores networked normativity and the ways that it encourages certain kinds of material movements and discourages others. He considers the contradictions inherent in our contemporary network culture as digital users are both encouraged to enlarge their personal, civic, and professional networks in online spaces and simultaneously chastised for such “promiscuous” behaviors. Payne asks the provocative question, “Are we sluts?” (1) to explore the ways that cultural norms regulate and moderate digital circulation. In a post-viral era, Payne claims that intimacy is reframed as sharing and participation, and *who and what gets to share* as well as *how much* they are permissioned to share are controlled by the (hetero)normative structures of the network. Thus, bodies who “overshare” in a network are exceeding the bounds of acceptability and normativity allowed in that network. It’s important to note in this discussion of the regulatory power of networks that sharing and intimacy controls are differentially mediated for different kinds of bodies. In answer to the pivotal question, “Are we sluts?” Payne writes,

“Maybe so—but not in a bad way—at least not if you are white, straight, independent, and affluent” (2). If we want to find out what anxieties regulate the network, then, we can look for “bugs” or “glitches” in the system that prompt bodies to contain circulation. Payne refers to these phenomena as *exploits*: “An ‘exploit’ is a network anomaly that troubles and destabilizes the function of power from within, attacking the centralized location of power” (151). Thus, if we are interested in locating and identifying the regulatory powers of composing networks, we can look for these exploits that exceed the boundaries of acceptability and trace the anxieties that are produced when the wrong kind of bodies are shared too much.

Noting how digital network development takes place inside capitalist contexts and neoliberal ideologies, Payne argues that sharing is an entrepreneurial enterprise. Thus, “shares” can be easily commodified, privatized, and aggrandized like friends in a social network. Payne also draws connections between gay barebacking culture⁴ and Facebook’s goals of providing a frictionless sharing interface. Payne argues that sexual and digital rhetorics both follow a flawed barebacking logic as they wrongly foreword utopian visions of interactivity. This techno-sexual vision includes the promise of pure and unadulterated encounters. It propagates the image of bodies meeting other bodies with no prophylactic seams in between. In both gay barebacking and digital utopianism, there is a version of spectrality at work. In barebacking circles, there is the HIV virus that exists as a ghostly threat, and it can be tempted, challenged, or invoked through these high(er)-risk sexual behaviors. In digital circles, developers work to ghost the interface itself so that these barriers to digital touch fade from perception.

In these techno-sexual cases, a new materialists paradigm reminds us that viruses, interfaces, and bodies themselves are not ghosts. Instead, they are materials that matter, and they create drag. As Payne notes, bodies (human and non-) and parts of those bodies move at different paces—the self and the self, the self and other, the self and the collective, and the public and private. It is this differential of movement that produce the seams, gaps, and overlaps. And

⁴ “Barebacking” is a term that describes the practice of anal sex without the use of prophylactics. The term is commonly associated with gay men who intentionally chose not to use condoms when having sex with partners who may be infected with HIV. This behavior is often characterized as high-risk and refuses the ethics and commitments of the safe-sex movement.

it is both the negative space of the gap as well as the enfolding and doublings up that stimulate, please, and displease our bodies. A “frictionless sharing” then robs us of these rubbings and fails to take account of the ways that bodies create drag on each other and on the networks in which they move.

In *Queer Phenomenology: Orientations, Objects, Others*, Sara Ahmed helps us to understand the drag that queer bodies create in a system as they fail to march toward the right objects, the right bodies, and the sanctioned versions of success and happiness. Ahmed discusses identity work as the plotting of particular lines either inside or outside well-worn trajectories, trajectories that are created by the force of collective experience as heteronormative bodies trace lines and are traced by lines that will offer particular rewards, e.g., straightness, monogamy, marriage, procreation. These are the paths of least resistance that will return our investments in social capital, status, and security. Concerned with the experience of anomaly, Ahmed asks what happens when the bodies get in the way of normative network building, when they pursue queer objects whose trajectories skew the straight/normal lines of desire and the neoliberal flows that define digital networks in a late modern capitalist culture. She suggests that by pursuing queer objects, those that don't directly return our investments, we can begin to glimpse new “object horizons” that help us reorient toward “toward different worlds” (176).

Bennett, Payne and Ahmed, together, help to understand the normative rhetorical functions of digital networks. As I mentioned earlier in this chapter, scholars thinking with Latour are considering how objects circulate and accrete meaning through their circulation. To that thinking, we should begin to consider how circulation and movement are regulated and restricted through normative practices. By paying attention to the exploits—those objects, tools, ideas, and bodies, that circulate too much and/ or move the wrong way—we can locate and identify the regulatory powers of composing networks. The exploit exceeds the boundaries of acceptability and in doing so produces an anxiety (hysteria, perhaps) that throws the network's normative structures into relief.

To illustrate this concept, I'll discuss two composed objects that act as exploits in the

Remix, Remake, Curate in in Chapter 4. Both the *Eagorilla* and the *50-Foot Shark* press at the boundaries of acceptability in the science composing community. These are the *wrong* kinds of objects. They come to matter because they circulate too much and gather up too many people in the *wrong ways* of composing science. Similarly, in Chapter 5, I trace the movements of composing bodies through different makerspaces at the high school, paying attention to whose bodies glide freely through the maker network and whose don't. This is another instantiation of the network exploit as some bodies, what might be the considered the *wrong bodies*, are confined while others are permissioned, either implicitly or explicitly, to move and pick up academic, social, and technological capital along the way.

Tenet 4: Affective Networks

Affects drive networked materialization. They layer on and mark the human and non-human bodies in a network. Thus, the objects and bodies that we can see and touch are not the only movers in a network. Material affects are also circulating and making meaning with, through, and around bodies, objects, and practices. Affect, as Chen describes it, is “something not necessarily corporeal...it potentially engages many bodies at once, rather than (only) being contained as an emotion within a single body. Affect inheres in the capacity to affect and be affected” (11). Affects, then, are both public and distributed feelings, and they drive human and non-human actants in a network. Chen develops an “ontology of affect” (30) by drawing on both Bennett and Barad’s understandings of material and discursive mattering. Chen’s theory explains how certain bodies, particularly those at the top of linguistic hierarchies, have been granted capacity to effect change in networks while others with lower linguistic positionalities (non-white, non-male, sick or disabled persons, animals, and minerals like mercury or lead) have historically been thought incapable of effecting change. As I described in tenet #2, they lack the rhetorical power of animacy. Chen, however, argues that we need to acknowledge lively animacies beyond these restrictive discursive taxonomies and develop attentiveness to other kinds of affective meaning making and mattering.

Chen illustrates this ontology of affect in multiple locations—from the relata of her living room to intra-activity of race, geopolitics, toxins, childhood, and toys that led to the turn-of-the-century lead paint scare. First, she traces affectivity in her own material environment showing how her living room sofa becomes an object that is affectively layered and charged with meanings. Discussing her experiences of temporary disability, she illustrates how her sofa animates the environment by providing comfort, security, and pleasure for an aching and ailing body. Through this example, Chen asks us to pay attention to environmental intimacies and to the queer pleasure that comes from intimate relations with objects. Chen argues that these affectual relationships between people and things queer the material boundaries of animacy, and encourages us to dislodge the notion that only other humans, particularly normative humans, are able to effect meaning-making. By acknowledging animacy and embracing queer ontological intimacies, Chen argues that we become capable of other ways of being, knowing, and acting in concert with others in the world. She writes, “Thinking and feeling critically about animacy encourages opening to the senses of the world, receptivity, vulnerability” (237). This kind of affective awareness is not only about becoming aware of our own affecting and affected bodies but also about developing an awareness of how other bodies, both human and non-, come to affect and be affected by networked intra-activity. In a more sweeping example, Chen also marshals a multiplicity of human and non-human actants that were co-responsible for affective outrage during the mid 2000’s toy scare. During this time, white middle-class parents were frantic with worry that their children would be poisoned from ingesting lead paint used on toys imported from China. Our cultural assumptions that children were going to lick these toxic toys—which is a queer thing to do with objects of play—ended in a hysteria around child safety. Chen shows how the fear of “queer licking” (167) and the affect of hysteria was rooted in nationalist, racist, and heteronormative values inherent to America’s white middle class. The example also illustrates the ways that objects like lead and toys come to meaning and matter through the circulation of affect.

Affects like hysteria, fear, shame, surprise, interest, and pleasure orient human and non-

human bodies to and away from each other and create particular trajectories and movements—goings with and goings against—in a network. New Materialist scholars Katherine Stewart, Sara Ahmed, Ann Cvetkovich, Samantha Frost, and Jack Halberstam, in addition to Mel Chen, theorize this movement by considering the affective economies at work in materialization. Affective economies are networked phenomena that can account for how people experience emotion. Building on notions of intra-activity, Sara Ahmed writes, “feelings do not reside in subjects or objects, but are produced as effects of circulation” (“Affective Economies” 8), arguing that “emotions should not be regarded as psychological states, but as social and cultural practices” (“Affective Economies” 9).

So while affects don’t originate in any one body, they do “stick” (Ahmed, “Affective Economies” 120) to the surfaces of bodies and objects in a network. These sticky affects create “intensities and textures” (Ahmen, “Affective” 4) in relation to the material world that resist “definition, classification, or rationalization” (Stewart 3). In *Ordinary Affects*, Stewart writes,

The potential stored in ordinary things is a network of transfers and relays. Fleeting and amorphous, it lives as a residue or resonance in an emergent assemblage of disparate forms and realms of life. Yet it can be as palpable as a physical trace. Potentiality is a thing immanent to fragments of sensory experience and dreams of presence. A layer, or layering to the ordinary, it engenders attachments or systems of investment in the unfolding of things. (23)

Because they stick to corporeal surfaces and layer over time, affects impact a body’s rhetorical velocity. Rhetorical velocity, as a concept discussed earlier in this chapter, has thus far been figured in terms of textual movement. Here, I extend the concept to consider how other bodies—those of composers and composing objects—also move in a network. Since velocity implies both speed and direction, these affects can speed a body up, slow it down, and/or change its trajectory. Sara Ahmed also speaks to what I call the burden of rhetorical drag in “Feminist Killjoys and Other Willful Subjects.” She explores the trope of the “feminist killjoy” (65) who ruins the happiness and contentment of others by pointing out racism, sexism, xenophobia, nationalism, ageism, or able-bodiedness. By calling attention *to the problem*, the killjoy is

fingering *as the problem*. Feminist killjoys are then marked an affective stigma because they make others around them ill at ease. Similarly, in the *Cultural Politics of Emotion*, Ahmed argues that the attachment of fear to a particular body serves to restrict its movement. Her examples of this phenomenon include the surveillance of Muslim bodies who are monitored and impeded from boarding planes or entering other countries because of fear that they may be associated with terrorist networks.

Both Sara Ahmed and Ann Cvetkovich argue that this kind of affective drag can re-orient bodies and turn them towards others who band together through shared feelings. Ahmed advocates for identifying with and owning the moniker of Feminist Killjoy. We are well aware of the impact of anti-Muslim actions, like the 2017 travel bans ordered by President Trump, that turn Muslim bodies toward radical Islamic insurgency. Both are a kind of affective *going together* that creates a specific ontology of affect. Cvetkovich, too, argues that the experience of trauma, particularly sexual trauma, can create powerful affective relations. In *An Archive of Feelings: Trauma, Sexuality, and Lesbian Public Cultures*, Cvetkovich demonstrates how trauma, even the quotidian trauma of living as a lesbian in heteronormative cultures, can create citizenship in public or counter publics. She demonstrates how queer feelings such as love, loss, desire, shame, and fear gather up bodies, move them in queer trajectories, and materialize lesbian public networks.

Similarly, Ahmed, Halberstam, and Frost have taken up the agential power of queer affects. Further supporting the interstitial notions of agency that I discussed in tenet #3, Ahmed argues that fear is an affect that exists in between bodies, specifically in failed alignments between bodies (“Affective Economies” 128). Samantha Frost points to fear as the ultimate reminder that we are not autonomous individuals making rational choices in the world. Instead, because “[f]ear orients the subject in time, we see that fear is both a response to, and a disavowal of, the impossibility of self-sovereignty” (159). Fear, then, is a queer affect produced by realizations of our own limitations to act on others as well as uncomfortable realizations that we are co-dependent on a host of objects and others that we cannot completely control. To trace fear,

then, is to trace the ways that objects and bodies misalign and fail to move together toward other objects.

Halberstam, however, argues that failure shouldn't always be accompanied by the affective response of fear. In fact, failure might be a source of queer pleasure. In the *Queer Art of Failure*, Halberstam writes, "Failure is something queers do and have always done exceptionally well. ... In fact, if success requires so much effort [and is always already on someone else's terms, we might add], then maybe failure is easier in the long run and offers differing rewards" (3). For Halberstam, queer failure is not constructed as a necessary step toward achieving the right goals, but instead is figured as a re-orientation toward different goals and different ways of being. It's a movement that defies the straitening logic of normativity. Taken together, these scholars underscore the role that affects, particularly fear and failure, play in the emergence and re-emergence of networks. Thus, I argue that affective intensities, like Higgs-Boson particles, make compositional networks and the bodies produced in them stick together, pull apart, align and misalign. They are the emotional charges of matter that layer, bind, and dissolve.

Finally, I argue that affects also cause a "scaling up" as bodies and things not only hang together, but produce and reproduce hierarchies of power. I borrow the term "scale" from transliteracy scholarship (Stornaiuolo, Phillips, Nathan and Smith) that both acknowledges the role of affective sense-making and works to account for how power operates in composing networks. Scale allows researchers to consider how bodies in a network are already imbued with particular kinds of power and privilege and how those markers are reproduced inside the network. By paying attention to scale, we unflatten the singular dimensionality of other network theories and account for hierarchies of power and privilege that operate on and persist in composing networks. For example, as I noted in Chapter 1, some composing tools and technologies, particularly digital tools and materials, are imbued with power through their associations with masculinity and novelty, while other composing tools and materials associated with femininity, such as yarn and safety pins, are dismissed as incapable of doing the serious work of composition. To take up *scale* is to consider how these boundaries are drawn and how

difference operates in the production and reproduction of inequity in a network.

In Chapters 4 and 5, I will demonstrate how affects layer on particular bodies and objects in each of the two composing networks. Specifically, I'll consider the anxiety and rhetorical drag that is produced by digital tools like Twitter and Google Hangouts. Ironically, these platforms are meant to create "frictionless sharing" but instead they are layered with a host of frustrations that stem from affective fear of failure. I'll also demonstrate how "coolness" layers on objects and bodies that are associated with the 3D printer and how that layering enables more fluid movement of bodies and 3D printed objects in the pop-up makerspaces. Furthering this notion of rhetorical drag, I'll explore how composing tools like paint, paint brushes, glue, and decoupage are layered with multivalent affects—feelings of safety and a sense of belonging for users as well as traces failure that cause them to be dismissed as non-technological by others. In addition, I'll discuss the ways that Spheros, spherical-shaped robots, gather up a host of African American male students who use these robots to compete. These objects and affective responses to play and competition that they engendered both include and exclude. They prompt one African American female in the RoboHacker makerspace to contemplate a sphero of one's own.

Tenet 5: Touching as a Research Metaphor

Touching can be a better metaphor for research than looking. A new materialist framework for writing studies research and practice acknowledges that being and knowing are intra-active processes and researchers are always already part of a phenomenon of study. From a new materialist perspective, this means that the material presence of the researcher's body and the networks that have produced that body—such as the researcher's institution, their family and community networks, and the academic field or discipline with which they identify—rematerialize inside the phenomenon of study. Barad rejects an objective exteriority to knowing and being. Instead, she argues that we shouldn't conceptualize research as watching from a distance since the act of theory-building is always an embodied act. She writes, "knowing, thinking, measuring, theorizing, and observing are material practices of intra-acting within and

as part of the world” (90). Thus, she argues, we should change our metaphors for knowledge-making. “Touching,” she suggests, is a better metaphor than “looking” because *to touch* is also *to be touched*.

Similarly, *touching*, as both a physical act and the arousal of intense feelings, gestures to the unconscious and affective ways that we make meaning with and beyond discursive structures. Chen argues that language is material as it arises from specific bodies and encounters in the world; however, words and objects take on “affective valence[s]” (152) that go beyond triadic representations and signify in powerful, yet often imperceptible, ways. According to Chen, affective valence “subtends, exceeds, richly accompanies such otherwise mechanistic understandings of words, animals, and metals” (232). By paying attention to these affective valences, and their power to gather up and move material bodies, we can approach an affective understanding of persuasion, one that I draw on in the case studies I build in Chapters 4 and 5. While I work to make interpretations of data explicit in these chapters, the stories that I tell are often invested with “excessive” affective valencies, valencies that communicate my own interests, passions, and political commitments to “making” and these maker networks. At times, I point specifically to these valences, noting the exhaustion that accompanies the emotional labor of community-based research, as I do in Chapter 4, and the anger that arises when certain makers aren’t recognized by others as important, as I do in Chapter 5. More often, however, these valences exist alongside the words, partially perceptible in the ways the stories are arranged and crafted, more than in what is or isn’t written. As much as the explicit interpretation and discussion of findings in Chapters 4-6, these affective valences can, perhaps, persuade my readers that “making” has important implications for the field if we are attendant to issues of representation, access, and equity that are *both made visible and made-to-be felt* in the case studies.

In addition, by reworking research as “touching” instead of “examining,” we can also better understand compositional networks where makers engage in intimate material “hands-on” relationships. In addition, we are able to theorize making and composing *through embodied*

acts of making and composing as I'll demonstrate with my data analysis methods in Chapter 3. When we engage in similar meaning-making practices as those we are making knowledge with and about, we have the potential to build more reciprocal and powerful knowledge-making relationships. This stance is integral to the work of cultural rhetorics which advocates for knowledge-making activities that are deeply rooted in the specificities of place, time, and particular bodies. Reciprocity also affords the opportunity to build sociopolitical alliances for both theory-making and world-making. An embodied research practice is one that is accountable for and to a diversity of human and non-human bodies that it materializes and marks. Recalling the passage from T.S. Elliott's *Prufrock* that I began this chapter with, researchers who take up an embodied practice get caught up in the butt-ends of composing days and ways. They *feel* "the open mesh of possibilities, gaps, overlaps, lapses, and excesses of meaning" (Chen 72) that emerge from crash encounters of bodies, objects, places, tools, materials, rhetorics, and ideologies at work in any research phenomenon.

Taken together, these five tenets of a queer and feminist-inflected new materialist research methodology offer writing studies a more complex theoretical paradigm for approaching composing networks and theorizing how networks become *networkings*. By focusing on the performative nature of matter, orientation, embodiment, and queer affect, the methodology I've built in this chapter embraces the politics and processes of composing difference and reanimates network theories as critical and accountable to the host of bodies that produce and are produced by them. To complement this methodology, in Chapter 3, I'll work to outline embodied, playful, hands-on, maker-centered research methods that are culturally appropriate for these two maker networks. These methods that I develop and are iterated on by the maker participants themselves work to represent material-discursive entanglements and movement in/of the networks. They pay attention to the political ecologies of making as well as affective components of collaborative meaning-making. Finally, my analysis methods include the both/and practices of flattening and unflattening the entangled experiences of makers to account for distributed agency and the hierarchies of power that are produced and reproduced in the network.

CHAPTER 3: Maker-centered Methodologies: New Materialist Approaches to Research Design

In Chapter 1, I argued that makerspaces are important to writing studies because they sponsor alternative composing practices, materials, ideologies, and bodies. The study of these spaces can help us respond to calls to make our academic composing spaces more relevant, engaging, connected, accessible, and productive spaces for sponsoring composition as a world-making endeavor (Sirc; Shipka; Sheridan). Thus, writing studies scholars should pay attention to the material histories, structures, dimensions, embodied experiences, and impacts of *making* as practices of material-discursive composing. The idea of composing exceeds the boundaries of textual creation and requires material theories beyond those of multimodality. In Chapter 2, I outlined a genealogical history of *materiality* as it has been figured and re-figured in the field of writing studies and argued that *new materialisms*, specifically queer- and feminist-inflected new materialisms, can provide a framework for reconstituting writing matter and materiality as performative and intra-active. Taken together, these theories reconstitute who and what acts, makes, or composes in a network; account for the (hetero)normative and regulatory power of networks in late capitalist economic structures; offer an explanation of how affects circulate in networks, accelerating and impeding normative flows; and bind the rhetorical practices of being, knowing, and acting together as mutually constitutive meaning-making practices. New Materialisms are significant to the field of writing studies as they undo the figure of the individual composer who can supposedly understand and master essential qualities or characteristics of a composing tool, material, or discourse, and turn our attention to the affective capacity and potentiality inherent in networked constellations of bodies-tools-places-materials-practices that compose, decompose, and recompose composing networks.

In this chapter, I outline research methods that complement these queer and feminist-inflected understandings of new materialism. I develop maker-centered approaches to data collection and data analysis that both recognize and contribute to the development of a *maker ethos* in alternative composing networks. In this chapter, I outline that *maker ethos*, and I argue

that through a new materialist lens, we can create research methods that honor and support makers' ways of being, knowing, doing, and making meaning. Next, I outline how game play can serve as a research methodology for making and remaking the dominant logics of research relationships by queering the proper intimacies and objects of research. Then, I describe the limitations of traditional qualitative data collection methods and introduce the origami fortune-teller game that research participants in my studies both made and played with as the primary means of surfacing data about their material experiences in maker networks. I describe my own affective history of play with the origami fortune-teller and argue that this data collection instrument is a feminist technology and a queer research object that can reorient research relationships. Finally, I discuss the practices of coding data garnered from these playful artifacts and share how I both flattened and unflattened data collected in these fortune-tellers and experience narratives. This method allows me to build three-dimensional data models from foam board, yarn, crafter's pins, and paper, non-digital composing tools that re-present and re-materialize maker networks through feminist craft practice. Taken together, these data collection and analysis methods gesture towards a queer material-discursive research practice for tracing networked meaning-making.

Research Methods that Foster Queer Orientations In and Toward Maker Networks

Makerspaces and the bodies that animate them tend to be oriented more toward intentions than outcomes (Honey and Kanter; Martin), playful and political engagements with materiality (Rogers; Buck, Condis, Prins, Brooks-Gillies, Webber), a diversification of production pathways (Sherrill; Crichton & Carter), and the productive power of failure (Halberstam; Juul). By favoring intentions over outcomes, makers reject notions of success that are often codified in goals or outcomes statements. Instead, they follow individual or shared interests, projects, passions, practices, materials, questions, or curiosities. As Banks and West-Puckett argue, a preference for intention over outcomes means that makers "orient themselves toward lateral trajectories without pre-conceived outcomes, being okay with not knowing how, if, or where ...

[they] might ‘come out.’” When orienting away from preconceived outcomes, makers then, can adopt *play* as an orientation toward composing.

According to Robert Farné in “For the Phenomenology of Play,” *play* characterizes the two fundamental guidelines which are at the basis of education: the spontaneous and natural direction on the one side, and the intentional one on the other side (169). Farné notes that in academic spaces, goal-directed composing activity matter most. This, I argue, is the legacy of liberal humanism as we work to train up the rational, choice-making capacity of agentic composers. Play, however, focuses our attention on the unexpected, the aleatory potentiality of bodies and materialities that intra-act. Thus, play is a transgressive orientation that threatens the neat packaging and pacing of learning in schools, learning that has been modeled over the last century on post-Fordist and Taylorist production logics (Prins 62; Henry 202). Play, as composing orientation, fractures the linearity of composing lock-step through pre-defined processes, such as *the* writing process, and instead acknowledges the infinite diversity of meaning-making, composing, and production pathways that can emerge from these crash-composing encounters when the suspensory controls of composing networks are relaxed. Finally, as makers orient toward play, they also orient away from heteronormative notions of failure that mark failure as a shortcoming of a body or of a body’s performance in a system. Instead, as Halberstam notes, the failure of queer bodies specifically to signify monolithically in a heteronormative network isn’t a failure of the body but a failure of the system. Those who identify as makers, it seems, are working to change the terms from someone else’s to their own; this act of resignification may only be possible by embracing failure as a way of rejecting the normative logics of regulatory networks. Finally, as Gee notes in *What Video Games Have to Teach Us About Learning*, failure is also a necessary condition of play. When gamers play new computer games, they do not expect to win or even necessarily to be successful the first time. Instead, they need to learn the game itself, the expectations, the types of resistance it provides to players, the language, and the objectives. Games that are too easy are often dismissed quickly by gamers. However, in school settings, where the emphasis seems to be more on a grade and what

it will mark in terms of success during and after school, it's hard to encourage the productive failure of play. This has been discussed at length in the computer and writing community as well as in education and learning sciences scholarship.

To study maker networks in culturally appropriate ways, then, we need methods that complement and sustain a maker ethos. Thus, the research methods that I designed to capture the experiences of makers in two academic-adjacent composing networks build on both John Law's and Caroline Dadas's commitments to "messy methods." Dadas's articulation of what we mean by "mess" builds on John Law's assertion that "messy methods" enact "an exaggerated expansion of what we think is possible when it comes to our methods for recording data that are always, from a post-structuralist perspective, in flux..." (63). This notion of dynamism that both Law and Dadas conjure fits well with a commitment to vibrant materiality that I explained in Chapter 2. Messy methods, like the forces of meaning and mattering, are always on the move, following the aleatory swerves and falls and momentary composition of bodies (Bennett; Barad) in any research phenomenon. I embrace the notion of "messy methods" in order to outline a queer new materialist approach to research design and research methods that focuses attention on the five interrelated tenets of new materialism that I outlined in Chapter 2. Thus, a queer new materialist research design

- works to trace the network (not the individual text, tool, or composer) as the unit of study—mapping "lively" intra-active assemblages of human and non-human bodies (Coole and Frost; Hayles; Munster);
- acknowledges that the creation of networked nodes are always *in flux*, being formed and reformed from the crash encounters of material impact;
- seeks to define the normative structures that regulate networks, limiting their aleatory potential to form and re-form nodes or bodies in the network;
- identifies the "exploits" (Payne 151) in the network that circulate too little or too much, destabilizing regulatory controls that constrain the potential for new aleatory configurations;

- traces the affective economies and structures of feeling that are woven through acts of making, crafting, and composing (Stewart and Cvetovich), accounting for affective pulses and flows that circulate in and around and “stick” (Ahmed, “Affective”) to certain networked bodies;
- queers “proper” objectivist intimacies and relations among research bodies (Chen; Payne);
- rejects ready-made research methods so that all parties can co-construct participatory practices in culturally appropriate ways across the assumed expert/novice divide.

While calls for more feminist, participatory, and embodied ways of making meaning in writing studies are not new (Nickoson and Sheridan; Alcoff; Kirsch and Sullivan; Seltzer and Crowley), there is a dearth of scholarship on queer method/ologies for writing studies (Dadas, Banks, and Cox), particularly queer method/ologies that actively pursue a new materialist approach to meaning-and-matter as well as to theory-and-practice materializing together. This queer new materialist approach to research design and research methods blurs distinct boundaries between methods and methodologies, answering Nickoson and Sheridan’s call in *Writing Studies Research and Practice* to acknowledge the entanglements of theory and practice as well as those of mind and body. These divides between methodologies and methods carry over from empirical/objectivist ways of making meaning that continue to dominate research and knowledge-making practices in the social sciences. Queer Materialist research approaches, however, refuse to construct impermeable boundaries between *theory making* and *theory doing*. They participate in queer/feminist making, crafting, and activist traditions which maintain that theory is not abstraction; it is an embodied, material, relational way of knowing, doing, being, and acting with others to create and inhabit space (Roberts; Rogers; Tiainen, Kontturi, and Hongisto).

To approach a mind/body research practice then, we might refuse notions of mastery and objectivist knowability. Instead, we might *feel* “the open mesh of possibilities, gaps, overlaps, lapses, and excesses of meaning” (Chen 72) that emerge from crash encounters of bodies, objects, places, tools, materials, rhetorics, and ideologies at work in any research phenomenon.

Thus, I use the word *feeling* as a means to communicate both the tactile sense of touch as well as affectual responses to emotions. Feeling plays a central role in my research methodology and methods as participants made and played with their data collection instruments by cutting, folding and creasing paper, sliding their fingers into the folded paper, and moving their hands to play the data collection game. During the process of game play, participants also materialized their feelings about making. Interestingly, the experience of feeling enabled participants to work across the gaps, lapses, and excesses of meaning in their maker narratives. Feeling and feelings, then, enabled makers to stitch together the contingent objects, places, tools, materials, and practices of making into coherent meaning-making.

Game Play that Relaxes Suspensory Power in Research Contexts

One way to enact playful, transgressive, queer methods in maker network research is to integrate games and gaming with research participants as a method of data collection. Games have the potential to underscore the dynamic nature of relationships in a given gaming phenomenon as players make and remake their identities based on new rules and structures, redistributions of material objects, and affective responses to the practices of game play. In each instantiation of game play, players refigure rules of play, their relationships, and thus their identities, suspending existing and often unnamed social rules and hierarchies existing outside of the game (Salen and Zimmerman; de Winter and Vie). In playful spaces, such as makerspaces, data collection and interpretation games can serve this democratizing function, creating more informal opportunities for unscripted sharing of experience data, addressing problems with disclosure that Selfe and Hawisher note are exacerbated by formal interview protocols that maintain a careful distance between interviewer and interviewee. In effect, these material practices of game play can transgress proper intimacies (Chen; Payne; Ahmed, *Queer*) that maintain clear distance and boundaries in a research setting, creating new opportunities for collaborative, collective, *queer* relationships and relational knowledge-making.

In addition, game play often produces an *excess* of emotion as we experience joy,

frustration, accomplishment, failure, and other structures of feeling as our positions to others change over the time and space of gameplay (Juul). As opposed to research method/ologies that ignore the affective components of research, valuing the “extreme usability” (Dilder 48) of discrete methods that privilege simplicity, efficiency, and error-free interaction, game play can approach two often overlooked features of usability—pleasure and memorability—acknowledging that structures of meaning can’t be divorced from structures of feeling (Cvetovich; Stewart), whether we explicitly acknowledge the connection in our research practices or not.

These dynamic, iterative, performative ways of becoming through game-play—fueled through affective engagements with other bodies and objects—emphasize the intra-activity of research contexts. Instead of notions of *inter-activity*, a concept that reinforces notions of status, separability, and individuality, Karen Barad describes intra-activity as a referential understanding of agency in which:

agency is a matter of intra-acting; it is an enactment, not something that someone or something has. It cannot be designated as an attribute of subjects or objects (as they do not preexist as such). It is the enactment of iterative changes to particular practices—iterative reconfigurings of topological manifolds of spacetime-matter relations—through the dynamics of intra-activity. (178)

Thus, we can come to understand agency in the research setting as a collective performance, one that infuses the research context with potential to make change as researchers, tools, and participants emerge and re-emerge in relation to one another. As the material apparatus of the game materializes in the scene, the dynamics are altered, and as Bennett notes, we witness an “aleatory swerve” (119) as bodies are refigured through their engagement with new materialities. Playful methods, then, can help us realize the goals of community-based participatory research as they work to suspend hierarchical logics and positionality as *participants* agree to become *players* who co-construct new relationalities and material structures for collaborative knowledge-making.

Traditional Methods, Traditional Data

When I first conceptualized this study, I knew that I would make use of some fairly traditional data from each research site that could help me understand large-scale networked production and meaning making; however, the limitations of this data prompted me to design an origami fortune-teller game play protocol that could capture the affective micro-relationships among makers and among makers and the other material dimensions of their making. These different kinds of data aren't "triangulated" as one might argue in an objectivist research paradigm. Instead, following a methodology that pays attention to *embodiment* and *orientation*, these different data sets orient me towards different kinds of knowledge-making as an embodied relationship of intra-acting with material data sets and their affordances and constraints. Before I describe these affordances and constraints, however, I want to provide a chart (see table 1) that reminds readers of the research sites and research participants and summarizes data sources and analysis methods that I will explain in detail in the next sections of this chapter.

Table 1

Research Design

	<i>Remix, Remake, Curate</i> Maker Network	<i>Pop Up and Make</i> Maker Network
Location	Hybrid: Online distributed community of makers whose facilitators also met for face-to-face planning retreats	Primarily face-to-face: Makerspaces operated as paracurricular programming a high-needs high school
Research Participants	2 museum scientists/educators, 4 spoken word poetry educators, 9 K-higher ed teachers	17 high school students participating in 3 of the school's makerspaces

Recruitment, Consent, Assent, and Anonymity (IRB documents available in Appendices A and B)

For private or privileged data, participants signed consent immediately prior to game play at face-to-face retreat in January 2016. Private and privileged data were disidentified.

Publically available data collected on the open web as part of the MOOC could not be disidentified. Participants understood that this work might be used as part of the study.

Students were recruited into the study based on participation in spaces during observations and teacher recommendations. Students under age 18 were individually provided with consent forms to take home for parent/guardian signatures. Students age 17 and under who returned signed consent forms also, along with students over 18, signed assent forms before opting into the origami data collection activities. All data collected at the high school was considered private and privileged and thus was disidentified.

Dates of Primary Data Collection

January-May 2016

May 2016

Primary Data Sources

Origami Fortune-Teller Data Sets, including:

- Fortune-tellers the participants made and labeled with places, tools, materials, people, and practices important to their making
- Game play logs
- Maker experience narratives resulting from game play

Origami Fortune-Teller Data Sets, including:

- Fortune-tellers the participants made and labeled with places, tools, materials, people, and practices important to their making
- Game play logs
- Maker experience narratives resulting from game play

Secondary Data Sources

- 2 Anonymous ASTC Interview Transcripts, one with poets and one with teachers
- Publically Available Content and Posts on Twitter, Google+, Google Hangouts, and Wordpress produced during the science literacy MOOC
- Grant applications, reports, and meeting notes
- Makerspace Observation Notes (including follow-up conversations with makerspace students and teachers)
- Publically Available Posts on Instagram and Twitter
- Grant applications, reports, and meeting notes

Data Analysis

- Qualitative Coding of Primary Data and Interview Transcripts
 - 3D Data Board of Primary Data
 - Google+ Analytics from Community Meter
 - Contextual information from other secondary data sets to build case studies
 - Qualitative Coding of Primary Data and Observation Notes
 - 3D Data Board of Primary Data
 - Contextual information from other secondary data sets to build case studies
-

For the *Remix, Remake, Curate* research, I collected two anonymous transcripts from interviews conducted by the Association of Science and Technology Centers program staff on March 19, 2016: one that contained responses from the participating spoken word poets and the other that documented responses from K-higher education classroom teachers. These interviews lasted approximately thirty minutes each and their purpose closely aligned with my own purpose in this study as interviewers asked questions about facilitators' experiences and elicited stories about what was significant to them personally and professionally in this work. Because the makers in the cMOOC network used social media tools such as Twitter, Google+, Wordpress, and Google Hangouts to connect, collaborate, and make public science, I also compared data

collected from the fortune-teller game with publicly available posts logged on these networks to address the research questions. In addition, I relied on grant applications and reports, as well as facilitator meeting notes to help build cases.

While the *Pop Up and Make* maker participants also used social media, specifically Instagram and Twitter, there was much less activity to mine from their digital forums. To create a third data set for this network, I conducted a total of ten hours of observation in three separate maker spaces over the month of May 2016, taking detailed observation notes in a dedicated journal. I collected 15 pages of notes, both before and after game play, and discussed these notes with makerspace participants and facilitators (both students and teachers), asking clarifying questions and gauging responses to patterns that emerged in the notes.

These data sources have been useful in providing a large-scale or flattened view of each network; however, the traditional methods held the data hostage—abstract, linear, flat. These data fell short in helping me explode the micro-relationships between makers, between makers and tools, between makers and places, and between makers and the practices of making—what I called, invoking T.S. Elliott, *the butt-ends of [composers] days and ways*. In new materialist language, these micro-relationships might be described as temporary entanglements produced by unexpected crash encounters. They have also been discussed in popular culture to describe the promiscuous practices of contemporary online dating. Columnist Richard Obert writes, “Micros are characterized by speed, novelty, intimacy, and excitement...It is similar to what people experience when they have an adrenaline rush based on a certain activity.” While Obert is most certainly describing “micros” as relationships between people, the concept can be enlarged to include non-human actors as well. To get at the micro-relationships, intensities, and entanglements of making in each of the two makerspaces, I needed a data collection technology that would prompt makers to reflect on the fleeting intimacies of making—those that might easily be dis/missed by third person observation and semi-structured interview. What I needed, then, was a way to explode traditional data collection methods through an entanglement of methods

and methodologies—one so interrelated as to be inextricable. Thus, I designed an origami fortune-teller game as collaborative data collection method/ology that foregrounds methodology more than it works to obscure it. The origami fortune-teller is a playful, promiscuous object that prompted its users to document and make-meaning about the micro-relationships that entangle bodies in a maker networks.

Practicing New Materialist Theory in the Research Setting

This origami fortune game was one born of my maker-centered relationships with the research participants, with my direct and tactile engagement with the materials, tools, and practices of the two maker networks, and with the theories of vibrant materiality I articulated in Chapter 2. As a participant in both of these maker networks, my relationship with participants was already figured as a co-participant and partner-in-the-making; thus, adopting a formal, institutional position in this research seemed to undercut interpersonal relationships I already had with the research participants. Similarly, the use of overly precise and ready-made research instruments like structured or even semi-structured interview questions or two-dimensional paper-based surveys also seemed an ill fit for these maker networks who had been working with messy three-dimensional composing tools and materials: globby DNA extracted from strawberries, hand-built double-helix poem structures that followed DNA's codone and anticodone base pairings, salt crystals grown on pipe-cleaners, 3D printers and pens, cubecraft paper toys, and, of course, paper folded into a wide array of origami figures. Finally, following Bogost, I was looking for a method of “carpentry” (93) that would build a philosophical object to enact the methodology of new materialisms. Specifically, I wanted to design a data collection instrument that played out the idea of ontology-as-*enfolding* rather than ontology-as-teleological-*unfolding*. As I described in Chapter 2, *enfolding*, following Deleuze, is the practice of becoming as matter boundlessly folds in on itself. Folding matter creates intricacies of difference out of which meaning and matter materialize. Playing with this idea, I decided to use a data collection instrument that could enfold makers' material experiences and unflatten the ontological plane. I

wanted participants to dwell in these folds and peaks of their making and materialize meaning and matter through the material logics and randomness of game play.

The origami fortune-teller was an object with a set of procedural rhetorics with which I was already familiar. As a pre-teen who grew up before the large-scale availability of home computers and internet-connected personal devices, I spent many afternoons and weekends with my girlfriends folding squares of paper into origami fortune-tellers, little toys that were often called “coochie catchers” at the time. On the triangular folds, we wrote the names of our future spouses, the brand names of cars we would drive, the number of children we would have, the places we might live, and the work we might do in the world to make a living. We would code this material object with the discourses that reproduced our young yet complex systems of desire. During each turn, our fingers slipped among the folds of the paper, we pushed and pulled along an imaginary Cartesian coordinate system, creating lines of possibility and potential horizons that remixed our present and future selves into bizarre constellations of object-oriented possibility. Through the processes of folding, we let the nodes on our pre-pubescent assemblages touch and rub against one another, smearing names written in colored markers, underscoring the permeability of boundaries, as we wrote down the names of boys (and occasionally girls to give the game a queer twist), objects, times, and places that could combine and recombine infinitely across the folds as we manipulated the fortune-telling machine. With this “silly object,” each turn was a first-person working of the material logics and created a strange assemblage of materialities through which we enacted our anxieties toward and desires for a future that was in-the-making. We knew even then that some lines would offer a host of (positive) returns, and we also pulsed with the possibilities of those that wouldn’t. We didn’t know that in Japan these paper fortune-teller were also known as Paku-Paku, which means roughly “gobble up,” but we could somehow feel that the present, the thereness of our presence as pre-teen girls, was imaginary, one that was under constant threat of being similarly “gobbled up.” We could feel the threat of an impending future whose course had been set through heteronormative and neoliberal lines of monogamy and marriage, representations of a solid middle class existence with a house, some

kids, and a luxury car to drive us to a 9-to-5 professional job.

Years later, I would learn that origami art was originally practiced by religious men as part of a ceremony; only later did it come to be associated with both women and children as Western cultures invested in the story of Sadako and the Thousand Cranes, a peacemaking practice that has been adopted primarily by women and children all over the world. For me, the practice of folding paper was lived as a feminine practice, as I remember the women's groups at my local church making paper cranes while the men stood outside and smoked. In my experience origami—more broadly and specifically the origami fortune-teller—embodied a feminized technology, girl-made and girl-powered, a thing *we made* to make meaning at the interstices of our material and discursive lives. Long before Bogost asked us to employ “carpentry” in our research methods, we girls were writing and making in three dimensions, but unlike Bogost, we seemed to understand that our writing and making of objects acted back on our bodies, as we co-constructed our methods, our objects, our identities, and our pasts/presents/futures through material constellations.

So when I asked makers in my research studies to make the fortune-teller, I first asked them if they knew what these fortune-tellers were or remembered what they called them or how they played with them during their own childhoods. Almost everyone was familiar with some form of the game/toy/artifact, but the females in my studies spoke up, relating experiences similar to mine of using the object to foretell an all but deterministic existence of womanhood through the institutions of marriage, work, and motherhood. Most participants didn't have a name for the teller, but a few offered “cootie catcher” or “coochie catcher” as something they'd heard over the years as young makers in their classrooms, churches, or homes resurfaced, remade, and referred to these objects. According to Simon Bronner, the paper fortune-teller is also known as a *chatterbox*, a *salt cellar*, or a *whirlybird*, and is a staple of childhood social games that often accompany transitional periods such as the passing of childhood into puberty

⁵For a discussion of gendered technology, see Bray.

(212). Bronner’s anthropological work with the fortune-teller calls attention to the ways objects are layered with affective textures of social meaning as well as the function that objects play in constructing identity, particularly childhood and adulthood, as well as gender and sexuality ⁵.

After a brief discussion of these historical and affective associations, I started the data collection protocol, leading maker-participants through Step 1, the cutting and folding of an individual fortune-teller, (see fig. 1). During each data collection phase, maker-participants were seated at large tables, either in a hotel conference room (science MOOC) or in classrooms that were hosting the pop-up makerspaces, and shared paper copies of the instructions, talking with each other about their experiences with the fortune-tellers, watching each other, asking me or their tablemates for help when their folds didn’t match the instructions, and sometimes re-creasing each other’s fortune-tellers in an effort to move to the next stages the data collection activity. This process was marked by community-building activities—collaboration, socialization, and narrativization—as participants discussed previous experiences with these silly objects.

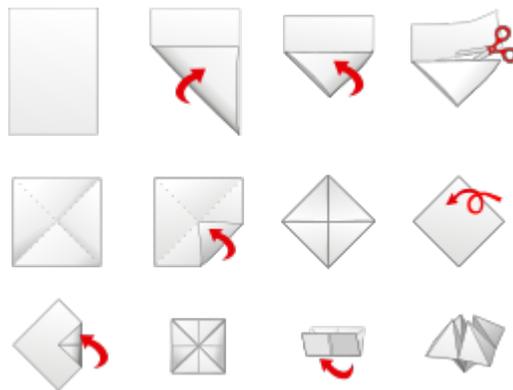


Fig. 1. Cutting and Folding of an Individual Fortune-teller

Once all participants had made a paper fortune-teller, finishing Step 1, we moved as a group to Step 2. In this phase, participants were asked to systematically code the fortune-tellers with

places, people, materials, and practices that were significant to them during their experiences in a maker network. They were given the following instructions (with accompanying visuals) for coding in Step 2:

- a. On the outside four squares, write the first four places (physical or digital) that come to mind for you where you compose as part of this maker network (see fig. 2).

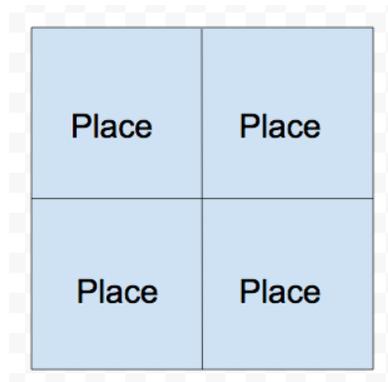


Fig. 2. Physical or Digital Composing Places

- b. On the opposite side, number the 8 triangles 1-4 and 4-1 in a clockwise motion (see fig. 3).

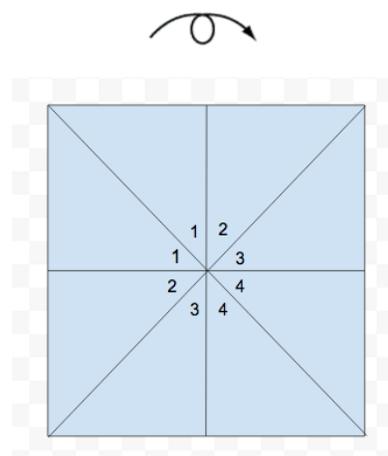


Fig. 3. Numbering Triangles

- c. On the even numbered triangles, list tools, objects, or texts you've made or made with in the places you listed on the other side.
- d. On the odd numbered triangles, list the people who have been important to you in those places—people you've made with, people you have inspired or helped, people who have helped you, etc., in this maker network (see fig. 4).

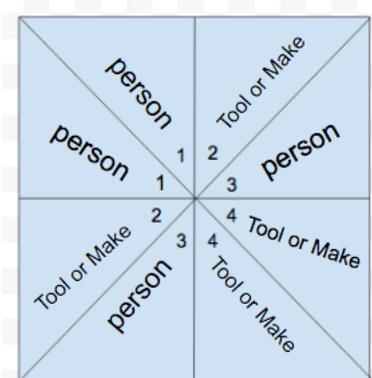


Fig. 4. Composing Tools, Objects, Materials and Other Composers

- e. Open up the teller and list the practices—the things you do—when you make or compose in this maker network (see fig. 5).

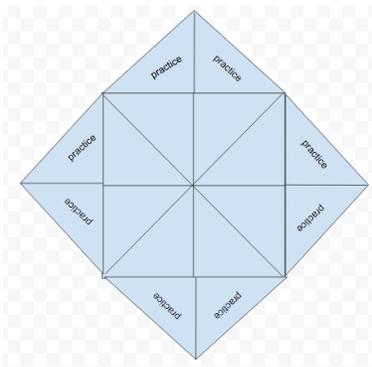


Fig. 5. Composing Practices

Through this practice of coding, participants named various human and non-human bodies,

⁶ Because of the diversity of participants, I used the third-person singular ‘they’ and ‘their’, which is in keeping with current writing and research practices which recognize the importance of trans* inclusive language.

places, and practices that were materially important for them during their experiences in the maker network. Participants then refolded their papers, enfolding their experiences in the fortune-teller. They were then ready for the game play in Step 3.

In Step 3, participants were asked to find a partner with whom to play the fortune-telling game. When there were odd numbers of participants, some makers created a group of three, modifying (i.e., hacking) the rules. Other makers, particularly those youth makers in the pop-up spaces, asked me to be their partner, sometimes playfully suggesting they wanted to work with me because they knew I wouldn't cheat. On a few occasions in the pop-up makerspaces, I obliged as it seemed that there was some anxiety around where this game was going and what they would have to reveal as players, a possible contradiction between the maker ethos and the embodied behavior of makers in the research setting, both of which I outlined earlier in this chapter. Each pair or triad was asked to create a game play log that documented the results of each turn (what was revealed on the fortune-teller) and to play by a set of specific rules. Participants then played with the material logics of the teller to create aleatory combinations of people/places/tools/materials/practices, documenting the material dimensions of experience that were revealed for them in each turn. They were given the following instructions:

1. The youngest participant is the first player. This player will give their ⁶ fortune-teller to the older partner. The older partner will move the fortune-teller while the younger partner “picks” their options.
2. The younger player picks one of the four place locations and writes it on their game play log. Based on the number of letters in the word or acronym, the older player moves their fingers back and forth to reveal the first inner layer of triangles.
3. The older player then asks the younger player to pick the number that best corresponds with the average number of hours per day they engaged the cMOOC (*Remix, Remake, Curate*) as a facilitator, or the number of 80-minute periods they had engaged in each makerspace (*Pop-Up and Make*).
4. The younger player picks the number and writes it down on their game play log

and also logs the person's name or the tool, object, make that corresponds to that number. The older player then moves their fingers back and forth according to that number.

5. The older player then asks the younger player to pick the number that best corresponds with their disorientation level while facilitating the cMOOC or making in the pop-up makerspace, with 1 being little or no disorientation and 4 being highly disoriented.
6. The younger player picks the number, writes it on their log, and also writes down the person's name or tool, object, or make that corresponds with that number.
7. The younger player then opens the corresponding flap and documents the making practice.

In Step 4, the younger and older players then spent three to five minutes discussing these constellated components of experience thinking about how they might make connections between the tool, object, make, person, practice, and place that was revealed for them during play. I prepared them for the writing in Step 5 by asking the player to create an "experience anecdote," a short story describing a single incident in the maker network. Following the work of phenomenological researcher Max VanMannen, I asked participants to begin the story as close as possible to a central moment of experience, to use concrete details, to use quotations from others, and to wrap up with a "punchy" last line if possible (252). Participants were then given 10 minutes to create their anecdotal experience narratives, stitching these people/places/tools/materials/practices together into narratives about their experiences. They produced "small stories" (Bamberg & Georgakopoulou; Daniell; McComisky) about the range of experiences of composing in self-sponsored, academic-adjacent composing networks.

After ten minutes, participants then changed roles, each having two turns with their own fortune-teller for four total rounds of game play; this process typically resulted in four anecdotal experience narratives, two from each player. I then collected the origami fortune-tellers, the game logs, the experience narratives, and the informed consent documentation that had been

filled out prior to participation. Each data collection event lasted between seventy-five and ninety minutes in its entirety, and I collected a total of fourteen sets of artifacts from maker-participants in the *Remix, Remake, Curate* cMOOC maker network and seventeen sets of artifacts from maker-participants in the Pop Up and Make maker network.

After collecting these artifacts, I also engaged participants in a twenty- to thirty-minute informal debriefing conversation about the experience of making the fortune-tellers and playing the game. Several participants said that they enjoyed the constraints of the rules because they were “forced to make meaning” from the constellations revealed during game play and found that they told very different stories from those they might have told if asked to tell a story about their experience without those constraints. Others pointed out that they were limited by having the same level of disorientation as they did the number of hours spent participating in the cMOOC or number of days they participated in a Pop-Up makerspace; therefore, they ended up with the same practices in their game log. Participants suggested that instead of picking an average number, they should pick the highest and lowest levels of disorientation over their entire experience, better representing the fluctuation of affective intensities distributed over time and over particular material engagements. Since a key element of game play, when inflected with queer and feminist ideologies, is to allow the players to “hack” the system and thus effect change, asking them for revision suggestions was my way of providing space to change the game in meaningful ways. What’s important is that my game (data collection method) and my methodologies (queer-feminist-materialism) inter-animate each other such that it’s not possible to understand either the methods/activities or the methodologies/theories apart from each other/the whole system. Even articulating here as separate elements seems artificial as these things were so intimately connected and clear both to me and to the participants—or as clear as queer-feminist-materialisms can be to high school students, teachers, and academic-adjacent educators. Finally, participants in the cMOOC, both formal and informal educators, offered up ideas for how they might appropriate and use the origami fortune-teller pedagogically. Most of this discussion focused on how writing teachers and writing workshop facilitators could use this activity as a

tool for prompting recall and reflection about students' writing processes and products. They were eager to try this out as a scaffolding activity to help students surface who and what mattered to them over the semester as they prepared to write reflective-analytical cover letters and learning statements which would accompany cumulative writing portfolios.

Data Analysis

Borrowing from work in grounded theory, my dissertation director, Dr. Will Banks, and I engaged in three practices of data analysis: qualitative coding, reflecting through the co-production of coding memos, and creating 3D representations of the coding schemes. First, we analyzed the origami fortune-teller sets (including artifact, game logs, and anecdotal experience narratives) in aggregate using three types of coding practices: open, axial, and selective coding (Neff; Teston; Farkas and Haas). We used the codes—places, people, tools, activities—that participants labeled on fortune-tellers first to define material dimensions of making, and then we read the stories that participants wrote about their experiences for additional codes that emerged through the narrativizing of experience. In the coding memos themselves, as we began to see common themes, ideas, or topics come up such as a pre-occupation with digital tools in the *Remix, Remake, Curate* network and the importance of peer-to-peer learning in the *Pop Up and Make* network. As we read through the anecdotal experience narratives, we noticed and coded affective responses to other bodies—both human and non-human—as these were emerging as key factors in the materialization of new nodes in the narratives. For example, a maker in the cMOOC study originally labeled their fortune-teller with the names of three other participant-makers who had made with them, inspired or helped them, or whom they had given help in the *Remix, Remake, Curate* maker network. Their game play log indicated that their second narrative would be constructed using the following elements from the fortune-teller (see table 2).

Table 2

Fortune-Teller Levels and Game Play Outcome

Fortune-Teller Levels by Code	Game Play Outcome
Tool	Twitter
Time	Two hours facilitating the MOOC each day
Activity	Crystal Make (the participant led in Year 1)
Disorientation	3
Person	Scientist (with whom they collaborated)
Practice	Adapting

In narrativizing their experience of the disorientation that ensued while facilitating a Twitter chat without any participants to chat with, however, the maker named students and teachers who were absent from the chat due to “last minute scheduling conflicts” as well as another maker participant not originally listed in the fortune-teller. Stating that it was “extremely uncomfortable” to be publicly lonely, this maker asked a participant from another facilitation team to join the chat, *adapted* her questions so they could be recycled beyond the 60 minute chat, and grew the network of who and what mattered through an affective response to loneliness and failure directed toward the social networking tool Twitter. What became clear for us here was that the process of making meaning by storying the nodes on the fortune-teller materialized new nodes that participants hadn’t originally listed. This was a powerful reminder that, as Hayes and Flowers argued in the early 1980’s, writing is a knowledge-making endeavor.

Next, we regrouped data in terms of contextual similarities and differences, practicing axial coding. According to Joyce Neff, “Axial coding forces me to examine each concept in terms of conditions, interactions among actors, strategies, tactics, and consequences” (130) which, in the case of the maker data, helped us to zero in on the similarities and differences in salient features of the open codes we developed in stage one. For example, after disaggregating the *places* and *tools* that were mentioned in the fortune-teller sets, we re-grouped the places into sets of online and offline places. Next, we categorized the people whose names were mentioned into their roles as scientists, poets, teachers, and students, also marking demographics such as race, gender, and age. Finally in this stage, we created axial categories for the practices that

were mentioned, grouping them according to practices that are closely associated with STEM disciplines such as “experimenting” and “observing,” those that are more closely associated with the humanities and textual production such as “composing” and “writing,” and those that are associated with networked and new literacy practices (Lankshear and Knobel; Gee; Jenkins; boyd) such as “sharing,” “collaborating,” “connecting,” and “cooperating.”

Finally, we returned to the “storylines” (Neff) that seemed to be emerging as important in these data sets, coding selectively for specific affective orientations towards tools, places, artifacts, bodies, and practices. In the cMOOC study, we noticed that affective orientations toward failure were controlling the emergence, growth, and directions of the network whereas, in the Pop Up and Make data, gleaned from young makers, play and pleasure were controlling affective orientations. Thus, we re-reviewed the origami fortune-teller data sets in their entirety looking for instances that would both support and refute the emerging findings around failure and pleasure as key affective currents that drive the materialization of networks. We selectively coded the supplemental data sets (interviews, social media sites, and observation notes) and noticed a major difference between the game data and the interview data. In the interviews with ASTC program staff, very few mentions were made involving failure, anxiety, or other seemingly “negative” affective intensities. This may be attributed to the need to perform well for an external organization/assessment team, demonstrating a “socially acceptable bias” that does not seem to materialize in the origami game play conducted by the participant researcher/insider.

Throughout the process of coding, both Dr. Banks and I reflected orally, and I logged those reflections in my coding notebook, using the notes to make hypotheses about the study design, research methods, limitations, and findings. Using the coding and reflecting practices described above, we were able to approach the research questions that guide this study, identifying tools, practices, places, and people who emerged in the makerspace data, and begin to unpack how affects move with, around, and through bodies in each maker network. These data coding methods involved the recursive practices of “flattening.” As Manuel Delanda argues, “flattening” disrupts hierarchical taxonomies that privilege, for example, human over non-human

bodies or theories over experiences. To flatten this data, then, we entered it and the codes we developed by color into a spreadsheet, which enabled us to see these components of experience equally and to make quick quantitative claims about how often particular materialities salient to makers' composing experiences were mentioned. In addition, as described, we were able to define "storylines" for the "small narratives," paying particular attention to the ways that affective concerns—particularly those of failure and pleasure—impacted the emergence and rematerialization of the maker network.

Visualizing the Experiences of Making in Academic-Adjacent Networks

But this data on a spreadsheet wasn't capturing the lively, intra-activity of the makerspace, the dynamics of my own and others' experiences there, that unflattened and unfolded over time and space. Inspired by Nick Sousanis's work in *Unflattening*, Dr. Banks and I also worked to represent this data and our coding schemes for it three-dimensionally, erasing the boxes that can promote a notion of bodies in a research phenomenon as discrete, individual, and static. As Sousanis writes, "Every procedure is designed to ensure that proper results are achieved. This all takes place in boxes, within boxes . . . Not only space but time and experience too, have been put in boxes. Divided up and neatly packaged into discrete units for efficient transmission" (9-10). To blur the boundaries between the boxes and erase the notion that nodes on the network are separate and unchanged by other nodes, we worked here to show the relationships between material bodies people, places, tools, and practices. Using everyday crafting materials like foam board, yarn, safety pins, construction paper, and the makers' original origami fortune-tellers, including my own, we made three-dimensional representations of the two compositional networks.

Like the relationships and connections represented in this three-dimensional visualization, the visualizations-as-compositions emerged over time. The construction of each data board took approximately fifteen hours of collaborative labor shared between me and Dr. Banks. Most of the time, Dr. Banks knelt on the floor in his office where we made the board,

tying loops of yarn around safety pins and slipping them over the bamboo skewers to which the origami fortune-tellers were fixed (see fig.6). I, on the other hand, sat at his desk reading and re-reading the coded data, directing him to string the yarn from this marker to that marker and telling him which yarns should be gathered up into an affective web, stapled together and banded with orange construction paper loops. While this board likely means very little to anyone besides the two of us, I am including an interpretive key below that details our final coding scheme and demonstrates how we translated our qualitative coding practices into hand-built visualizations of maker networks (see fig. 7 , fig. 8, and table 3).



Fig. 6. Dr. Banks Crafting Data Visualization Board

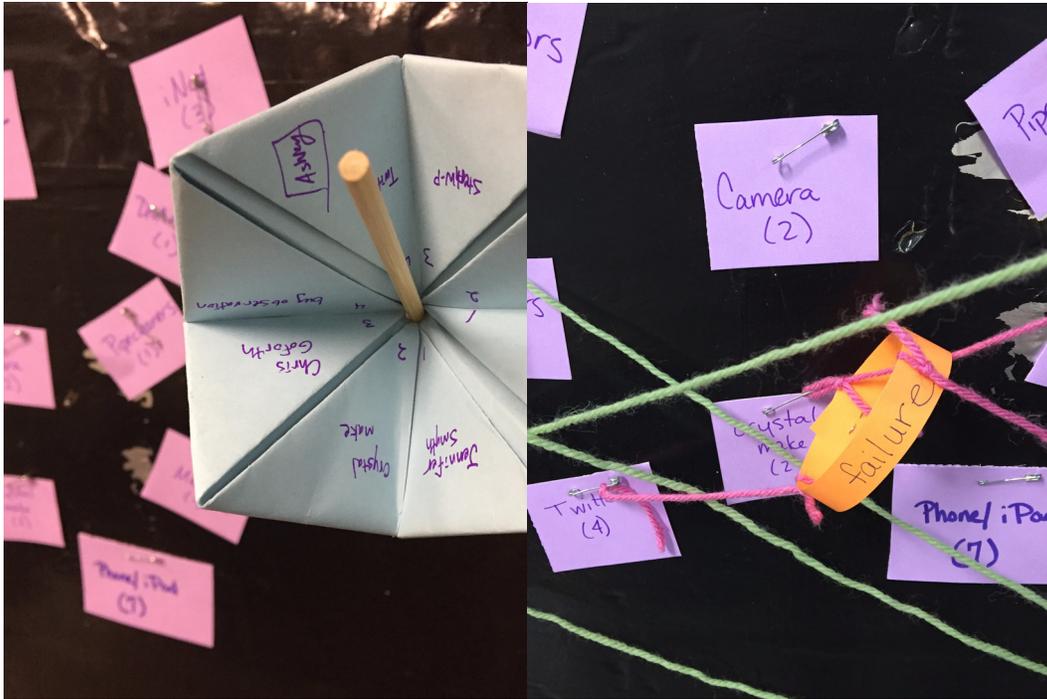


Fig. 7. Data Visualization Board Close-up



Fig. 8. Completed Data Visualization Board

Table 3

Data Visualization Key

Purple Paper Rectangles (Top Left Quadrant): These are the tools, materials, and makes that surfaced as labels in on the origami fortune-teller. Numbers on the marker indicate the number of times the tool, material, or make was mentioned.

Light Pink Paper Rectangles (Bottom Left Quadrant): These are the places, both physical and digital, that makers listed on the origami fortune-tellers. Numbers on the marker indicate the number of times the place was mentioned.

Green Paper Rectangles (Bottom Right Quadrant): These are the people who were mentioned on the origami fortune-tellers as participant-makers who had made with them, inspired or helped them, or whom they've given help in the maker network.

Blue Paper Rectangles: These are the practices makers listed that they had engaged on the origami fortune-tellers. Composition practices are located on the Mid-Left of the board, scientific practices are located on the mid-bottom of the board, and networking practices are located on the upper right quadrant of the board.

Dark Pink Rectangles: These rectangles represent the new nodes that were materialized through the processes of writing the anecdotal experience narratives. These nodes show up only in the narratives, not in the labeled origami fortune-tellers.

Origami Fortune-Tellers (Distributed Across Board): Each fortune-teller represents one maker-participant in the maker network. The fortune-teller represents a singular maker but it enfolded with the other makers, tools, practices, places, and makes that have created their maker identities.

Fortune-Teller Labels: A canvas tag with an eyelet is attached to each origami fortune-teller indicating the maker-participant's initials.

Yarn: Each string of yarn represents the connection a maker surfaced to a tool, person, make, material, or place during their experience in the maker network. Note: Yarn color is not significant in the coding process.

Orange Paper Loops: Each loop represents an affective intensities coded in anecdotal experience narratives as directed toward other people, places, tools/materials/objects, and practices. These loops gather up individual pieces of yarn and bind particular material constellations together.

This process of making an analytical tool has enabled me to make new kinds of knowledge about the ways that makers produce and are produced by the affective pulses and flows of their engagements with other material bodies. This kind of knowledge-making was unavailable to me in the flat space of the digital spreadsheet. Through both “flattening” (Delanda)

and “unflattening” (Sousanis), I worked to enact a queer materialist “both/and” practice that has enabled me to identify and theorize patterns of emergence in these academic adjacent composing spaces.

Limitations of Research Design

While the benefits of using “messy,” non-traditional data collection and analysis methods have been explored, it’s important to note limitations as well. First, the research design may be perceived as lacking “gravitas” (Vie and DeWinter) that is expected in the field of writing studies as it engages playful methods that disrupt clear roles between researcher and participant. This design, however, extends calls for more culturally responsive research-based practice and is grounded in community-based research protocols that call for contextual sensitivity, shared decision-making, and equitable contributions of different kinds of expertise and decision-making in community (Grabill; Cushman). In future studies, I would, however, build in opportunities for participants to contribute to the design of the origami fortune-teller game as well as the rules of play, making the entire design-make-play-reflect process inclusive from the beginning. While I asked participants to debrief after playing and help me to see the affordances and constraints, a more participatory process would have participants negotiate categories and material dimensions that may have been left out in the constellations of tools, objects, materials, people, places, and practices. Second, because research participants were asked to both make and write as part of data collection activities, there is the potential to invoke making and writing apprehension (Daly and Wilson), both of which were observed and accounted for in context. For example, a few students in the pop-up makerspaces struggled with creating their fortune-tellers and writing their narratives, but I helped them to fold and refold their paper, and I also allowed them to dictate their stories to me as I wrote them down. Third, the game play protocol does limit participants’ construction of experience as they are asked to stitch together aleatory combinations of persons, places, tools, materials, compositions, and processes, making meaning at the intersections of these phenomenon. In the debriefing, participants discussed how the chance pairings of tools-

materials-objects-people-practices made it challenging to create narratives of their experiences; however, in line with research on difficulty as an asset to game design (Gee, *How Video*) most participants appreciated the challenge and found it more engaging because of the difficulty. Certainly, this research design with its queer, lateral methods of tracing emergence may seem more cumbersome than a traditional “straightforward” approach to knowledge-making. The data collection activities took between one and two hours in each of the contexts; however, these experiences help rematerialize the community, providing yet another opportunity to make, share, learn, and connect as participants collaboratively made meaning *in their communities about their communities*. This approach foregrounds the development of relationships over time, also in line with community-based research theory and practice.

Once we go off-script and step outside of our neat boxes and structured protocols, meaning-making processes can, as Law and Dadas argue, get “messy.” Adding to Law and Dadas, I argue for an understanding of “mess” that is both figurative and literal. This means that we can value the intentions of indeterminate game-play over predetermined outcomes as well as the possibility of “vibrant materialities” such as the tension from a strand of yarn stretched between two safety pins. As my own example illustrates, a method/ology built on queer materialist orientations acknowledges flux while leaving unfilled space and gaps for new material encounters to impact the research phenomenon. For example, makers in my study regularly remixed and reiterated on the rules of the origami fortune-teller game. They materialized their own histories with similar origami objects or “cootie catchers,” sometimes in the middle of game play, and, at times, changed the rules based on their own procedural knowledge. These moments are what Erica Rand might call a “queer agency” (6) in the research process. This agency belonged neither to me as researcher nor to the participants but instead grew from the aleatory space between intentions and outcomes in the research phenomenon. Responding to these situations, then, requires less of a fixed stance as a researcher and more of a fluid adaptability or receptivity to rematerialization. Jane Bennet might call this the researchers’ ability to “relax... suspensory control” (9) which allows new knowledge-making relations to emerge and re-emerge

inside research phenomenon.

This discussion and practice of queer new materialist research methods is certainly exploratory; however, it gestures toward approaches that will be useful for writing studies as more and more scholars are engaged in the study of alternative composition spaces like makerspaces. So while scholars in the field of writing studies have taken up gaming and making in classroom contexts (McNair; Morris; Prins; Brooks-Gilles) and in professional learning such as during the 4C conference (deWinter and Vie), the potential for practices of gaming and making to impact our research practice is largely undertheorized. Thus, we might reorient the field of writing studies toward queer new materialist method/ological approaches that are physically and conceptually messy, transgressively playful, and intentionally fragmentary. In these intentional gaps and folds, *feeling* and *feelings* as well as *meaning* and *matter* can materialize. By doing so, we can (re)consider what it means to compose, (re)figure who or what does the composing, and (re)think the relationship between materiality and discursivity. These considerations are necessary if we are to understand how makerspaces come to matter at this moment in time.

In Chapters 4 and 5, I'll trace out what matters for participants in each of the maker networks in this study, documenting who and what gets to make, who and what gets made, and what drives network materialization in each of the two networks that comprise this dissertation project. First, in Chapter 4, I'll trace the *Remix, Remake, Curate* cMOOC and then in Chapter 5, I'll map out the Pop Up and Make maker network, using data to tell stories about the hard, messy, personal, public, silly, serious, connected, and affective labor of making and composing in academic adjacent spaces. In these case studies, it is my goal to help writing studies scholars and practitioners see these maker networks through a queer new materialist lens and to better understand the function and behaviors of composing "nets" as constellations that both enable and constrain the "work" of composing.

Chapter 4: Making Science

Introduction

From 2014 to 2016, the National Science Foundation Intersections Partnership between the Association of Science Technology Centers and the National Writing Project provided \$60,000 in grant funding to local educational initiatives pairing formal and informal educators to promote science literacy. One such local initiative developed by the North Carolina Museum of Natural Sciences (<http://naturalsciences.org>), the Tar River Writing Project at East Carolina University (<http://trwp.org>), and the Poetry Project (<http://josephusiii.com/the-poetry-project>) engaged youth composers, their teachers, spoken word artist educators, and museum scientists in publicly making and sharing science and science media in a Massive Open Online Collaboration (cMOOC). Over two years, *Remix, Remake, Curate* (#imakesci) engaged seven scientists, thirteen K-higher ed faculty, and six spoken word poets in developing and participating in fifteen weeks of maker-centered intensive online science programming with over fifteen hundred youth makers across grade levels and educational contexts.

Centered on various “make cycles,” facilitators invited youth participants to tinker, explore, and produce science and a science media in a playful community of practice by connecting across distributed digital platforms such as WordPress, Twitter, and Google+. Facilitation teams included at least one poet-educator, one scientist, and one classroom teacher from the elementary level, one from the middle level, and one from either the high school or college level, teachers who had participated in TRWP-sponsored professional development. Each facilitation team designed and facilitated one make cycle in each year of programming, focusing their cycles around the following areas of inquiry:

- biodiversity and backyard citizen science;
- the art and physics of sound;
- collecting and curating nature and memory;
- exploring the microworld of crystals;
- insect and arachnid anatomy and physiology;

- biotechnology and life codes;
- computer programming languages and coding meaning on the web.

Each of these inquiry areas was largely determined by the participating scientists' expertise areas as well as their affiliation with a particular lab at the museum. The poets and teachers chose to work with the scientists based on their own personal and professional interests. Over the two-year project span, facilitation teams met for four extended planning and debriefing retreats and collaborated through phone calls, group messages, emails, and collaborative online tools like Google Documents and Google Hangouts.

While planning the make cycles, facilitation teams foregrounded three domains of literacy practice that were mapped across the disciplines of science and writing studies: concepts, practices, and values. These domains provided the basis for open and flexible curriculum pathways in each make cycle. For example, during the first make cycle of year two, which focused on biodiversity and citizen science, facilitation teams developed programming to lead participants in tracing biodiversity (*natural science concept*) by having students document and observe (*natural science practices*) the life forms that assembled around their porch lights by taking field notes (*scientific writing practices*). Participants used their field notes to draw conclusions about the relationships between weather and insect behavior (*scientific practices*) as well as to personify, craft, and perform dialogic poetry between various life forms they observed (*creative writing practices*). Young people and their adult mentors, including classroom educators, youth leaders, and parents, shared their observation notes, photos, videos, drawings, questions, problems, hypotheses, and poem drafts in the various online forums of the cMOOC (*peer review practices common in both science and creative writing*). Through generous feedback to the participants' shared artifacts, facilitators celebrated close attention and curiosity, two *values* that were shared by both scientists and poets. Facilitators also explicitly named and labeled the use of poetic devices such as hyperbole, noting how these strategies created rhetorical significance but were ill-fitting devices for the scientific inquiry as they lacked *accuracy* and *precision*, values that undergird meaning-making in the sciences. By providing a space for them

to use poetical, rhetorical, and scientific language practices together, K-higher ed students in the project were encouraged to develop critical literacy practices.

Modeled on the National Writing Project's Making Learning Connected Massive Open Online Collaboration (also known as CLMOOC), the *Remix, Remake, Curate* programming took a novel approach to science learning and writing in four ways: first, it focused on the "intersections" of bodies and knowledge, working to link seemingly abstract concepts, practices, and stances to the people who engage them—practicing scientists and poets. To accomplish this, both the scientists and poets participated alongside students and teachers in each make cycle, developed and shared video tutorials and poetry performances that showed them working on similar inquiries in both their labs and living rooms, responded to youth makers' science and poetry artifacts shared in the Google+ community, and participated in live Google Hangouts and Twitter chats with participants by answering questions, discussing their research and writing, posing questions about ethics and responsibility, and modeling curiosity and engagement in open online spaces.

Second, the project explored the intersections of (and disconnections between) scientific and humanistic inquiry, forcing the practitioners from each of the disciplines out of their comfort zones and disciplinary ways of knowing, doing, being, and writing (Carter). For example, during the first facilitation planning retreat, demonstrating the kind of accessible science invitation they might design for a make cycle, one of the scientists led the entire group through the process of extracting DNA from wheat germ using low-cost everyday household materials such as alcohol, dish detergent, and wooden coffee stirrers. The group followed along diligently during the procedure, carefully listening, measuring, and agitating the liquids, and at the end of the demonstration, each facilitator held a mucus-like glob of DNA on the end of a stick. Looking a bit incredulously at the blob, one of the teachers asked, "So what? What do we do with this?" The scientist stumbled a bit and reiterated the marvel of extracting DNA as genetic code of life.

⁷ SoundSee was an open-source application created by one of the participating scientists who worked in the Visualization Lab (<http://naturalsciences.org/learn/visual-world-ilab>) at the NCMNS.

The teacher pressed, “But why does it matter?”

One of the poets suggested that the group take a few minutes and each person write a short poem personifying the strange blob on the end of the stick, another way to get at what this object might mean inside contemporary biopolitical contexts. “That makes me very uncomfortable,” the scientist shared. “We are trained to avoid the humanization of things that aren’t human. It’s a dangerous practice.” But the poets, led by a highly charismatic and persistent director, insisted, and the group, including the scientists, wrote haikus and rhyming couplets. Some shared a few silly and provocative lines, which started a robust discussion about the significance of DNA extraction. The group then brainstormed several pathways they and their students might pursue for making meaning out of this strange matter, including invoking fiction and nonfiction texts that take on the implications of our ability to hack the A-C-T-G codes of DNA. They discussed cloning extinct or nearly extinct animals to increase biodiversity à la *Jurassic Park*, medical research involving extracted DNA cell lines as explored in *The Immortal Life of Henrietta Lacks*, and forensic science applications such as those that helped authorities find the infamous Green River Killer. Together, the group began to see how the push and pull of objects and discourses around objects could make matter matter and forge uneasy connections between the disciplines. As I discussed in Chapter 2, this is one of the goals of New Materialism, to bring the sciences and the humanities back into more productive conversations with one another.

Third, the *Remix, Remake, Curate* MOOC worked to make scientific inquiry accessible to all ages and experience levels, an important aim of work in citizen science. By engaging participants in inquiry and the collecting and analyzing of data, citizen science promotes the collaboration between scientists and the general public, fostering public appreciation for scientific knowledge-making. During *Remix, Remake, Curate*, participants contributed to ongoing projects like documenting local flora and fauna with the iNaturalist community using mobile applications for tablets and phones and the collection of human voice files through SoundSee ⁷ to visualize the waves that compose the unique timbre of each human voice. By prioritizing access and accessibility, using free online tools, apps, and everyday materials to

make science, the facilitators worked to overcome geographical and economic boundaries to the museum by using openly networked digital tools and by creating multiple curriculum entry points and multimodal curriculum materials that engage visual, oral, and textual communication strategies for a variety of youth learners. This worked to create a shared community of practice that valued all participant contributions, not just those that *successfully* engaged the concepts, practices and stances. In addition, this community of practice worked to break down hierarchies between formal and informal educators and between adults and youth, a task that was supported by the design of the Google+ platform itself. Hierarchies between teachers, scientists, poets, and young people were flattened as participants' posts were displayed side-by-side with only names (and occasionally institutional affiliations) to differentiate members of the community.

Rematerializing Disciplinary Empiricism

So far in this chapter, I have written about the cMOOC initiative as if I had studied it from afar, *looking* at the network from the outside to understand it as something entirely other, something different from and therefore able to be approached by a rational, dispassionate researcher-self. This is a false positionality. From a new materialist standpoint, there is no “outside” of the network. Networks enfold bodies, gathering them up into what we recognize as phenomena. Therefore, the “I” that conceptualized this research study—its design, its methods, its limitations, its attempts at reviving materiality in new terms for writing studies—is part of this *Remix, Remake, Curate* network I’ve described. Conversely, this maker network is also part of me as a writing studies researcher, a “self” that emerged through aleatory swirls of participation, crash encounters with these new composers, composing objects, tools, places, and practices, and a connotative fall that results in the temporary congealment of this maker network research study.

Invoking Karen Barad, I argue that this dissertation project is another materialization of the *Remix, Remake, Curate* maker network, one that congeals out of the contingencies of the particular material bodies (human and non-) that collided in this phenomenon. As I noted in Chapter 1, I co-directed this project during its two consecutive years of grant funding,

assembling and working with this diverse team of educators and young people from different disciplinary, racial, geographic, economic, and age groups. I worked with a host of “others” to compose this composing network, *intra-actively becoming* a co-principal investigator, a grant project director, a cMOOC facilitator, a citizen scientist, a science writer, a science experience designer, and a science writing researcher. In Chapter 2, I acknowledged that the “material presence of the researcher’s body and the networks that have produced that body—such as the researcher’s institution, their family and community networks, and the academic field or discipline with which they identify—rematerialize inside the phenomenon of study” (44). This claim is made apparent here for me as I can *feel* how my previous research and experience in making, maker education, digital rhetorics, connecting learning, and cMOOCs, as well as my longstanding commitment to equity, access, diversity, and inclusive learning, rematerialized in this cMOOC endeavor, threading through its design and delivery, and my attempts at knowledge-making about this community.

I can also *feel* how the crash encounters with the materialities of both science and spoken word poetry have acted back on me, orienting me toward a material-discursive rhetoric that takes things, places, objects, tools, and bodies seriously, considering the cultural practices that organize and give them meaning. As writers, we tend to think of our primary material *discourse* as a reusable and renewable resource—a commons that does not diminish when we use it. Our words can be read over and over, remixed infinitely as they are never at risk of being used up. The scientists and poets, however, were more keenly aware of the material limitations in composing. As we worked to design experiments during the #iMicro make cycle that explored everyday microbiology, for example, we were vexed by how to provide access to the micro world without the widespread availability of microscopes in schools, youth centers, and homes. Similarly, the poets reminded us over and over that watching a video of spoken word poetry was not the same as performing it in front of a live audience as bodies engage in improvisations during delivery, whether in the form the audience’s snapping fingers that energize the poet’s delivery of the next line or the temperature of the air in the room that impacts how long the poet can hold out until

taking a breath at just the right moment.

New materialists contend that this kind of material-discursive stance is essential to meaning making, decision making and action taking on issues involving the entanglements of science, technology, environmental, biological, economic, and geopolitical domains. If we, as writing studies scholars, are to forge cross-disciplinary alliances with the sciences that can approach the pressing problems and big decisions we face as a society, we must relax our resistance to matter and objects, entertaining that ideas that “matter and meaning are not separate elements...mattering is about substance and significance” (Barad 3). It’s about understanding what that gooey blob of DNA is, as well as what it means for the ways we act in the world. Thus, we must not just *look at* but also *listen to* and *feel* the material and embodied world of science composing, approaching critical questions about who and what gets made that are both about *matter* and *mattering*. When we take up both *matter* and *mattering*, *feeling* rather than *looking* becomes a more apt metaphor for the knowledge-making practices we’ve engaged. I can *feel* the ways that this network has taken up my whole body in a host of labors during its two-year run. And when I recount the narratives in this chapter, I can *feel* the emotional intensities and affective currents that pulse around bodies, including my own. I have been caught up with and by them, pushed and pulled by the convergences and divergences of meaning making in the sciences and the humanities, and these tensions, more felt than seen, have acted in the production of knowledge both in the network and in this study. It is important to recognize these felt experiences as much as we do the tactile and visible experiences of materiality, even if we cannot always enumerate or point to clear moments of affects and their effects.

The material organization of this chapter is wrapped up in affect and its effect as well. While readers in writing studies (my dissertation director included) might desire that I first start with a section on “What Gets Made”—a section which includes a careful analysis of one text, one maker, one tool or one technology—I will intentionally withhold those discussions until later in the chapter. I realize that this might cause frustration and a bit of disorientation, but I think that’s ok. That’s often how I and other makers felt as part of this *Remix, Remake, Curate*

Network. My intention here, however, is not only rooted in a queer sense of *schadenfreude*, but also meant to make a larger point, which is that we often miss the *who*, *where*, *when*, and *why* of composing because we're hyper-focused on *what* has been composed. In this chapter, delaying my response to "What Gets Made" was a choice. However, in the next chapter, which details the high school maker network, sometimes—when the 3D printer malfunctioned or when "eating" and "talking" took precedence over production-centered work—there was no traditional composed product to analyze at all. Thus, the *what* of composing necessarily moves from the discrete to the systematic. Even here, however, when we turn later in this chapter to compositions such as the *Eagorilla* and the *50-foot Shark*, I hope to reiterate that the most important answer to the question of "What Gets Made?" is the composing network itself.

Who Gets to Make

One of the central questions that defines this research study is the question of who gets to make in a composing network. As I've described it, this maker network gathered up thirteen writing project teachers from central and Eastern North Carolina, as well as a dozen of their school-based colleagues whom they recruited to participate, and the elementary, middle, high school, and university students in central and eastern North Carolina taught by these teachers. These teachers were all white professionals ranging in age from their early 30's to their late 40's, four of whom were men and the remainder women, a fairly accurate representation of the teaching demographics in central and eastern North Carolina. The grant leadership team was particularly interested in engaging teachers who could provide access to rural students, students of color, low-income students, and students who would not otherwise have access to a local or regional science center. The desire to work with these teachers and their student populations was based on research indicating that American youth engagement with science literacy in school is thin, and "an ever-growing body of evidence demonstrates that most science is learned outside of school" (Falk and Dierking 483). According to this evidence, formal classroom science education in the primary and elementary school settings is ineffective owing to a lack of

teacher preparedness *in* science and lack of space in the curriculum *for* science. Informal science education sponsored through public and private science institutions such as museums, science centers, aquariums, and zoos, however, is shown to be a promising remedy because learning in these spaces is motivated by learner interests. Faulk and Dierking note, however, that one-and-done visits (like field trip experiences common especially for eastern North Carolina students) are also largely ineffective as they fail to provide robust opportunities for thick engagement and participation in the scientific literacy practices that engage learners' interests and experiences. Thus, Faulk and Dierking encourage those who are interested in science literacy to develop and support informal science learning networks "that support long-term, more in-depth opportunities for science learning" (488). Thus one goal of *Remix, Remake, Curate* was to create sustained opportunities for thick engagement with the concepts, practices, and values of science, and these teachers were selected for several overlapping reasons: 1) their access to underserved student populations, 2) their history of designing innovative and inclusive learning experiences using digital tools, and 3) their interest in science and the creation of learner-centered science curriculum that would thread in and out of classroom spaces.

Each of these teachers brought a cadre of students and their families with them into this network. Teachers of elementary and middle school students tended to either create classroom profiles for Google+ and Twitter or to have parents create profiles which they monitored for children under age thirteen. This means that for each elementary or middle school teacher or classroom profile, there were often 30-100 *less visible* youth users engaging in making, collaborating, sharing, and responding in the distributed cMOOC platforms. High school teachers, however, tended to have their students sign up for accounts and/or join the Google+ and Twitter platforms individually, making their participation more visible in terms of network analytics.

In addition to teachers and students from central and eastern North Carolina, seven scientists/science educators from the NC Museum of Natural Sciences were involved in the facilitation of the *Remix, Remake, Curate* MOOC. Four of these participants were female and

three were male, and all were white professionals ranging in age from their early 30’s to their early 60’s. With the exception of the director of digital learning and the director of museum exhibits, who also participated in the MOOC facilitation, these scientists/science educators were employed in the museum’s Nature Research Center (NRC), which opened in 2012 to provide public access to working research labs and the scientists who run them. According to the NCMNS web site, “In these exhibits, you can explore not just what we know about the natural world, but how we know it—the tools, techniques, and real live scientists that study the past, present, and future of our planet.” Because of the mission of the NRC, these scientists were familiar with practicing science in public spaces. Yet only one of these scientists had significant experience practicing science in public *online* spaces as that scientist had developed a robust social media presence for communicating public science. None, however, had experience designing or participating in extended, interactive science learning programming that would happen across distributed web-based platforms. This is evidenced in the disorientation and anxiety that one scientist expressed in the experience narrative about the difficult, collaborative, and recursive processes of designing open online curriculum for their team’s make cycles in year one and year two. Table 4 details this scientist’s origami fortune-teller labels.

Table 4
 Scientist’s Origami Fortune-teller Labels

Places	Tools/ Materials/ Objects	People	Practices	Number of Hours Per Day Facilitating MOOC	Disorientation
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⁸ Because the identities of scientists, teachers, and poets might be compromised by using singular, gendered pronouns which could be cross-referenced with publicly available online data, I will refer to each with the plural, gender-neutral pronoun “they.”

North Carolina Museum of Natural Sciences	Laptop	[Poetry Educator]	Collaborating	1	Left blank
The Winds at Ocean Isle	Phone (multi-tool)	[Teacher]	Brainstorming		
G+ Hangouts	Videos (Cypher Circle)	[Museum Scientist]	Experimenting		
Pocosin Retreat	Bugs	[Poetry Educator]	Communicating		
			Sharing		
			Compromising		
			Knowledge		
			Observation		

In the experience narrative, the scientist wrote,

It's Friday afternoon, and I'm busy trying to get things on my to-do list to a point where I can leave early [for the second planning retreat]. Why do the last 20 minutes of your day seem to fly when you have a hard, can't-miss-because-someone-is-waiting-for-you (in the mini-van out front) deadline? I'll only be gone for the weekend. What's the big deal? Some of my anxiety is because I don't know if I'll finish the weekend with clear goals: to do lists, which I need to function professionally? That's what happened the first time. Must be the reason...

The same scientist was, however, eager to share their expertise with the group, also mentioning in the narrative that they ⁸ were “looking forward to getting everyone excited about the wonder and power of DNA.”

The fourth group that composed the *Remix, Remake, Curate* maker network were the spoken word poet/poet educators representing two poetry collectives from the central and piedmont regions of North Carolina. In year one of programming, all four of these participants were male, and in year two, two female poets joined the network at the leadership's request in an effort to provide greater gender diversity. All were African-Americans ranging in age from their late teens to their early 40's, and all were college students with the exception of the executive

director of one of the collectives. All of the poets had experience performing spoken poetry in local, regional, national, and/or international stages as well as experience teaching spoken word poetry to young people in formal and informal learning contexts. Like the scientists, they had had no experience designing and facilitating online learning, but most of the poets reported being familiar with the digital platforms used in the cMOOC.

It is important to note that all of these participants engaged directly in the visioning, goal setting, facilitation, and assessment of this experimental science learning design. In an educational era where these essential aspects of teaching are routinely outsourced to educorps like Pearson, this kind of horizontal participation and thick engagement from educators is highly uncommon. As most facilitators noted, it was a daunting and disorienting task to build such an aspirational and far-reaching network, and no one group or individual could have produced the *Remix, Remake, Curate* cMOOC alone. While it seems clichéd to say that “everyone mattered” in this process, it is a cliché that is backed up by the data. All facilitators who either joined or continued to participate in year two were mentioned by another facilitator as someone who inspired or helped them or someone whom they inspired and helped, and these mentions/matterings crossed institutional and disciplinary boundaries as is evidenced by one classroom teacher’s comment: “[Musuem scientist] did tons of work to get everything together. We relied on [the scientist’s] focus to bring our big ideas for citizen science to a digital audience.”

What Gets to Make

In this section, I will turn attention back to the lively matter of things that new materialists argue are central to our meaning-making networks. In particular, I will discuss how participants materialized *place*, as a material-discursive collection of things and their affordances/constraints and how they invoked particular *tools, materials, and artifacts* that mattered to them in their science and science media making. Here it is important to remember the concept of lively materiality that I outlined in Chapter 2 and that although I take up who and what gets to make separately here for the purposes of readability, the aleatory collisions of these

specific people with these tools, materials, objects, and places is essential to approaching what gets made in this network.

The diversity of people who materialized in this maker network is matched by the diversity of composing places that co-materialized as part of the composing network. The word *place* is used here intentionally, following Heidi McKee and James Porter's conceptualization of place versus space in online environments. While the cMOOC spans both online and offline composing locations, the word *space* can be used to signal webbed material configurations that conjure constellated understandings of embodied relationships, communities, and cultures. With these relational constellations, we invoke the rights and responsibilities that accompany relationships. Thus, the conscious use of *place*, as opposed to *space*, underscores the material-discursive relationships that might be lost by an Aristotealian understanding of space-as-container.

In their fortune-tellers and experience narratives, cMOOC facilitators named both online and offline places, the "Google+ community" and the "Atlantic coast" where facilitator building retreats were held, as well as public and private places like the museum, apartments, and homes as important to their composing practices. The most frequently mentioned space was the classroom, and teachers recounted several experiences of composing in the cMOOC with their students. One teacher wrote of cMOOC composing that threaded through instructional time, both in the classroom and outside on the school grounds, as well as in online spaces accessed from both desktop and mobile devices: "Spending time using the iNaturalist app with my students was what came of this activity. We spent time observing and sorting plants and insects as well as reporting the info we found. We then posted images and poems to the Google+ community for sharing and feedback."

The diversity of places where writing and writing instruction happened made a significant impact on the composers and on the composition of the network itself. In "Composition's Imagined Geographies: The Politics of Space in the Frontier, City, and Cyberspace," Nedra Reynolds argues, "place does matter; surroundings do have an effect on learning or attitudes

towards learning, and material spaces have a political edge. In short, where writing instruction takes place has everything to do with how” (20). And findings from my study reveal that opportunities to move outside of classrooms and schools provided new opportunities for facilitators and students to engage science, science media, and science curriculum building in more personally meaningful ways. For example, one teacher participant labeled an origami fortune-teller with three physical and one digital place (see table 5).

Table 5
Teacher’s Origami Fortune-teller Labels

Places	Tools/ Materials/ Objects	People	Practices	Number of Hours Per Day Facilitating MOOC	Disorientation
Denver	Laptop	[Poetry Educator]	Diversity	2	Level 2
Classroom	Phone (multi-tool)	[Museum Scientist]	Respect		
Google+	Videos (Cypher Circle)	[Teacher]	Fun!		
Myrtle Beach (living room)	Bugs	[Teacher]	Partnership Inquiry/ Curiosity Sharing Sound Listening		

The teacher then described in detail experiences at an ASTC/NWP sponsored building retreat in Denver where representatives from the *Remix, Remake, Curate* team joined other local sites in a national networking and program-building retreat. She wrote:

My favorite moments at the Denver retreat were when we [teacher, poet, scientist] escaped

the meeting room and went outside to plan our project together. I remember sitting out by the pool, under an umbrella with our laptop, talking about this MOOC...dipping our feet into the pool and being really excited but overwhelmed at the same time. I remember it being quiet out there as there weren't many (any?) people at the pool. Later we snuck off to a party room to record sound bytes for our [*Remix, Remake, Curate*] elevator pitch. I remember lots of laughter and playing as we completed these two audio recordings and watched the accommodating employees work around us as we rushed to finish.

What's striking to me about this passage are both the specific details of place that this teacher recalls in her narrative and the material conditions that have created this resort location as a *place* for professional educators to convene and plan. Reynolds argues that our sense of place as a discursive social construction often risks eliding the material structures that transform space to place; however, this teacher seems attuned to both the affectively networked interactions between her immediate group and the service labor that works to create the material luxuries of such a place, evidencing a material-discursive approach to place that binds each of the bodies co-producing it together into a geospatial network. According to Mel Chen, it is sensory engagement with the material world "that binds sensing and sensed objects to one another" (208), creating a "skin" or body that congeals momentarily but which persists, as it did for this teacher, in our meaning-making endeavors. Perhaps one reason for the persistence of this place and its coming together under the skin of "Denver" has to do with its novelty. It is rare that educators are allowed time and space beyond the confines of their classrooms, hallways, and buildings to think, play, and design, particularly with other educators and subject-matter experts; thus, this experience rises up as an important moment worth storying as place changes the dynamics of curriculum co-composing.

Composing Tools/Objects/Materials

Since the theoretical dawning of Vygotskian activity systems, scholars interested in tracing changes in individuals' and groups' cultural and psychological processes have paid attention to how humans learn and mediate their existence through the use of tools (Russell; Palmquist, Mullin & Blalock). Central to this explanation of how change happens in a system is Vygotsky's notion of the "Zone of Proximal Development" (ZPD) in which one learns by

using tools (such as language) to mediate with others to get what they want. The trial-and-error of using the “tool” to get the “object” or “goal” means constant refinement of both the human and the tool until a human/non-human synergy emerges and the desired object is attained. This learning space happens not as individual cognitive development but as social relations with tools and other bodies in an activity system. Activity Theory, then, allows for ongoing analysis of human behaviors over time that are object-oriented, goal-directed, and historically-situated, dialectically-structured, tool-mediated, and structured by roles and mutual arrangements among participants. In this paradigm, *human agency* is largely conceptualized as *human mastery over tools*, which provides humans with the capacity to act.

For New Literacy theorists like James Paul Gee, who examines the use of particular digital technologies as tools, this conception of human mastery is evident but tempered a bit by the emergent sense of agency he embeds in the term “smart tool.” According to Gee, “smart tools” are bodies, like characters in a video game, that possess particular kinds of knowledge. “For example,” he writes, “in [the video game] *Full Spectrum Warrior*, the soldiers the player controls know how to move to and take various formations in battle. Thus, this is something the player does not have to know” (10). Agency, he argues, is distributed between the “smart tool” and the humans who use it to pursue goal-directed activity. While Gee points out in *The Anti-Education Era* that humans can also be thought of as tools for other humans, the non-human matter only matters when it is connected to goal-directed, intentional human action.

For new materialists, however, things are not objects that humans master but instead are lively “actants” that others imbue with the potentiality to impact a system. Latour writes,

An “actor” in AT [Activity Theory] is a semiotic definition -an actant-, that is, something that acts or to which activity is granted by others. It implies no special motivation of human individual actors, nor of humans in general. An actant can literally be anything provided it is granted to be the source of an action. Although this point has been made over and over again, the anthropocentrism and sociocentrism is so strong in social sciences (as well as in the critiques of social explanations) that each use of AT has been construed as if it talked of a few superhumans longing for power and stopping at nothing to achieve their ruthless goals. (“On” 7)

As researchers, we have spent a lot of time tracing how other humans, particularly alpha humans privileged by a grammatical hierarchy, use discourse to “grant” activity to others, but we are much less able to discern how non-humans, including animals, viruses, metals, and other actants might “permission” such a determination. This is part of Mel Chen’s project in *Animacies: Biopolitics, Racial Mattering, and Queer Affect* as she considers how meaning might be ordered beyond the heteronormative, hegemonic structures of human language.

The very mention of a *composing tool* here, then, is an aberration of a new materialist research study—an ideological carryover from liberal humanist delusions of power and mastery, one that undercuts the very new materialist framework I’m arguing for in this project. From the outset of this study, I was interested in finding out about the materials that these scientists, poets, teachers, and young people composed with, but the word *material* wasn’t resonating with the cMOOC facilitators as I talked to them informally about my study design. There were a few “Aha!” moments when I tried to explain with very vague phrases.

“You know... the stuff.” I’d say.

“Right,,” they’d say. “The tools.”

“Yeah, kind of,” I’d say. “The things that you used to make science and make science writing,” I’d say.

“Tools and materials,” they’d say.

“Yeah,” I’d say.

This aberration was coded into the fortune-teller game, and it is just now, in the writing about tools/materials/objects, that I can feel the slippage between those two terms, terms that arise out of particular ideologies about who and what can make. It is here that I ask my readers to recognize this as an example of Chen’s “queer...gap...of meaning” (72). It is, I think, a productive contradiction that underscores the difficulty of reframing lively, active materiality for writing studies.

Thus, participants in the study materialized a host of tools/materials/objects (T/M/O) that mattered to them in their composing. The most frequently mentioned T/M/O’s included

computing hardware—computers, laptops, keyboards, mobile phones, and iPads—tactile materials necessary to travel to online *places* like Google+. Twitter was also mentioned by four of the cMOOC participants in this category in addition to being listed by eight other composers as a *place*. While these digital tools and technologies took front and center, other T/M/O's such as “poetry templates,” “cypher circles,” and “bug observations” were also popular mentions blurring distinctions between *what gets to make* and *what gets made* in the cMOOC. Others mentioned objects like “porch lights,” “darkness,” “water colors,” and “crystals” as salient to their experiences, things and properties of things that impact the making of science and the making of science media. Curiously, however, participants didn't weave these non-digital T/M/O's into their experience anecdotes, an interesting phenomenon that suggests that these “silly” (Berlant) or non-traditional composing materials are unmentionable in the stories we tell about serious science writing and making. Even the mention of crystals in one facilitator's narrative was superficial as they used the word to identify the make cycle title but then recounted a narrative about experiences facilitating a Twitter chat instead.

How Do They Make

While not specifically stated in the research questions, the practices of making that emerged in the cMOOC echoed the practices that facilitators identified as important to the practices of science and creative writing in their make cycle designs. For example, eleven different participants named “observing” as a practice in their fortune-tellers. In their anecdotes, facilitators discussed observing other facilitators to learn about their behaviors and ways of working so that they could be better collaborators, as well as observing insects and plant life around their schools as activities that preceded poetry writing. An analysis of the newsletters that facilitation teams wrote to mark the start and end of each make cycle, part of the publicly available data that I detailed in Chapter 3, also reveals observation as an important part of making as participants were asked eight times over the course of the programming to carefully observe their environments.

Surprisingly, however, only one participant (a scientist) mentioned “experimenting” as a practice, which is curious considering the MOOC was designed to foster both inquiry and experimentation as a means of science learning. “Inquiry” and “questioning,” however, were mentioned by three classroom teachers. It is interesting that both the poets and the classroom teachers failed to orient toward experimentation; I suspect, this might have to do with the preferencing of linear intentionality and brain-over-body processes that are privileged in formal learning contexts. As a practice, “experimentation” has a more material dimension than do either “questioning” or “inquiry.” When we experiment, we can name things that we experiment with like the brands of dish detergent that produce the biggest globs of DNA and porch lights with different wavelengths that bring the most bugs to the yard. In new materialist terms, we could say that we set up crash encounters of different kinds of bodies and work to note the swerves and connotative falls that re-congeal. Experimentation carries more risk as it has no predetermined end or answer, always resisting conclusion. Inquiry, however, foregrounds cerebral activities and intellectual processes. Inquiry is often talked about not just as a practice but as a *process* that moves the learner from unknowing to knowing. It is goal-directed and, in practice, often lacks the iterative processes associated with experimentation. Thus, we might consider inquiry a more humanistic endeavor while experimentation gets coded as scientific practice.

As most of the classroom teacher facilitators teach in the English Language Arts, it is, however, no surprise that they and the poets labeled their fortune-tellers with creation practices such as “note writing,” “taking notes,” “brainstorming,” “reporting,” “revising,” and “publishing” as part of the practices of making in the cMOOC. These are normative, goal-directed writing practices that guide writers and compose the stuff of writing instruction. In an anecdote, one poet-participant discussed “writing metaphors and similes,” but the other practices of composing were not taken up in the experience narratives. Instead, the anecdotes focused more on New Literacy/social composing practices mentioned in participants’ fortune-tellers including “collaboration,” “teamwork,” “connecting,” “responding,” and “cooperating.” For example, one teacher wrote, “It also helped to listen to [teacher’s] words of encouragement and

knowledge. It was SO IMPORTANT to me to have [them] in my room so we could collaborate easily and often.” The practices mentioned also included a definitive affective component as participants across groups mentioned the relational practices of “empathizing,” “being honest” or “truth telling,” “taking risks,” “being respectful,” and “seeking diversity.” These affective components will be explored later in the chapter as I address what drives the composing network.

Who Gets Made

Flipping the question of who gets to make, I’ve also set out to understand who gets made in the network. This question grows from the long history of work in materiality which I explored in Chapter 2 that explores how humans both inscribe and are inscribed by rhetorical practices and takes on the new materialist proposition that both bodies and identities are created through the aleatory crash encounters with other material bodies. As I’ve described so far in this chapter, a host of people from different disciplinary and institutional networks have engaged/ been engaged by a host of digital and analogue objects, doing a host of science-y and writer-ly things together in the cMOOC network. So how do these objects, activities, and others act back on the composers themselves?

To understand what it might mean to be *remade* through networked engagement, it might first be useful to understand what it means to be *unmade*. Queer theorists like Judith Butler, Jose Estaban Muñoz, Robert McRuer, and Gayle Salamon have long been interested in the making and unmaking of gender and sexuality, and new materialists like Karen Barad have taken up these ideas of *performativity* beyond studies of gender and sexuality to understand ontology more broadly—the making of both matter and what matters—as recursive practices of composing, decomposing, and recomposing. Barad’s articulation of intra-activity asserts that both things and discourses/ideologies emerge from the same fields, making them intricately entangled, enmeshed, and intra-active. These material-discursive matterings are always involved in a choreography of making and unmaking, shaping bodily identities through layered performances that signify inside particular networks. When repeat performances fail, however, we witness the aleatory possibilities inherent in iterative work. We can glimpse the fragility of the construct of

“identity” and see how the doing of identity can just as easily be its undoing.

This unmaking/remaking of identities in *Remix, Remake, Curate* is evidenced most profoundly in narratives created by the poets and the classroom teachers. For example, one of the poets describes themselves as being a “youthful, seemingly tech savvy college student,” an identity construction that circulates through lore such as Mark Prensky’s racist and ageist trope of the “digital native.” This poet’s anecdote continues to weave together Google Hangouts and their apartment as significant places, the MacBook Pro and the iPhone as important tools, collaborating as a practice, as well as various team members both named and unnamed on their fortune-teller (see table 6).

Table 6

Poetry Educator’s Origami Fortune-teller Labels

Places	Tools/ Materials/ Objects	People	Practices	Number of Hours Per Day Facilitating MOOC	Disorientation
Twitter	Macbook Pro	[Poetry Educator]	DNA Extraction	2	Level 3
Google+/ Hangout	iPhone 5	[Poetry Educator]	Observation		
The Beach	Punnett Square	[Poetry Educator]	Metaphor		
My apartment	Keyboard	[Poetry Educator]	Creativity		
			Editing		
			Critical Thinking		
			Collaboration		
			Writing		

And in their experience narrative, they wrote:

Me, being the youthful, seemingly tech savvy college student, knew I would be able to

figure out Google Hangout fairly easily. While sitting there with my group I setup a Google hangout link to use during our make cycle. I thought it was that simple, just making a hangout and pressing play. Fast forward 3 months and the day of the hangout arrived. I walked out of class to my apartment to start the hangout, and when I attempted it failed. The wifi disconnected from my laptop so I made a hotspot with my phone to use the wifi. This idea failed also. Next I tried restarting my computer. After which the hangout failed again. I failed three times before calling any of my group mates. Luckily, they were geniuses. I called [teacher's name] and explained my problem starting the Google Hangout and [they] happily fixed it using [their] IT expert on hand at school. I was able to participate on my phone teaching the workshop in the palm of my hand.

This poet's narrative underscores the movement that happens when well-rehearsed performances fail and undo the identities that have sedimented through repeated successful performances. Interestingly, the teacher's name that was invoked in the narrative wasn't labeled in the original fortune-teller game. This poet labeled their fortune-teller with the names of four other poet participants, yet narrating the practice of failure materialized another human node on his composing network. It precipitated the growth of their collaborative behaviors beyond those people who were most similar to them, causing the turn toward a teacher to solve functional technology issues, a move that Prensky's narratives foreclose in locating technical expertise as an essential property of youth.

Remix, Remake, Curate teachers also created narratives that addressed the making and unmaking of their identities, and these were most pronounced in the ASTC interview. Several classroom teachers discuss how their identities as ELA teachers are being unmade and remade as they integrate more and more STEM learning into their classes. One teacher notes of the *Remix, Remake, Curate* maker network,

it forces you out of whatever mode of thinking or traditional practice...because as a language arts teacher, I love science, but when I hang out with [teacher name] and [they are] a graphic designer and very into like aesthetics and lots of new techy stuff, that begins to trickle into my passion and the work that I do with my students.

The remaking of those teacherly identities through the *Remix, Remake, Curate* network does not necessarily reverberate for these educators in their local contexts, however. When discussing the creation of the MOOC as an open network where knowledge and expertise connected, intersected, and circulated, teachers hinted at the difficulty of remaking their identities as trusted

and valuable knowledge-makers inside their own classroom. “Sorry,” one teacher said to their colleagues during the ASTC interview, “but my students don’t care about you all [other teachers]. They like hearing your feedback, but more from the folks that they think are experts because they don’t recognize educator expertise. The experts are the people that they want to connect with.” Another teacher responded in agreement: “Yeah, having [a scientist] say something about your bug and how it is probably this or that and then has some fact that she can pull out of her head about it.” So while facilitators recognized that technical knowledge in the cMOOC network was distributed across groups and bodies and flowed in a give-and-take, especially between poets and teachers, there is little data to support the idea that scientific expertise was recognized as located in any group beyond the scientists.

Finally, in addressing the question of *who gets made*, I’ll return to the concern I raised in Chapter 2 about the distinctions, boundaries, and material impacts of unmaking and remaking the identity of a maker. As I argued in Chapter 1, the rhetorical constructions of makers in the cultural imaginary are largely caught up with notions of masculinity, digitality, individuality, and entrepreneurialism, and those constructions of makers and making do show up in this study data, particularly in the ASTC interview. As I noted in Chapter 3, the teachers’ and poets’ responses in the ASTC interview were, on the whole, more positive, successful, and socially-acceptable; thus, this teacher’s discussion of the importance of making may be connected to beliefs about the *right ways* “to make,” which were elicited in the more traditional and formal research context of the semi-structured interviews.

In response to a question interviewers posed about what value *Remix, Remake, Curate* had for the local writing project site and its teachers, one teacher recounts their experiences of moving from a participant in TRWP’s previous cMOOC to a facilitator in the *Remix, Remake, Curate* network—leveling up his own capacity as an educator. This narrative follows what they describe as a leveling up of roles in their school, and the movement is attributed to their participation in the TRWP network as well as in their local district’s STEM partnership with the university. The teacher notes how their professional role is transitioning from visual arts

to STEM educator and how this transition brings with it new materials such as “software and firmware and codes and 3-D printing” as well as new practices such as marketing. The teacher zeros in on “technological innovation” as an emerging concern for him as an educator and argues, “it is important how we sell our ideas if we want to make physical profit so that we can buy more supplies.”

This comment underscores the entrepreneurial ideological frame through which making is being materialized in many schools through the STEM movement and the development of industry-sponsored STEM curriculum. However, it is an outlier in the cMOOC network data as the practices of making were most closely associated with the practices of connecting and relating, not the practices of competing and individual achievement as are common to entrepreneurial rhetorics. *Making* was mentioned in the cMOOC fortune-teller data sets on fifteen different occasions, twenty-six times in both the educators’ and the poets’ ASTC interviews, and ninety-two times in the facilitators’ newsletters, demonstrating that the community did indeed take up *making* as a central practice of *doing* in the network; however, this practice materialized alongside the practices of *listening*, *empathizing*, *collaborating*, *connecting*, *cooperating*, and *sharing*, practices that refigure making as an affective, relational orientation to others. So while the ideological struggle over what it means to be a maker was present in the cMOOC network, the prevailing attitudes by participants provide hope that making can be recused from these neoliberal ideologies by closely investigating the networked material practices of making that can be elided when we focus on individual makers and their innovations. This leads me to the conclusion that to take on the mantle of a maker is to situate oneself and one’s composing practices in a dynamic constellation of diverse material bodies and to be open and responsible to those bodies as well as to the new kinds of bodies that will arise in the making.

What Gets Made

As I’ve stated earlier in this chapter, each make cycle was transacted through a number of routine weekly or bi-weekly *makes*. To begin a make cycle, facilitation teams collaboratively composed a make cycle newsletter that was emailed to all registered cMOOC participants and

also posted on the WordPress website (trwpconnect.wordpress.org) which served as the official hub for *Remix, Remake, Curate*. The multimedia newsletter format, including pictures, audio, and videos, was borrowed from the National Writing Project CLMOOC and each facilitation team remixed the newsletter with new content for each make cycle. Kickoff newsletters were meant to introduce broad areas of science inquiry, outline the activities that would take place during the make cycle that participants could do in their own classrooms or homes, announce synchronous online events like Twitter chats and Google+ Hangouts, as well as synchronous events that took place at the Museum of Natural Science such as BugFest, invite participants to engage and share, and provide resources to support participant making and sharing. Wrap-up newsletters were meant to bring that cycle to a tentative close and featured makes and makers that stood out to facilitators while encouraging participants to continue making and sharing in the next make cycle. This served as a periodic synthesis of what was being made in the cMOOC.

Each make cycle also included two collaborative synchronous online events—a Twitter chat at the hashtag #imakesci and a Google Hangout on Air that was live broadcast. These two makes featured prominently in the facilitators' fortune-teller and anecdotal narratives as the poet's narrative in the *Who Gets Made* section earlier in this chapter demonstrates. The Twitter chats were originally intended to be one-hour opportunities for adults participating in the cMOOC, mostly educators and parents, to connect and discuss some of the learning goals of each make cycle, explore science concepts, practices, and values, as well as learn more about resources and tools that could assist them in making with youth composers. Thus, they were scheduled for a weekday evening during each make cycle. In the first couple of make cycles, these were poorly attended, so facilitators decided instead to experiment with the timing, duration, and audience of the Twitter chats.

During the crystal make from year two, one facilitation team decided to moderate a day-long chat that better accommodated the facilitators' working schedules and allowed multiple class periods of students to participate as they rotated in and out of participating teachers' classrooms. Instead of structuring the chat around questions about science and poetry making,

as is commonly done in Twitter chats, the facilitation team leveraged this space as a place for collaborative science poetry making. One of the facilitators started with a simple invitation, tweeting “We’re ready to go, so here’s how the game works: I’ll post a line, you post a line, and we write a poem about DNA together. #imakeci #imicro.” This invitation resulted in a 60-line poem about DNA composed by 27 different authors, including youth composers and the scientist/poet/teacher facilitation team (see fig. 9).



Fig. 9. Collaborative Twitter DNA Poem

Unlike the Twitter chats, the Google hangouts were scheduled during the school day and were meant to give students an opportunity to share their poetry and science making, to ask questions about concepts and practices they were struggling with, and to give them an opportunity to connect synchronously with poets, scientists, and other classrooms. As they

were also live broadcast on YouTube and shared on the cMOOC platforms, they provided opportunities for those not participating to lurk and observe these events (see fig. 10).

Technological issues were frequent with this event-in-the-making as invitations to participate in the hangouts were not always received through the G+ platform and some teachers lacked adequate bandwidth to keep the connection alive in their schools. These troubles are mentioned by several facilitators as are issues with privacy for the elementary and middle school classrooms where students were not allowed on camera and participated via their teacher as a proxy for their questions. One teacher wrote:

My biggest frustration came with Google Hangout. I had used this before, however, they were resetting the school's network so the wifi kept going in and out. I really liked it when it worked because not only did it allow for collaboration with people from all different backgrounds, levels, ages, etc. This also allowed my students to get very creative.

These live broadcast recordings, in addition to the newsletters and resources that surfaced over the week in the G+ community were archived on the *Make With Me* page of WordPress site and updated weekly. Over time, with the contributions of each of the facilitation teams, this site (trwp.wordpress.com) emerged as a crowd-sourced digital archive of the things that facilitators made in the MOOC. The WordPress site also features prominent links to the G+ community where youth participants shared their individual and collaborative classroom makes.



Fig. 10. Google Hangout Screenshot

While I've largely resisted discussing the individual objects that were made in this cMOOC maker network, Christina Hass, Pamela Takayoshi, and Brandon Carr remind writing studies researchers to quantify writing studies data sets as much as possible. Quantifying as a rhetorical move can help us situate qualitative analysis alongside large-scale aggregate data about *what gets made* in digital networks. The following data, then, is meant to help readers contextualize the storylines I've provided thus far in this chapter and to understand the scale and intensity of participation in the *Remix, Remake, Curate* network. Facilitators and participants logged a total of 453 posts, 590 +1 approval responses, and 1,098 comments on participants' posts. Over the course of two years, the Google+ community engaged 377 Google+ users as members, with 148 considered "active," e.g., they posted at least once in the community. The community doubled its reach in year two, increasing membership in the G+ community by 65%. Interestingly, the top five contributors to the G+ community were all classroom teachers with one of the poets coming in as the sixth most prolific poster. Curiously, that poet did not contribute any original posts, but left 46 comments on other community members' posts. Over the course of the two-year programming, the most popular categories were #imicro which included posts and activity from the microworld world of crystals in year one and the DNA and life codes posts in year two, #ihacksci which included posts and activity from the computer programming languages and coding meaning on the web in year two, and the #inatsci which included nature memories as well as insect and arachnid anatomy and physiology .

The following is an incomplete but representative listing of the kinds of science and science media makes that emerged through the different make cycles as responses to the invitations that facilitators made in the newsletters. While not a complete list, these artifacts indicate the diversity of individual and collaboratively composed products that materialized in the cMOOC community. Each of these was identified by facilitators as salient and featured prominently in make cycle wrap-up newsletters:

- [a class poem about a birch tree written from field notes](#)
- [a collaborative rhythm circle representing nature sounds](#)
- [pictures of a hawk spotted in an urban area](#)
- [an individual student's poem about moss](#)
- [a student's audio recorded "I Am From Poem"](#)
- [a student's remixed audio recording and reflective writing about her sound mixing](#)
- [a student's video recording of a haiku poem about rain accompanied by a sounds from a rainstick](#)
- [a teacher facilitator's how-to video for coding poetry in Mozilla Thimble](#)
- [a participating teacher's blog post about nature, painting, and play](#)
- [a student's nature drawing](#)
- [a student's six word poem HTML-coded in Mozilla Thimble](#)
- [a photo of a student's story of Charlie the Centipede](#)
- [a video of a participating scientists demonstrating how to extract DNA](#)
- [a video of a student reading a pop-up book about fireflies](#)
- [a video of a youth participants singing about butterflies while playing the ukulele](#)
- [a time lapse video of a facilitator and child extracting DNA](#)
- [a blackout poem excerpted from a nonfiction article about DNA](#)
- [a Photoshop image of a fictional genetically mutated animal](#)
- [a poetry how-to video created by a poet facilitator](#)
- [a screenshot of a student's name coded in binary with digital Legos](#)
- [a student's coded message using type symbols](#)
- [a picture of students' bracelets coded in binary with colored beads](#)

These objects demonstrate the ways that networked science *making* is entangled with networked science *writing* as scientific meaning-making and science-media making practices like the extraction of DNA and the sharing of DNA double-helix structure poems are explained, shared, contextualized, and discussed by participants through alpha linguistic writing and responding.

For example, the Google+ post listed above in which the student shared a [remixed audio recording](#), the student writes a 117 word description of their composing processes that accompanies the shared audio file. Three cMOOC facilitators—a teacher, a poet, and a scientist—commented on the student’s post with an additional 62 words in response to the poem and the reflective description. Science writing is thus co-produced when science making is shared in online spaces. As Deborah Brant notes in the *Rise of Writing: Redefining Mass Literacy*, writing is “on the rise” because, as we see in the cMOOC, it is the primary means of connecting in online spaces. In our contemporary networked culture, she argues, individuals spend more time writing than reading, and this shifts the socio-cultural parameters of literacy. She writes, “more and more people write for prolonged periods of time from deeply inside interactive networks and in immersive cognitive states”(160). The objects included in this litany, however, challenge Brant’s findings, as “reading,” “observing,” “looking,” and “listening” are named as practices that are embedded in science making and science writing. These practices are, however, largely invisible because they don’t leave the same traces as the production-centered writing practices that makers in this study named, like “Tweeting,” “reporting,” “editing,” and “publishing.”

In addition, the objects listed here are composed from a variety of digital and analogue matter threading across online and offline places. In the digital places of the cMOOC, they are flattened into code and translated into bits and bytes that can travel across the World Wide Web. It’s important to remember, however, that all of these compositions are both material and discursive as they engaged composers’ bodies, other objects, hardware, software, and infrastructures of delivery, as well as the material and embodied meaning-making practices such as those discussed in the section *How Do They Make. Remix, Remake, Curate* participants were challenged with the task of building a program together that no individual or group could have composed on their own; therefore, the most obvious answer to the question *what gets made* is the network itself. Over the course of two years, the constellations described in the previous sections created a *net* capable of doing a tremendous amount of literacy *work*, one that gathered up a

diversity of youth and adult makers to compose with each other and with the objects, practices, tools, and places of science and poetry.

What Drives Composition (As Process and Product) in the Network

This final question guiding this study considers how movement happens in the network as bodies align, misalign, and go together toward particular objects. As I argued in Chapter 2, this movement is mediated by affects which speed up or slows down the movement of human and non-human bodies in a composing network. The affective intensities that emerged in this study coalesced around what Dr. Banks and I coded as “fear of failure.” Fear of failure emerged for participants most often in response to feelings of “falling behind,” to anxieties around not being a good collaborator or facilitator, and especially toward synchronous connecting and composing technologies like Twitter and Google Hangouts. In fact, many of the *Remix, Remake, Curate* facilitators’ experience narratives read like missed connection stories titillating with excitement, anticipation, and ultimately frustration around not being able to connect with others online. I briefly recounted one such story in Chapter 2, but here I will give it more attention. One of the teachers told the following story about public loneliness while facilitating a Twitter chat, showing an initial anticipation that dissolves anxiousness:

When we did the first make with the crystals, we had a lot of good ideas in our group, but things didn’t always come together like we might have wanted them to, especially in terms of scheduling. For our Twitter chat, I ended up just tweeting all by myself for the first half, asking questions and answering them myself, which was extremely uncomfortable. We planned to have our elementary person’s students and our middle school person’s students participate in the chat, so we scheduled it for a time when I didn’t have students in my room. There ended up being last minute schedule conflicts for the teachers whose students were going to participate, so that’s why it was a lonely chat. Eventually, I texted [another educator] and got [educator] to start participating and adapted some of my questions so that they were more open to future considerations.

This narrative invokes Sara Ahmed’s theories of fear as misalignment between bodies that I discussed in Chapter 2. For this educator, “things didn’t... come together.” In other words, inside the rhythms of the school day, these extra-curricular projects involving students, teachers,

scientists, and poets from different institutions couldn't synergize, and this misalignment caused negative feelings. In fact, most of the synchronous live events created just as much anxiety as they did excitement because of technological issues and scheduling issues like these. Failed alignments, however, did create "other rewards" (Halberstam 3) as noted earlier when participants leveraged these failed Twitter chats to create day-long collaborative poems.

Samantha Frost reminds us that the "the feeling of fear orients the subject in time: forward-looking, backward-looking, or some combination of these" (165) and that "fear is a passion among whose effects is the illusion of individual autonomous agency." In other words, it is through the experience of fear that past, present, and future are pulled together into an affective experience, one that reminds us that we are not, in fact, self-determining, independent, and free individuals or makers. Similarly, in the *Cultural Politics of Fear*, Ahmed argues that the attachment of fear to a particular body serves to restrict its movement. Ahmed's examples of this phenomenon include the surveillance of Muslim bodies who are monitored and impeded from boarding planes or entering other countries because of fear that they may be associated with terrorist networks. Taking on these two ideas about the origin and consequences of fear, we can better understand how *Remix, Remake, Curate* facilitators' pervasive fear of failure situates them in a time of educational preoccupation with achievement, a positioning predicated on linear notions of success and failure instead of recursive notions of engagement. And we can also theorize how the network worked to contain objects and bodies that might be coded as "failed," particularly compositions and composers that failed at communicating with appropriate scientific discourse and failed to meet the expectations of scientific disciplinarity.

Returning to Robert Payne's analysis of how ideological norms regulate the flows of sharing in networks, we can learn about the regulatory forces in the cMOOC network by tracing what circulates, following the affective currents that lead to the production of certain kinds of *appropriate* and *inappropriate* sharing. As Payne notes, when certain bodies share too much

⁹ According to an analytic report of the Google+ community generated from the app Community Meter.

they can get saddled with particular affective “skins” as they fail to orient correctly in the network, producing anxiety for others as well as a host of straitening responses meant to pull the bodies back in line with normative flows. For example, in the *Remix, Remake, Curate* network, youth composers shared a number of playful mashups, science- and science-fiction inspired compositions that demonstrated an uneasy tension between composing in the humanities and composing in the sciences. During the biotechnology and life codes make cycle in the spring of year two, high school students began rapidly sharing and iterating on Photoshop mashups of fictional animal and human-animal mutations. Their teacher posted early in the day that the class was “Extracting DNA in a Dreamweaver class. Exploring the connection in Science, Writing/ Poetry, and Graphic Design.” During that same school day, sixteen different animal mash-up images were posted, and the two most popular posts of all time in the community⁹ were genetic mutation mashups created by students in this teacher’s class.

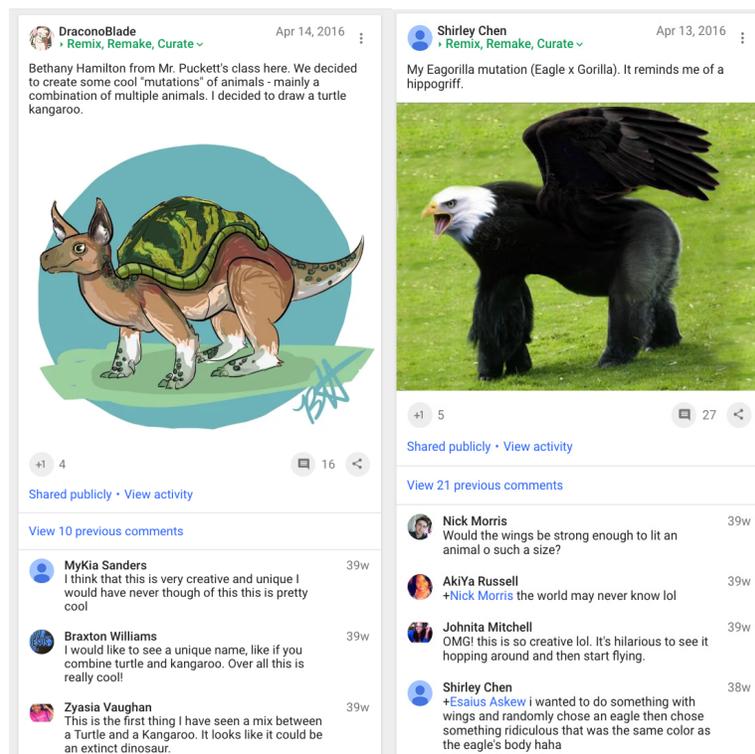


Fig. 11. Photoshop Animal Mashups

These two artifacts (see fig. 11) were reshared four and five times, a high number for makes in the Google+ community, and received the most comments from other participants, with the “turtle kangaroo” receiving 16 comments and the *Eagorilla* receiving 27 comments, mostly from other students. In the comments, students asked questions about the mutated animals, prompting the mashup artist to compose fictional text about its anatomy, diet, and mating behaviors, concepts and natural science discourses that threaded through from the previous make cycle about insect and arachnid anatomy. These statements, however, were parodic and created a comedic effect that was recognized and picked up by other students. One student noted that this *Eagorilla* is the “definition of America!!!!” and several students agree and include the hashtag #murica in the comments, invoking the rural pronunciations of America that are often associated with deeply held values of nationalism, patriotism, and American strength. Another teacher comments, “I love these so much precisely because they seem so impossible. It’s the stuff of science fiction...” but that thread is also dropped as students ignore the teacher comments and steer the conversation toward more frivolous conversations: another student comments, “If I saw this I would probably take a selfie with it! lol.”

One of the participating teachers also comments that these mashups invoke questions about both authenticity and ethics and uses the tagging feature of the Google+ community to invite the facilitating scientist into the discussion. The teachers ask the scientist to address the plausibility and implications of such improbable combinations. Interestingly, the scientist does not engage the conversation around this artifact, nor does the scientist comment on any of the related animal mashups. This is a peculiar absence considering the same scientist had commented on other kinds of makes shared during the same time period, particularly photos of DNA extraction that are materializing on the community alongside these silly and impossible mashups. While timing may be partially responsible for the silence, this is also likely related to the scientists’ expressed frustrations about responding to imaginative content that fell outside the

¹⁰ This data is culled from grant reports and meeting notes.

parameters of descriptive science writing and science making.

In year one, the *Remix, Remake, Curate* facilitators had identified that locating “science” in the science and science media making being shared on the community was, at times, a challenge; thus, in year two, they explicitly identified a need to pull at the science literacy threads that were present but not immediately obvious in the student artifacts¹⁰. As mentioned earlier, the science aspect of the programming was clearly frontloaded in the newsletters and resources, but throughout the youth making, the teachers were the primary respondents to student work. Since only a handful of the teachers who participated in year one teach science, many of the teachers felt comfortable pushing on the literacy and poetry aspects of students’ shared compositions but ill-equipped to question, tease out, or respond to the science concepts or connections. On the flip side, the scientists reported in meetings that they were not comfortable responding to shared, digital student work at all as their programming was largely in face-to-face and there was little expectation in informal learning to close that feedback loop of inviting, making, responding, and re-inviting. Thus, the facilitation team worked between year one and year two to build response protocols that were intended to loop the science learning throughout the make cycle by responding to student artifacts, noticing and prompting both the science and writing concepts, practices, and stances that we identified as outcomes for each make cycle. These were attempts to “norm” the sharing in the community that had exceeded what was acceptable, triggering particular affective responses—fear of failure, disorientation, discomfort—from facilitators. Enacted in year two, these protocols, which are presented in Appendix C, served as norming structures that would help the educators manage the silly, the inaccurate, the flippant, and the improper approaches to science and science media making, straightening out these lateral ways of composing that exemplified the *wrong ways* to make science.

This is apparent in the anxieties around an elementary student’s make in year one. During the collecting and curating nature and memory make cycle, one student shared the [a memory about visiting an aquarium and learning about a shark](#), using the digital composing tool ThingLink to create a image with embedded digital content (see fig. 12). The student’s teacher, a

participating facilitator, posts a link to the ThingLink composition which includes a photograph of the student holding the paper drawing and one line of anchored text which reads “He is about 50 feet long.” The teacher adds the following comment to the artifact, “This is [student’s] nature story about a shark he saw at the aquarium. We are going to double check on the size of the shark. He may still do some editing so feel free to ask questions and he can add them to his digital story...”

Two teachers commented on the student’s artifact, appreciating the student’s work with new media tools and nature narrative, yet there was no response from the scientists. During the subsequent facilitator’s meeting, this artifact surfaced as one that created a sense of disorientation for the facilitating scientists. They asked, “Is it our role in this MOOC to tell the students they are wrong? Do we just let these kinds of inaccuracies go or should we be correcting them?” Out of these questions the following responding facilitation protocol emerged as a way to balance contributors’ experiences and expertise.

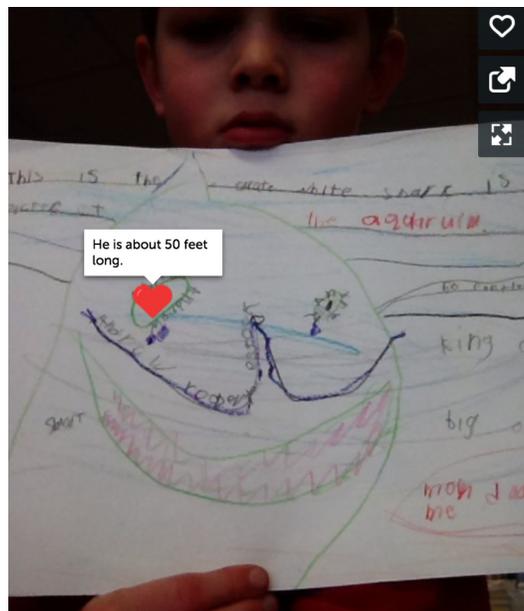


Fig. 12. Fifty Foot Shark

The affective currents that pulsed around this student’s make revealed underlying anxieties about how we make knowledge in a networked era. As danah boyd notes in an article

about the backfire of media literacy in an age where we've systematically discredited expertise, experience as a way of knowledge making has become a powerful truth-making paradigm. Citing the news media's lack of coverage of marginalized people's concerns, she notes, "For decades, civil rights leaders have been arguing for the importance of respecting experience over expertise, highlighting the need to hear the voices of people of color who are so often ignored by experts." This has backfired, she argues, because our experiences are so polarized that we are unable to connect and negotiate meaning, matter, and action. She goes on to argue that the impacts of these ideological shifts are severe:

In the United States, we're moving towards tribalism, and we're undoing the social fabric of our country through polarization, distrust, and self-segregation. And whether we like it or not, our culture of doubt and critique, experience over expertise, and personal responsibility is pushing us further down this path .

From an analysis of the circulation, anxieties, uptake (or lack thereof) in the cMOOC, two primary tensions arise. The first is the competing desires among the educators and the youth composers as the educators demonstrated a nervousness about play, anxieties about composing technologies, and pre-occupations with outcomes and the intentional use of digital writing and science-making tools. The youth composers, however, pursued non-linear, aleatory connections, linking DNA, conventions of science writing, political parody, humans and animals through lateral composing processes that enfold their peers in their compositions as is evidenced in the *Eagorilla* mashup. These affective priorities order and structure meaning making for each group and create a stress in the composing network as the different groups orient toward different practices, objects, and desires.

Second, there is a tension between valuing participants' experiences with science and scientific expertise in the cMOOC, one that is mediated through the science and science media making. As a "mediator between technology and what we have come to term 'users,'" Bernadette Longo suggests that "technical writing practices work to conquer users' native know-how and reformulate these uneducated practices into scientific discourse that can partake of

cultural power residing in scientific knowledge” (117). From this perspective, we can see where youth composers both took up and resisted scientific knowledge-making practices, making the educators in the network nervous about a host of failures that are, in this current political climate, often attributed to schools, to students, and to their families, not the discipline itself. Invoking Halberstam, then, I wonder if successful science making and scientific disciplinarity “requires so much effort for some, then maybe failure is easier in the long run and offers other rewards” (3). Some of those “other rewards” might be present here in the *Remix, Remake, Curate* network as teachers’ fears of failure were mediated by their students’ enthusiasm, engagement, excitement, and participation. Perhaps to enjoy those rewards, we need to relax the “suspensory power” (Bennett 72) and disciplinary expectations about what it means to be “scientific” and instead experiment with interdisciplinary approaches to science meaning-making and matter(s), seeing what falls out when we take intersectional, interdisciplinary approaches to increasing science literacy for underserved populations. I’m certainly not advocating in this chapter for getting rid of rigorous, discipline-specific modes of investigation and knowledge making. Rather, I’m suggesting that we tend to see those methods more clearly when we bring them against other methods and when we make failure an option in making science.

In Chapter 5, these affective tensions will continue to emerge in the high school pop-up makerspace case study as I’ll investigate how science making is regulated by other norms such as gendered norms of participation that adhere to particular objects and practices of science making. As Chapter 5 details, the textures of making in primarily face-to-face maker spaces, features of network circulation commonly discussed in digital networks are mapped onto the makerspace network young people and their teachers are composing in the physical space of the school. This approach underscores my assertion that composing practices are not contained online or in face-to-face spaces. The cultural logics and practices are remediated in each, impacting who and what gets to make, who and what gets made, and what drives the materialization of the network.

Chapter 5: Making In School: Rainbow Robots, Chicken Wings, and a Prosthetic Hand

Introduction

In 2015, the LRNG Innovation Challenge (www.educatorinnovator.org/lrng2014/) grant provided \$20,000 in funding to J.H. Rose High School (<https://www.pitt.k12.nc.us/jhr>) and the Tar River Writing Project (www.trwp.org) to plan, develop, and facilitate pop-up maker spaces. With a tag line of “No Bells, No Walls, and No Limits on Learning,” LRNG, with support from the John Legend Show Me Campaign and the National Writing Project, challenged educators to apply principles of Connected Learning in their local contexts by designing opportunities for young people to explore their interests and passions. As described in Chapter 1, Connected Learning (Ito et al.) is a framework of learning design principles that foregrounds production-centered activities like making and experimenting and acknowledges the transformative power of peer-to-peer networks and adult mentoring to cultivate shared interests. Connected Learning also leverages digital tools and open networks to connect young people to each other and to mentors, and hinges on the belief that all people have the right to rich educational experiences that connect them to social, political, and economic opportunity.

J.H. Rose High School (JHR) and the Tar River Writing Project (TRWP) have a long history of collaborating on curriculum and professional development grant projects, and the leadership of both institutions share a commitment to serving JHR’s racially and economically diverse population of teachers and students. In 2014, when the LRNG grant opportunity arose, leadership from JHR and TRWP seized on the chance to design new para-curricular programming for the school’s SMART Block period. While many students were currently taking advantage of SMART Block, a seventy-minute open lunch period during which students could study, receive additional academic help, play intramural sports, or participate in club activities, other students were not—particularly African American students who qualified for free and reduced lunch. While white and middle class students were using this time to develop their academic and social networks—taking advantage of subject-area remediation, studying for tests, accessing digital networks in the school’s computer labs, or practicing for Quiz Bowl or Science

Olympiad, students on free and reduced lunch were more likely to be found in the largely unsupervised cafeteria where fights tended to break out, or wandering the halls in non-designated SMART Block areas. These students were also more likely to receive disciplinary violations, landing them in what students were starting to call “SMART Block Jail,” the equivalent of in-school suspension, during this period. Thus, pop-up makerspaces were designed with these students in mind—an intervention that could engage these young people in making things that mattered to them and help them to grow their social, academic, and political networks.

To find out what kinds of things might matter to these students, the makerspace design team, composed at that time of the school’s instructional coach and myself, launched a student survey in Spring 2015. From that survey, we found that 89% of the 184 9th-12th graders surveyed were “interested” or “very interested” in making things during SMART Block, and they were most interested in making music, food, art, and games. Fashion, robotics, and digital making also ranked highly among their interests. After conducting the surveys in a random selection of standard (non-honors and Advanced Placement) classes, the design team worked to identify eight to ten teachers across the curriculum and grade levels that shared those students’ interests and would also be available during SMART Block to facilitate makerspaces. The instructional coach met one-on-one with potential teachers to talk with them about the grant and the project commitments, and we recruited ten additional teachers from culinary arts, art, English, history, music, STEM, computer science, and science. For the remainder of the spring semester, we used the digital application Tackk to host an online professional development community where we read and discussed articles and case studies about Connected Learning, making, maker ed, and makerspaces.

In June 2015, the makerspace design team, which now consisted of myself, the instructional coach, and the teachers, convened for a five-day institute at East Carolina University with the goal of engaging each other first *as makers* and then making plans together for the pop-up maker spaces that would start in the fall at JHR. Each day, the first two hours of the institute were reserved for making textile projects, and the tables were littered with sewing and

embroidery machines, bleach, stencils, paints, an assortment of fabrics, iron-on patches, fabric cutting mats, scissors and rotary cutters, conductive thread, LED lights, knitting needles, crochet hooks, yarn, and other materials. The instructional coach had also made *Challenge Cards* which were spread out on the tables. The five *Challenge Cards* titled “Sew Fabric,” “Machine Sew,” “Stencil,” “Bleach Stencil,” and “Flag Design” contained easy-to-follow directions as well as links to instructional videos hosted on YouTube that would help educators compose with the tools and materials in our “pop-up” makerspace. These challenges could be used to move from lesser to more advanced activities in the fabric makerspace, but they were not conceptualized as mandatory steps in a curricular series. They were meant to model the kinds of “open curriculum” materials that teachers could design for their makerspaces as well. Like most makerspaces, the cards weren’t the only, or even the primary means of support available to those of us who were new to the tools. In these spaces, other human beings are the most valuable learning resources. And we were delighted, in fact, when another teacher brought her mother in to show us how to use the digital sewing/embroidery machine. This modeled the kinds of interest-based connected learning across generations that can happen in openly networked makerspaces.

When design team participants weren’t making with fabric, they were making with laptops and tablets, Google documents, pens, paper, Post-it notes, chart paper, the windows in the library, and glass crayons. They were working out makerspace partnerships, the foci of these spaces, open curriculum projects, the materials and tools they would need, the days they could operate, and how they would spend their start-up budgets. And in classic National Writing Project tradition, they were making with constraints, namely the constraints of design charrettes and feedback protocols. They were also preparing for the days when student makers and school leadership would join the institute, preparing elevator pitches and ways to collect feedback—first from the students and then from their administrators. Because we were committed to participatory design of these makerspaces, we first hosted students on Wednesday, making alongside and with them in the fabric makerspace, then sharing makerspace plans, and finally recruiting them to serve as Maker Mentors in the spaces in the fall. Finally, on the last day of the

institute, the SMART Block committee, which included parents, school administrators, and other teachers, joined the institute to hear the plans and learn how they could provide support for the makerspaces during the upcoming school year.

When the 2015-2016 academic year started, Maker Mentors debuted the makerspaces at JHR's open house, and in September, the following six makerspaces opened around the school:

- The Remake Lab: Upcycling Old Furniture, Appliances, Broken Things
- The 3D Fabrication Lab: 3D Scanning, Modeling, Printing, Rapid-Prototyping
- Digital Storytelling: Stop-motion Animation, Green-screen, Movie-making
- The RoboHacker Lab: Robotics, Programming, Circuitry, and Video Game Design
- Clothing Closet: Tie-Dying, Bleach-Stenciling, and Accessory Design
- Music and Beat Making: Music Production, Analogue and Digital Instruments

Each space was open either two or three days out of the school week, and the teachers tweaked their operating schedules based on student demand. They experimented with pop-up locations around the school and different kinds of projects, and they advertised and promoted the spaces with signage and daily announcements.

Over the course of the academic year, the teachers met to support one another, and one concern that was voiced over and over during their meetings was the intensity of facilitating a makerspace. Even though two teachers were co-facilitating a single makerspace, teachers voiced concerns over the loss of their planning periods and found it difficult to pop-up and clean-up within a 70-minute time frame, even with the help of their Maker Mentors. Eventually, most teachers decided it was best to “pop-up” in their own classrooms given the time and space constraints of meeting students in the large commons areas. At least one facilitation team tried advertising and hosting full-group demonstrations to manage some of the chaos of students dropping in across the period, but that intervention wasn't successful. Students liked being able to pop-up at any time during the SMART block session to make. Because of the high demand, teachers also struggled to maintain inventory of expendable materials; however, the instructional coach secured an additional \$10,000 in grant funds from internal and external sources, which

were budgeted for spring 2016 and fall 2016. The biggest material challenge, however, was the lack of adult mentors who could provide general oversight and/or technical expertise.

After the summer institute at ECU, the LRNG funding that supported the partnership between JHR and TRWP was exhausted. There were no funds to pay for my continued involvement with makerspaces; thus, the instructional coach took on an informal leadership role at the school level. We kept in close contact as we wrote final reports for the LRNG grant and public relations pieces on the project together, which is where the data in the previous paragraph was gleaned, but I was no longer directly involved with the makerspaces at JHR. After stepping away from a project for nearly a year, I was eager to begin my research with student makers at the school. At that point, the makerspaces had been in operation for eight months, and I was curious about *who and what gets to make, who and what gets made, how making happens, and what drives the composing network*.

Who Gets to Make

As I wrote in the introduction to this chapter, the Pop-Up Makerspaces were designed with a particular student population in-mind—students who were not otherwise engaged in production-centered, network-building activities during SMART Block. These students tended to congregate in the school’s cafeteria during the SMART Block period. Since music-making was such a popular choice in the student survey, one of the makerspace design team members set up the Music and Beat Making Studio in the cafeteria space. Some of the composing tools and materials in this pop-up space included iPads, Garageband and other sound mixing applications, musical instruments, microphones, remixable tracks, and school SoundCloud accounts for saving and sharing music. According to the instructional coach, there was a good deal of participation there; however, there were numerous complications due to the open nature of the space and the lack of adequate instructional and logistical support.

After I received permission from my Institutional Review Board, the school district, and the school principal to conduct research in the school and in these makerspaces, particularly

the Music and Beat Making space, I was excited to begin collecting data through gameplay with these students. The instructional coach suggested I research The Remake Lab, The 3D Fabrication Lab, and The RoboHacker Lab instead. There were several good reasons for his steering me away from the Music and Beat Making Lab, even though those were the stories of composing I was most interested in collecting. First, this was one of the most vulnerable makerspaces at the school. The teacher did not have a co-facilitator, had unreliable leadership from the Maker Mentors, was juggling multiple extra-curricular commitments, and was having difficulty with the logistics of the cafeteria's wide open space. Second, the instructional coach feared that most of the students in the cafeteria were not of age, and I would have difficulty securing parental permission for participation in this research study. Finally, there was little consistency in student participation in that space; thus, the students would likely not be able to craft meaningful narratives of their experiences making with tools, materials, places, or people. In New Materialist terms, we might say, these students hadn't been enfolded in the maker network.

On the other hand, the three makerspaces that were suggested had other affordances. These spaces had a host of makers that were eager to participate in the research study and did bring in signed forms from their parents or guardians. While these students weren't exactly the target population, the students participating in these spaces (and in this study) were not a homogenous group; they came from diverse racial, ethnic, economic, linguistic, cultural, national, and technical backgrounds. In addition, the spaces featured a diversity of high- and low-tech composing tools such as 3-D printers and robotics equipment as well as glue, paint brushes, and torn paper. And, while I didn't get a chance to engage the population of student makers in the cafeteria, the Remake Lab became an alternative space for students seeking refuge from the chaos of the cafeteria. In addition, students who might normally be in cafeteria area also began to visit both The 3D Fabrication Lab and The RoboHacker Lab, with white styrofoam lunch trays in hand, making and eating like many other students. I'll discuss these students in more detail later in the chapter. In sum, seventeen JHR student makers participated in this research study: seven

Black Males, four Black Females, two White Females, two Asian Males, one Asian Female, one White Male.

As I described earlier in the chapter, these makerspaces were born from a process of participatory design, and it was clear from my observations and from students' narratives that teachers were working to provide access points for students to engage new materials, tools, and technologies. Not only were makerspace signs hanging in the halls and daily announcements made reminding students about days and locations for the different makerspaces before SMART block each day, but facilitating teachers and Maker Mentors were often standing in the doorways inviting students into the spaces to participate. Both students and teachers worked to connect other students to new tools, materials, and other makers. For example, during one of my observations, I was sitting at the back of the The 3D Fabrication Lab, and the makerspace teacher was standing by the door, using an X-acto knife to weed the negative spaces out a vinyl Storm Trooper sticker he had printed on the vinyl cutter. He was facing the door and looked up whenever students walked by. The Maker Mentor, a Black Male student who seemed to live in The 3D Fabrication Lab—taking classes with the facilitating teacher, coming in for SMART Block as well as before and after school—was working on a t-shirt screen but moved closer to the door when the Smart Block period started.

“Hey! Come on in,” the teacher said as a group of students wandered by in the hall.

The maker mentor grabbed the screen and walked out into the hall. “Really? Where you going? You need to come in here and see this, man. This is hot! Where you going? Come on, dude. Follow me.”

The three students hesitated, then followed him in. He was taking them over to the t-shirt printer, but they stopped as soon as they saw the 3D printer. For a solid minute they watched its print arm move methodically and intentionally back and forth under its white light. Gently, it hummed,

The teacher followed them over and said to the Maker Mentor, “You finally got that base positioned right, huh? I think you wasted a spool of filament on that thing.” Then to the other

students, “I don’t think I’ve seen you guys in here. Let me show you around.”

They new students finally looked up from the printer. They followed the teacher, lagging behind, still glancing back at the printer. “We’ve got origami and Cubecraft projects you can work on over here.” He pointed to a table where three students were working. “We’ve got 3-D pens if you like to draw.” He gestured for two students to show their work. “Hey, would you two show these guys what you’re working on?” The students held up intricate tracings of the sides of an Eiffel Tower Project. “You can come in and jump right on these if you want, just make sure the filament doesn’t run out.” He grabbed the tail of plastic extending from the pen to show them what he meant.

One of the students said to another, “Yeah. Tomorrow we come here?” The other nodded his head.

Then the Maker Mentor quipped, “Yeah, man, but not to play with those. Ya’ll need to come in here and help me print these t-shirts. I got too much going on. I need some help.”

These kinds of crash encounters of unexpected bodies in a space don’t just happen. As the instructional coach wrote in one of our final reports, “Perhaps metaphorical walls and bells are more constraining to students than actual walls and bells” (1). Even though the door to this makerspace was wide open, these students were hesitant to enter. And despite being invited by the teacher, they had to be goaded by the maker mentor to enter the space. A lifetime of walls and bells have, it seems, like the structures of Foucault’s panopticon, become internal structures that mark the classroom as a place you go for class, not a place you might go to make, play, and learn—especially during a “free” period.

At the other end of the school, in The RoboHacker Lab, making spilled out of the classroom and raucous laughter filled the hallway. Five students stood around looking at two mobile phone screens. Two Sphero robots, held by two of the students, were cycling through their red, blue, and green colorscapes.

“We’re going on a cruise, little buddy,” one of the students said to his Sphero. He leaned his head down and puckered his lips as if he were going to kiss it.

“He looks like a happy child,” another student said to me shaking his head.

“I think I broke it,” said a third. “Mine won’t connect.” He shook the balls of wires.

“Don’t do that! It’s not BB. It’s your phone, man. You know Android is a POS,” said another student.

“Watch your mouth,” the teacher said, walking out into the hall.

“I’m good at this,” the first student said to me. “I’m ready.”

“Help me, [teacher],” pleaded the student with the disconnected Sphero.

“I don’t know what’s wrong,” the teacher said. She tapped the screen on the student’s phone. “Maybe you need to update the app?”

“He’s out then. Get out of here with that Android mess. Let’s do this!” the first student shouted.

The new contender paired his phone and tested the connection. He gave the Sphero a test drive and checked the directionality. Right. Left. Backward. Forward. They placed the robots on the starting line, and everyone moved twenty feet down the hall to the finish line. Someone yelled “Go!” and the little robots rolled in rainbows towards the finish line. The students howled with laughter, as the teacher laughed and shushed them at the same time. The student who affectionately leaned over to kiss robot won the race. He told me he always wins. The other students agreed. Then the student with the Android came back, but this time he had an iPhone. They let him back in the rotation, and these five students raced again and again, mostly oblivious to the other students at the door watching these rainbow robots race.

From the fortune-teller data I collected the next week in The 3D Fabrication Lab, I learned there was another perspective on this story—a perspective from one of the students I had seen standing at the door watching the races. I also learned how the student with the Android suddenly showed up with an iPhone ready to compete. But before I share the perspective of this observer, a perspective gained from the data in her fortune-teller and experience narrative, I want to share some context that I gathered from both my observation notes and from follow-up questions with the makerspace design team.

This student who had been standing by the door was one of four Black Females who participated in the study; yet, unlike the other females, she associated mainly with Males in the makerspaces. Her demeanor was generally quiet; however, she asked questions of teachers when necessary and carried on conversations in small groups. She often entered The RoboHacker and The 3D Fabrication Lab roughly ten minutes after the SMART block period started, and each time I observed, she was carrying a white styrofoam lunch tray, a fairly accurate indicator of lower socioeconomic status in the school. She would sit down either alone or with a small group of males to eat and work on projects. When I recruited students to participate in the study, she wasn't one of the first to volunteer, however, teachers in both The Robohacker Lab and The 3D Fabrication Lab suggested I speak with her one-on-one because she was a regular participant in both spaces. When I approached her, she asked direct and thoughtful questions about the study and agreed to participate. Her fortune-teller data is displayed in table 7.

Table 7

Student Fortune-teller Data A

Places	Tools/ Materials/ Objects	People	Practices	Number of Days Visited	Disorientation
3D MakerSpace	Circuits	[Black Male Student]	Making Circuit Noises	32	Level 2
RoboHacker	Laptop	[White Male Teacher]	Netflixing		
3D MakerSpace	Sphero	[Asian Male Student]	Helping Others		
RoboHacker	Robots	[White Male Student]	Snap! Making a shirt Playing with Sphero Coding/ Programming		

During the game play, her turn-taking produced “RoboHacker,” “Netflix,” “[Asian Male Student]” and “Sphero.” She connected these material dimensions with the following narrative.

I come to Robo Hacker on Tuesdays and Wednesdays. Sometimes tests are going on or people aren't here to participate, so I watch Netflix to pass the time. Most days I meet up with [Asian Male Student] and [Black Male Student] in here. Me and [Asian Male Student] tend to create things and have fun. [Black Male Student] likes to take my phone and play with the Spheros. I understand though because I really need to get my own Sphero. If it weren't for Robo Hacker, I probably wouldn't have heard of these things.

As I noted in Chapter 3, the process of writing is a process of invention, which is evident here in the student's narrative. The process of writing about the four dimensions of her making also materialized “tests,” which sometimes prevent students from participating in SMART Block, and her phone—the same iPhone that the student brought out to compete in the races. While the Black Male student was not randomized during game play, she had previously listed him as a person important to her making experiences on the origami fortune-teller, and she chose to include him in the narrative.

This student's narrative underscores that for some students, peer-to-peer collaboration is at the same time an essential condition *for* and a *barrier to* making, playing, and learning. When other students don't show up to the makerspace because of mandatory testing or other conflicts, instead of creating things, she chooses to engage in a consumption-centered activity—watching Netflix. Yet, when the right people are present in the makerspace, they “create and have fun.” On the other hand, when the *wrong* people are there, she is denied access to the shared technologies in the makerspace and to her own personal technologies as well. There is a sense of resignation about the student's taking away her phone when she writes, “I understand though because I really need to get my own.” It makes me wonder about how many times other boys or men have pulled video game controllers, screwdrivers, markers, or composing tools out of her hands. I, too, understand.

The findings in this section underscore the importance of both *invitations* and *interventions* as necessary preconditions for crash encounters that materialize difference in a maker network. These invitations are ongoing, personalized, and come from multiple channels and people involved with a space. They encourage all makers to participate fully in the production-centered activities of a space, including, eventually, leadership and the emerging directions of the space. This is the Maker Mentor model that, in practice, worked better in some spaces than others. Interventions, work to distribute resources more fairly and curb practices such as those described in The RoboHacker Lab, where only certain students get access to particular tools and technologies. Interestingly enough, this is often seen in school settings when Accelerated, Honors, or Advanced Placement students get opportunities to use tools and technologies for creative play and problem-solving while standard students are only allowed access to technology for testing. In this case, however, the “suspensory controls” have been relaxed at the institutional level, but it is the social rules and norms that are excluding this, and perhaps other, female makers. Community-based makerspaces like the Xerocraft Hackerspace (<https://www.xerocraft.org/about.php>) are already providing important interventions such as their WTF! Women, Trans, and Femme (WTF) night. One night a week, for a four-hour block, the space is facilitated by and reserved for WTF-identified makers, providing opportunities to redistribute technical and vocational composing expertise among those who have historically been marginalized. Academic and academic-adjacent makerspaces might look to some of these socially progressive models to implement interventions that can work toward maker equity.

What Gets to Make

In Chapter 4, I discussed the ways that web-based digital tools like Twitter and Google Hangouts performed as actants that make things move and happen in the *Remix, Remake, Curate* network. They created feelings of anxiety, loneliness, and excitement, and these feelings oriented

¹¹ This is a prime example of what N. Katherine Hayles would call a Platonic backhand.

¹² JHR has uncharacteristically “loose” web filters with most social media sites unblocked for student use. Most students, however, use wireless data to access the web making this a moot point.

bodies in the network towards and away from other composing bodies. In the *Pop-Up and Make* network, however, web-based social media tools made little, if any, impact on the student makers in this study. In fact, none of the students listed a single web-based social media composing tool like Twitter, Google+, Instagram, or Snapchat as import to their making experience. Between June 2015 and May 2016, there were 30 public posts on Twitter and 4 public posts on Instagram at the makerspace hashtag. These posts were, however, contributed by the makerspace teachers, including the instructional coach who tweeted from a makerspace dedicated account, and other educators who were working to create excitement around the *Pop Up and Make* project. Their posts were typically composed of photographs of students making in each of the six spaces with short descriptions of their projects. Even the Maker Mentors, who were also encouraged to amplify the student making in each space as part of their responsibilities, did not engage these social media composing tools.

The lack of student interest in the social media channels is intriguing, particularly given how teachers and adults more generally claim that young people are always on the internet posting and don't know how to engage in face-to-face settings. In addition, others claim that the maker movement is "the physical manifestation of the digital" (Olenski)¹¹ and makers have been empowered by Do-It-Yourself programming on traditional and web media outlets, finding inspiration for projects, connecting to other makers who are geographically dispersed, and learning how to do things through information exchange on the open web. JHR students, however, aren't sharing the things they are making on the school's digital media platforms, despite having full access to these sites at the school.¹² They didn't seem particularly keen on accessing the things that their peers have made online. I never heard students ask for or mention the dedicated hashtag; nor did I see them pull it up on the lab computers. And finally, students largely ignored those "leveling up" *Challenge Cards* that the design team created. Instead, they preferred experimenting, watching other students and teachers, and asking them for help when necessary as opposed to reading directions and accessing the YouTube instructional videos whose links were made available on the cards. In the final LRNG grant report, the instructional coach

wrote the following “...we have found in implementation is that students prefer to draw their inspiration from materials and people. The laminated cards and their linked resources are almost never used by students, and facilitators have stopped taking the time to make them available...”

(1). In these makerspaces, the physical presence and proximity of the materials, tools, and bodies was important for these students, much more important, it seems, than the distant connections, possibilities, and potentialities of the web.

These findings indicate that non-web-based making can have an important place in the composing curriculum when “sharing” is unintentional—the result of coexisting in physical space, breathing the same air, reaching for the same purple marker, or building the same sound circuit out of littleBits. Alternatively, this example could also be indicative of those metaphorical walls and bells that I described in the last section. The excitement that I experienced in the Remake Lab, The RoboHacker Lab, and The 3D Fabrication Lab isn’t crossing over to the digital platforms, at least from the students’ point of view. Perhaps students use their social media profiles to create other kinds of ethos or identities that aren’t tied to making, producing, collaborating, and its affects. Further research into the lacuna of student participation on these social media sites could address these uncertainties.

While the impact of social media technologies was minimal for student makers at JHR, other kinds of digital technologies left palpable traces. Robots, which have already figured heavily in this chapter, were powerful actants. These robots, specifically, 3D printers and Spheros, gathered up students and other tools and materials into collectives with different composing goals, behaviors, and orientations, as I’ve already demonstrated. In the story I recounted about the invitations in the The 3D Fabrication Lab, the printer was a gravitational object. The new students that I described, and countless others, were attracted to it, captivated and even mesmerized by it. I talk more about these attractions later in the chapter as I take on queer affect, but here, it suffices to say that the 3D printer turned bodies towards it and towards each other. This includes turning students toward teachers who facilitate these spaces even though they were not enrolled in their classes. In students’ fortune-tellers, the 3D printer was

mentioned ten times; however, one student listed the 3D printer 4 times over as the only tool important in his making. His experience narrative reads:

When I started with the 3D printer, I thought it was cool because I ain't never seen it before. But then he [teacher] was teaching me how to work it. I learned how to use it to print a phone case.

The novelty of this tool prompted the student to visit the space “20 times,” and with the help of one of the facilitating teachers, he designed and printed a custom phone accessory. His fortune-teller lists his disorientation level as “1”; however, the teacher reported he had several “failed prints” before getting the product he wanted. It seemed that neither the student nor the teacher was terribly bothered by failure in this context, which is a stark contrast from the teachers’ anxieties around failure in the *Remix, Remake, Curate* network. Perhaps it is easier to attribute failure to a machine when you can see it working and not working, extruding or not extruding plastic in front you, rather than when you can’t see its failure to relay bits, bytes, and the traces of others’ bodies in cyberspace.

While the 3D printer moved inside its box, tethered to electrical outlets, the Spheros were more mobile. When they weren’t being used by the particular group I described earlier in the chapter to compete with one another, other makers were using them more precociously. These composers were much less precise with the codes, and they often lost control of the machines. The Spheros rolled around the classroom, cruised up to other students, and circled them up in playful games. We might think of these playful rainbow robots, when performing in these ways, as new kinds of tools in Heidegger’s toolbox. Instead of being ready-to-hand or present-at-hand, they were quite literally *out-of-hand*. On several occasions they would roll the wrong way and interrupt students who were working on other projects. One afternoon in particular, a group of students who often worked in the far corner of The RoboHacker Lab, were working on programming a Lego Mindstorms Robot, a small prototype for an upcoming robotics competition. The Spheros, however, were rolling beside and under their table, and at one point, one of the makers, exasperated, reached over and grabbed the Sphero. “If you want to come over

here and help us with *real* robots,” he said. “We’d really appreciate it.”

While some of the more serious makers were not amused with these easily programmable machines, the makers in my study listed the Spheros 9 different times on their fortune-tellers, and three makers listed them twice. One maker, who participated only in The RoboHacker Lab, got caught up in making because of the little rainbow robot. As his narrative indicates, the robot led him to another student who was programming the device. From there he connected with the makerspace teacher to gain access to Spheros. His fortune-teller game log indicates he had visited the space “3 times,” and he had also built “buzzers” with the littleBits programmable circuit toys. The student wrote, “The first time I seen the Sphero was when a kid was using it down the hallway. By [teacher’s] room. Then I ask [teacher] where I could use it. Then I started going to her classroom. That started my use of the Sphero.” From the circulation of the robot, then, the student was pulled into makerspace.

I have often argued against taking a techno-centric approach to makerspace design, suggesting instead that we should pay attention first to people and the kinds of things they want to make. I still think this is the right approach; however, this data shows the power of technological novelty to attract and engage young composers. One of the problems, however, is how makers like those who enjoy the Spheros might learn or be motivated to level-up. This is what the instructional coach calls the “puffy paint problem.” He used this phrase in our LRNG final grant report to describe a particular group of students in The Clothing Closet who came into that space to use the dimensional fabric paints to write their names or other sayings on t-shirts but weren’t interested in learning to use other tools, technologies, or materials in the lab. In The RoboHacker Lab, particularly, there was a marked divide between the technological composing abilities of the students coding with Python, Visual Basic, and C++ at the Lego Mindstorm table and those who were “popping-up” to program with templated commands that are loaded in the apps that connect with the Spheros. One of the difficulties is how to bridge that gap. As

¹³ She used the term “incubation” in the early 1980’s to define relatively short periods of focused planning time followed by intense bursts of activity in [Donald Murray’s] writing processes. I extend the term to allow for a host of unintentional, non-goal directed activity that may or may not directly and explicitly lead to production-centered work in the making process. In Connected Learning parlance, these incubation-centered activities to practices of “hanging out” and “messing around” that Mimi Ito describes in her HOMAGO framework. These activities, she argues, are likely to lead to “geeking out” if students are with the right tools and the right people.

I stated earlier, students didn't make use of the *Challenge Cards* that were meant to help them bridge those levels, and there were never enough knowledgeable bodies around to help students gradually take off the training wheels. This was an ongoing concern for the JHR makerspace facilitators.

How Do They Make

In Chapter 4, I cited the practices of “reading,” “observing,” “looking,” and “listening” that were central to participant's making. In the *Remix, Remake, Curate* maker network, particularly when participation was text-based and asynchronous, these activities are largely invisible. In the JHR maker network, however, these activities such as “walking around,” “eating,” and “talking” are decidedly present—so much so, in fact, that they can cause a great deal of consternation to school leadership who didn't recognize them *as components of* students' making processes. Leadership, teachers, and most of the makerspace design team wanted to see more production-centered activity and less of what they considered “time-off-task.”

In their fortune-tellers and experience narratives, however, students listed *production-centered* practices as most important to their making. Practices such as “printing” “stenciling” “designing,” “sewing,” “cutting,” “circuit building,” “writing,” and “researching” were listed most often. Almost as often, however, students recorded the kinds of practices I referred to in the last paragraph, “walking around,” “eating,” “playing,” “watching,” “talking,” and my personal favorite, “just living and breathing.” These are what I term, following Carol Berkenkotter, *incubation-centered* practices.¹³ In addition, the JHR makers named a host of consumption-centered practices like “watching videos,” “studying,” and “reading” that were also part and parcel of making. These *consumption-centered* practices are generally solitary and resemble traditional learning activities that take place in schools. Thus, they didn't concern teachers and administrators as inappropriate uses of SMART Block time.

For some JHR students, making during SMART Block was relaxed, and that was one of its primary appeals. As I mentioned earlier in the chapter, when teachers attempted to

schedule events during the makerspace such as full group demos, students didn't show up or left once they realized a more formal organization was being imposed. The impromptu attitude was underscored by one study participant whose public senior project presentation I attended while also collecting data for the study. I'll discuss her maker experience data in depth later in the chapter. She had worked with one teacher in The 3D Fabrication Lab to print parts for a prosthetic hand which she showed during her presentation. Her research explored 3D bioprinting, and she discussed how her experiences in The 3D Fabrication Lab had opened up a new interest area in bio-medical engineering. When someone asked what she liked most about working in the the makerspace with the 3D printers she answered:

Really, I just like how laid-back it is. You get to work on the projects you want to with the people you want to. If you don't know something, you can ask the other students. What are they called? The Mentors, yeah. Or you can go to [teacher] and get help. And if you don't feel like working on something one day, you don't have to go. I like that. It's casual.

Her phrase, "it's casual," has stayed with me for nearly a year as I thought about the makerspaces at JHR as casual spaces where makers could pop up or dip in, and what might be gained or lost from such casualness where leveling-up was an option or pathway, not an expectation or outcome.

In contrast to the casual maker, there are also makers who feel the pressure of time. One such maker is the Maker Mentor whom I introduced in the very first anecdote in this chapter. He was the Maker Mentor who invited the new students into The 3D Fabrication Lab, and only half-jokingly told them that when they came back, they should help him print t-shirts instead of working on designs with the 3D pens. Every day that I observed, he worked non-stop through the SMART block period, making with the 3D printer, the direct-to-garment printer, the vinyl cutter, and a host of visual design software programs. When I asked him to participate in the study, he told me that he would be glad to participate, but that he didn't have time to do origami and play research games. He said he had logos to design, t-shirts to print, and people to help.

Weeks after I had finished data collection at the school, one of the makerspace teachers sent me an email with this student's experience narratives. He told me to stop by the school to

pick up the student’s fortune-teller, game log, and signed forms. When the student caught up on some of his projects, he and the makerspace teacher had played the data collection game because the student remembered and wanted to be part of the study. He wanted others to know how important making had been to him and to his experience of school during his senior year. His fortune-teller data, which I’ve included in table 8, shows that he spent 30 or more SMART block periods in The 3D Fabrication makerspace, which is a significant investment of a young person’s “free” time. In addition, his average disorientation level was a 3 out of 4, which is likely indicative of the multiple, complex projects and tasks that he was undertaking simultaneously. Finally, it is interesting to note that, for him, hardware and software are experienced as *places*, which makes sense given the time that he invested *at the vinyl cutter, at the printer, in the Adobe software programs, and, of course, in The 3D Fabrication Lab*. I’ll share one of his experience narratives in the next section when I discuss *Who Gets Made*.

Table 8

Student Fortune-teller Data B

Places	Tools/ Materials/ Objects	People	Practices	Number of Days Visited	Disorientation
Vinyl Cutter	Screens	[3D Fab Makerspace Teacher]	Talk to People (Mentor)	30+	Level 3
Room 604 (3D lab)	T-Shirts	[Instructional Coach]	Test Print		
Adobe Software	Stickers	[RoboHacker Teacher]	Proofs		
Flexijet Printer	3D Models	Students	Layout and Setup Make Screens Prep Vinyl cuts Output Film for Screenprinting		

Other students also seemed to feel the pressures of composing and meeting deadlines as well. One student in The 3D Fabrication Lab who listed “poster design” and “researching” as two of his production-centered making activities wrote the following experience narrative about an upcoming design competition. While ending on a humorous note, it does give a sense of the competing pressures that young people are under as they feel the weight of multiple classes, extra-curricular activities, social and academic relationships, and a host of other concerns, some of which will reveal themselves in other makers’ narratives.

In my experience in makerspace in regards to Poster Design is that there’s a graphics design competition that I’m trying to enter. I entered last year and the poster is hanging on the board. I also made another poster for a project for my biology class. (I’m not sure if I’ll be able to enter this year since I’ve been busy lately. I only have a few weeks left before the deadline and I haven’t started yet! Fate has been cruel to me!)

Given these pressures, then, makerspace designers might do well to make spaces for a variety of commitments—those that are “casual” as well as those that are more exclusive and serious involving the kinds of daily commitments that turn tools into places.

Who Gets Made

In Chapter 2, I introduced Bennett’s concept of vibrant materiality and noted that “objects act back on or compose the composers themselves” (29). One such example of this phenomenon occurred in the The RoboHacker Lab with the group of makers who engaged in Sphero racing. As I described earlier in the chapter, five males regularly met up in the hallway outside of the classroom to race the robots during SMART block. On their fortune-tellers, they each listed exclusively other members of the group or the RoboHacker makerspace teachers as important to their maker experience. One maker writes,

I remember when I was chillin on my phone. I went to the trashcan to throw something

away and I saw my buddy [member of Sphero racing group] and he was standing there trying to connect his Android to the Sphero. It wouldn't work because Androids are garbage. I kept rushing him to connect his phone so we could race the Spheros down the hall. We finally connected and I beat him. King [Student]!

Here the student crowns himself a “king” because his robot has bested another, and his robot's success becomes his own. He attributes that success to his phone's operating system, and another student is able to identify an additional cause, demonstrating the multiplicity of causal actions that relate to any one outcome in a complex network with human and non-human actors. This student's narrative states,

I remember it was May 2nd and I saw [student who loses the race] walking down the hall to [facilitating teacher's makerspace] class. So I decided to follow him and watch him struggle trying to connect to the Sphero. Once he got connected, he and [winning student] raced down the hallway and [winning student] beat him. He probably won because [losing student] didn't have the speed turned up. His was at 50% and [winning student's] was at 100%. I laughed at him.

The technical inequities that were involved in this student's loss are both material and procedural. Until he grabs another student's iPhone (which I discussed earlier in the chapter), he doesn't have the right material apparatus to pair with the Sphero, and once he does, he doesn't have an adequate technical understanding of the Sphero's settings to have a fair chance in the game. And this comes with a price. He loses, and his loss is mocked by others in the group. Even though the laughter that the student mentions in his narrative did seem to be among friends, competition was the value that is most valued, and it shaped how the robots and the makers could perform their identity in the space.

I guess I shouldn't be surprised, but I am I. And as I wrote in Chapter 4 in reference to the *Remix, Remake, Curate Network*, I have made meaning in this study too, not from distanced, objective “looking” but from *feeling with* the research participants. I am bothered that the five makers who raced the Spheros mentioned each other *exclusively*. I'm mad that they didn't bother to mention the student whose iPhone was necessary for all of them to participate in the races. I am irritated that despite the fact that this student participated at least 32 times in two different

makerspaces and recorded “helping others” on her fortune-teller, no one in this study named her as a maker important in their making. It raises the question: when do Black Females get recognized as makers and leaders in this maker movement? And if or when they do, how will they be recognized and by whom?

Through his experiences in the The 3D Fabrication Lab, the student who wanted to make sure that his data became part of this study materialized in this network as both a *maker* and a *mentor*. Clearly, this student performs as a maker in the most traditional sense of the word, engaging in *production-centered practices* and displaying, as I noted in Chapter 1, “creativity, innovation, and dissatisfaction with a pre-built environment and a ready-made existence” (5). He takes pride in producing custom visual designs and shares those designs with others, asking for and accepting feedback and criticism to improve upon his art. He produces a host of physical products that display those designs as well, taking the time to hone the production of his craft. In his fortune-teller, he lists the following production-centered practices: “test print,” “proofs,” “layout and setup,” “make screens,” “prep vinyl cuts,” and “output film for screen printing.” He also lists “help others” and “talk to people (maker mentor)” as activities important to his making.

He is recognized by teachers in the school as a maker exemplar, and while he has the official title of Maker Mentor, the mentoring part of that work is overshadowed by his status as “entrepreneur.” This is an identity he seems not to have chosen, at least in the fortune-teller data or during my observations in the school, but one that has chosen him. Recently, one of the 3D Fabrication makerspace teachers was commended for instilling in this student (and others) “an entrepreneurial spirit that will likely be the foundation of his success throughout his life.” And while this was undoubtedly meant as a esteemed compliment to both the teacher and the student, the statement implies that what matters in working with young people is that we help them be “successful” competitors in the market. Entrepreneurialism has become a powerful buzzword in today’s corporate-facing educational systems—powerful for teachers it seems, but not so much for students. And success, of course, as I argued following Halberstam and Ahmed in Chapter 2, is predicated on orienting the *right* way toward the *right* objects. In this case, the

right orientation is entrepreneurialism and the *right* objects are those that are or can produce marketable commodities. I'm not talking about makers who "play" with 3D pens and fiddle with "silly" designs that have little value beyond what they are worth to their makers. I'm talking about makers like this student who hustle and sell t-shirts, 3D printed fidget cubes, business cards, brochures, and other commodities. These students are the epitome of success in our contemporary neoliberal paradigm.

And while educators take pride in celebrating these success stories, what gets concealed are the material conditions that can prompt this kind of making. This student and many others who get labeled "entrepreneurial" at JHR don't hail from the upper echelons. Like my own son who has hatched dozens of maker-based get-rich-quick schemes, these students are more likely to come from lower middle class, working class, or impoverished backgrounds, and they are making-to-sell because they need the money to help support themselves and their families. The 1% are not "entrepreneurial." What might be enabled if we shifted our language to talk about makers in the ways that they talk about themselves? What if that sentence had read, this student has a "*helping* spirit that will likely be the foundation of his success for the rest of his life?" Does it sound too soft? Too feminized? What or who might it take to rematerialize academic and academic-adjacent making and makerspaces alongside rhetorics of collaboration, cooperation, empathy, and care?

What Gets Made

In Chapter 4 I was able not only to list what got made in the MOOC, but also links to where these products were shared online. As I stated earlier in the chapter, the objects student makers composed were largely *not* shared in online communities or forums; however, participating makerspace teachers did post a couple of clearly finished objects on Twitter at the hashtag #rampantsmake between June 2015 and May 2016.

¹⁴ Note the data collection protocol didn't ask students to record the specific makerspace where they produced each composition.

- [a pegboard necklace holder made](#) (The Remake Lab)
- [a t-shirt painted with “mom” and a heart on the chest](#) (The Clothing Closet)

I listed the following made objects in my observation notes:

- Cartoon Cubecraft Figures (The 3D Fabrication Lab)
- T-Shirts (The 3D Fabrication Lab)
- A littleBits Circuit with 3 miniature fans (The RoboHacker Lab)
- Sanded, Painted and Decoupage Bar Stools (The Remake Lab)
- Sanded, re-painted and decoupage cabinets (The Remake Lab)

And these Made Objects were recorded by students during their fortune-teller game play : ¹⁴

- Logo Design
- Rampant Lines Newspaper Articles
- Clay Circuits
- Phone Case
- 3D Eiffel Tower
- 3D Prosthetic Hand
- Table
- Lamp
- Phone Case
- 3D Model
- Portrait
- Cabinet Door
- T-shirts
- Picture Frame
- Lamp
- Stickers
- Trash Can
- Posters

- Jewelry Holder
- Footstool
- Robot

Interestingly, during the fortune-teller game play and in their narratives, the students materialized the *tools* or *materials* of their making more frequently than the *objects* or products that they made. As noted above, JHR makers named a total of 21 different composed *objects*, with “posters” and “t-shirts” named by multiple students for a total of 24 composed *object* mentions. However, 29 different *tools* or *materials* were named, and generic tools like “paper,” “applications,” and “computers” were named multiple times as were specific tools like “Adobe Photoshop,” “Spheros,” and “3D printers.” When total number of *tools* and *material* mentions were calculated, the number grew to 60. This 40% increase is significant as it signals that what mattered to students in their making experiences was not the *objects* that they made, but the *tools* and *materials* of their making.

In the JHR makerspaces, different kinds of literacies are materialized and come to matter for students. For example, as I mentioned earlier in the chapter, the student who worked in The 3D Fab Lab developed powerful interests in 3D printing and its applications. This interest prompted her to focus on bio-printing in her senior research project. She transferred her learning in the para-curricular makerspace context into formal academic learning and achievement. In her experience narrative, she wrote:

I used SMART block and the makerspace program we have to give myself time and tools to make 3D prosthetics. Along with the help of [3d Fabrication Lab teacher] and the ‘Enabling the Future’ [enablingthefuture.org] website, I learned how to print a plastic hand for a woman or young adult. Different from when I first used the printer, I had to learn how to use Cura and download the files for the parts I wanted to print.

While in her English classroom, the student developed traditional research and print literacies; in The 3D Fabrication Lab, she acquired what James Gee describes as “fab literacy.” I want to quote Gee at length here, because it wasn’t until I read his blog post that I really understood the potential of 3D printing and why it might shift the ways we think about writing, making,

and digital composing. I knew, as did the students, that the 3D printer was “cool” and there was something magnetic about watching the machine, listening to its hum, and feeling its warmth. Yet I didn’t think about it as a composing object that posed a direct threat to more democratic and equitable futures. Gee writes:

Fab is the newest literacy beyond digital literacies...Fab makes making a two-way street. We can now turn bits (digital code) into atoms (things) by “printing” the code and we can turn atoms into bits by reality-capturing devices that digitize things and make them into digital code. “Printing” here means machines that can add or subtract material to make things on demand from digital code...Fab is not indexical. It doesn’t point to things. It is not a simulation. It does not make just virtual things. Fab is material. It makes and manipulates matter...It creates an entirely new way of writing and reading the world...It will without doubt create social gaps and inequalities if we let it...Fab could create a world with yet deeper inequalities than we currently have, a world where only a few engage in the alchemy of turning ideas into bits into atoms and back again. The rest will live in a world where the stuff of life and the world—objects, cells, materials—are owned and operated by only a few...Will we, as a species, make a better world or a worse one when some or many or all of us become god-like creators, calling worlds into being ?

Here Gee asks us to think about “fab literacy” not only in terms of techne, but also in terms of phronesis—not just *what gets made*, but *what ought to get made*.

In this example, we can see the student maker embodying both elements of “fab literacy.” She states that she’s learned to use “Cura” (<https://ultimaker.com/en/products/cura-software>), a 3D modeling application that interfaces with the Ultimaker 3D printer, to download and prepare digital files. With the help of the 3D Fabrication Lab teacher and plans she downloaded from the *Enabling The Future* website, she is able to 3D print an assistive device for someone in need. Through her research, which she shared at her senior project presentation, the student was astonished to learn about the different applications for 3D printing, including those applications that are meant to both save and improve lives as well as those that end lives. In her senior project presentation, she noted that while medical researchers are 3D printing artificial organ tissue and engineering assistive devices that are wired into patient’s neural networks, the US military is also prototyping exoskeletons to create super-soldiers for the battlefield. In conclusion, while the “3D prosthetic hand” is the short answer to this section’s title, the more important answers are wrapped in the entanglements of meaning and matter and the intra-activity of ethics and ontology that I explore in Chapter 2.

Finally, in this section, I want to introduce one of the makerspaces that I haven't yet discussed in any detail, The Remake Lab. Reasons for my lack of data from this space are threefold: first, their operation schedule conflicted with the days I was available to observe at the high school, second there were fewer students participating in this makerspace (8-12 students on average as opposed to 20-30 in the other two spaces), and finally, only 3 students from The Remake Lab were interested in participating in this study. The two students whose data I will share next were uncharacteristic of the space in that they were talkative and inquisitive. From the moment I walked in, they asked of me "What my business was in *their* space?" One of them asked a facilitating teacher, "Is she an OK kind of person?" and when the teacher gave them an affirmative answer, the student said, "Ok, then. What you want to know?"

These two students are Black Females, and their fortune-teller data showed that they had attended The Remake Lab exclusively. Each had attended over 20 times, and each of them listed the other as well as one of the facilitating teachers as important in their making. One of them listed the other twice and the other also listed another student as an important person. In terms of their level of disorientation, each listed "Level 2" and beside the number on the game log, one student wrote, "we all have our days" and drew a smiley face. Both of their narratives focus on The Remake Lab as *place*.

Me and [other student] needed somewhere to go during SMART Block, so we thought about [facilitating makerspace teacher]. Then we went to her room and we got mad because she won't down there. Then we called on the phone and found out she was down here in Remake and that's when the whole shebang started. And then me, and [other students] were talking and I painted my trash can. I'm remaking it into a lamp. I spray painted it and added some designs.

In this student's narrative, she isn't drawn to the space to make anything in particular. Instead, she's drawn to the teacher and her pre-existing relationship with that teacher. Once she finds out the teacher is not in her regular classroom, she gets "mad" and goes to find her, extending the nodes on her school network. This is another example of the metaphorical bells and whistles. Without the teacher moving out of her usual space, it's unlikely that the student would have

either. But by the teacher doing so, the student makes new connections to an art classroom and to The Remake makerspace. She lists “spray paint,” “lamp,” “bucket,” and “paint brushes” as tools and materials on her fortune-teller, and in her narrative, we learn that she’s remaking a trash can into a lamp—a crash encounter of composition that wouldn’t have been possible without unexpected movements by both students and teachers.

The other student’s narrative brings even more unexpected objects into the composing narrative. I didn’t expect to be writing “shrimp fried rice” and “chicken wings” on little pink pieces of paper to affix to my data board about composing, but they materialized in her narrative and on my board. Her narrative reads:

One day we come in here talking, right? Ok, we all talking about life and crazy stuff and I was tearing paper to go on my decoupage project—a table or a footstand. And then we went to the lunchroom and warmed up [other student’s] Chinese food that she shared with me. It was shrimp fried rice and chicken wings. We share a lot, even though we don’t want to because we know what it’s like to be hungry. We came back here to the Remake Lab because we don’t like being in the cafeteria. It’s too loud and too much shenanigans down there.

The made objects—the footstool and the table—are asides in her narrative of making. What matters most to this maker is the space that has been made for sharing, for talking, for eating, and for making a community. It gives her a space to escape the “shenanigans” of the large lunch room where there are too many young people and not enough adult mentors. The cafeteria is a space where, as I described earlier in the chapter, makerspaces are struggling to make it. I asked one of the facilitating teachers about this student’s response, and she responded, “Yes, it’s a great place for them to come. To feel safe. There is so much going on down there in the cafeteria.”

One of the projects in the Remake Lab illustrates this sense of community and safety that’s being made by the students and teachers there. It’s a bar stool that has layer upon layer of torn paper decoupage on its surface. I have talked about the layering of affect on objects metaphorically before, but this is a literal layering of materials on top on each other as well as the affective layering of comfort on an object that otherwise means little. The stool is messy, sticky, and haphazardly decorated. One student told me about this stool, “It has been passed down from

generation to generation. The teachers in The Remake Lab don't care what you make, but you have to make something. You have to get jiggy with it."

In the language of maker-centered learning, this object might be talked about as a "low-barrier make," a project that requires little specialized skill or knowledge to complete. And in maker-centered learning, the next logical step, would be to "level up." Leveling up prompts makers into completing new tasks that will challenge their skill levels. In The Remake Lab, however, there wasn't much talk about leveling up or challenging students to take on more responsibility. Perhaps this is because for many of these students, life outside of this space is challenging enough. Instead, The Remake Lab was a place where students were using making as a way to "stitch-in." Unlike leveling up, stitching in is a lateral composing process of making connections with others. It's more of a craft metaphor than a making metaphor perhaps, and it signals the ways we build social networks by sharing tools, materials, stories, and food—everything from crochet hooks to chicken wings. I'll pick this up in Chapter 6 because I think it has important implications for how writing studies practitioners might design curricula in writing classrooms and programs.

What Drives Composition (as Process and Product) in the Network

In Chapter 2, I discussed affects as public emotions that circulate in, around, and through bodies in networks. They gather up human and non-human bodies into collectives that "hang together" across space or time. While the teachers' experience narratives in the *Remix, Remake, Curate* network were littered with affective charges, namely fear of failure, the students' game play narratives were much less expressive. In, addition, the students produced fewer narratives, and their narratives were also shorter in length. Therefore, much of the affective data in the *Pop Up and Make* network was gleaned from my observation notes.

In the JHR maker network, "coolness" was an affect that hung around 3D printing as well as one of the makerspace teachers that facilitated the 3D Fabrication Lab. In their experience narratives, two students explicitly named the 3D printer as "cool" and a "cool tool." In my

observation notes, I also recorded one student telling the teacher directly, “You’re too cool, [teacher’s name]” after the teacher helped the student figure out why his model failed to print. And another student said to a peer, “That’s cool,” as the same teacher was demonstrating how to set up a file in Cura, the 3D modeling software.

In *The Rhetoric of Cool: Composition Studies and New Media*, Jeff Rice notes that “cool” is a term sometimes used to mean the embrace of the vapid and temporary at the expense of deep and meaningful knowledge-making. Instead, Rice’s book attempts to reclaim “cool” as a way to talk about new rhetorical moves that are enabled when students engage new media composing tools. Fab literacy, as I described in the last section, is an emerging new media literacy that has deep implications for not only literacy instruction, but also for in/equity and further global dis/enfranchisement. The affect of “cool” that moves these bodies in the 3D makerspace is a powerful catalyst for sponsoring fab literacies that are developed through making with tools like the 3D pens, the 3D modeling software, and of course, the 3D printer. “Cool,” then, might play more of a role than we’d imagined in decreasing rather than increasing inequities brought on by the rapid proliferation of new composing tools.

Other affects hung around other bodies and tools in the JHR makerspace. For example, in the The Remake Lab, as I’ve already described, students found a “safe” place to retreat during SMART block. Another of the student makers described The Remake Lab as “soothing.” In her experience narrative, she wrote, “When there are no projects that I can help with, I just sit and draw. I like drawing, and it’s soothing when I am in an actual art room instead of class. I sit quietly and keep to myself while doing so...” These affects binded the makers, the teachers, and the tools in this space in similar ways to the makers and the teachers in The 3D Fabrication Lab. And while the 3D printer performed “coolness,” the tools and materials that this maker named such as “fabric,” “paint,” “paintbrushes,” and “pens” performed a protective role. This student said of her making practices, “I just feel more calm when I’m here using them.” Several of the students in this space physically showed their affection for one of The Remake Lab teachers by hugging her, and I was reminded often by the two students who shared their Chinese food

and who were “mad” when they couldn’t find this teacher that this was, without a doubt, their favorite teacher in the world.

While I already described the ways that *pride* and *winning* as well as *shame* and *losing* were entangled with the competitive use of the Spheros, I want to return to the moment that I first introduced the robot racing champion. I began that story with the following line: “‘We’re going on a cruise, little buddy,’ one of the students said to his Sphero. He leaned his head down and puckered his lips as if he were going to kiss it.”

As I’ve read back over this chapter and that story, I’m reminded of Mel Chen’s queer animacies that I described in Chapter 2. In that chapter I wrote, “Queer animacy permissions us to examine our embodied responses to bodies and things that are both similar to and different from our own...” and I provided Chen’s example of the early 80’s lead toy scare, a parental paranoia over the children’s improper oral contact with or “queer licking” (167) of toxic toys. In this Sphero narrative, our victor is close to inappropriately touching the little robot—with his mouth. It’s clear throughout my observation notes that the Sphero gives him a queer pleasure. While that gratification might be read here as the kind of pleasure that men get from their race cars, men often name their race cars with feminine names. This student calls the robot “little buddy” and as his friend observes, “He looks like a happy child.” When I named this student earlier as “King,” however, I may have missed something important. I may have missed the element of performativity and play that were at work in his narrative. After all, Jane Bennett notes of new and vibrant materialisms, “Becoming always vies with being” (93).

Children don’t have to be permissioned to give in to their embodied responses to bodies and things different from their own. That’s the work of play and playfulness, an affect which was diffused across these makerspaces. “Play” and “playing” were mentioned 9 total times by students in their fortune-tellers and experience narratives, and it was the controlling affect in the *Pop Up and Make Network*. In this paracurricular space where students and teachers weren’t beholden to standardized curriculum and assessments, play queered the typical boundaries between subject-area teachers, between students and teachers, and, as the previous example

illustrated, between students and technologies. As Mitch Resnick, Director of the MIT Lifelong Kindergarten notes, “Unfortunately, many schools throughout the world have a similar resistance to playful learning. Teachers and administrators are often skeptical of playful-learning activities, seeing them as ‘just play.’ Too few educators recognize the importance of leveraging student interests and passions.” To embrace a model of learning that is built on access, invested with interest, and charged with passion, we have to privilege the intentions and desiring bodies of teachers and students over the outcomes that work to demurely guide and straighten us out. We have to dismiss the Cartesian split and understand that learning happens with our whole bodies—bodies that pulse with desires, aversions, differences, and indifferences. These bodies have been hacked by technologies, objects, and ideologies, and are capable of hacking back, rewriting the codes of learning at the interstices of meaning and matter.

Finally in this chapter, I want to return to a maker that I’ve discussed twice already in this chapter; she’s the one who printed the 3D prosthetic hand. To use her terminology, she called her making experience “casual,” and here, I’ll make the argument that she, too, performs as a casual maker in the JHR maker network. I use casual here as analogous to promiscuous as she circulates in and out of different makerspaces, picking up different tools and materials, engaging different composing practices, and amassing technical, vocational, and academic capital along the way. Her fortune-teller data represented in table 13 illustrates this composing promiscuity.

Table 9

Student Fortune-teller Data C

Places	Tools/ Materials/ Objects	People	Practices	Number of Days Visited	Disorientation
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[Digital Storytelling Makerspace Teacher] (Digital Storytelling)	3D Printer	[White Male students]	Printing Stickers	30	1
Animation Studio	Greenscreen	[3D Makerspace Teacher]	Origami		
Cura	Adobe Programs	[White Male student]	Become Adobe Certified		
[3D Makerspace Teacher] (3D Lab)	Imovie	[White Female student]	Make Posters		
			Claymation		
			3D Printing		
			Prosthetics		
			Make a Short Film		
			Design a Newspaper (pages)		

In her data, she names three different makerspaces, four different high-tech composing tools, and seven different making practices, including layout and design for the school’s newspaper which translates to academic credit as well as attaining Adobe Certification which translates to both academic credit and industry certification (see table 9). Notice that unlike other makers in the study, she doesn’t repeat the tools, materials, objects, people, or practices in any of the categories because she’s had enough experiences to go around the fortune-teller.

Invoking Robert Payne, and the *Queer Promiscuity of Network Culture*, it’s important to note that this student’s body is the *right* kind of body. It’s appropriately raced, sexed, and classed, and this student has access to other kinds of institutional power sources as well. Thus, her movement in this maker network and in the school more broadly is encouraged by other bodies who monitor the halls during SMART block, as well as during and between classes. She’s not

the kind of student who’s asked for a hall pass, and she doesn’t exploit the makerspace network because the larger network of the school and education more broadly was built to accelerate students like this. She can’t share or, even in the context of this chapter, it seems, be shared enough.

But there are other bodies that were much less mobile. For example, one of the makers I met in The Remake Lab was deliberate about her composing, using the same tools and materials—paint and a brush—each day that I observed in the space.

Table 10

Student Fortune-teller Data D

Places	Tools/ Materials/ Objects	People	Practices	Number of Days Visited	Disorientation
Remake Lab	Rulers	[Black Female student]	eating	25	1
Remake Lab	Paint	[Remake Teacher Facilitator]	drawing		
Remake Lab	Markers	[Remake Teacher Facilitator]	study		
Remake Lab	Color Pencils	[White Female student]	painting		
			drawing		
			eating		
			design		
			study		

Her making was exclusive to The Remake Lab (see table 10), and the tools and technologies that

¹⁵ Gee argues in *The Anti-Education Era* that all students don’t need the same skills and abilities. In this popular press book, he writes that they need the ability to “plug-and- play” (189) in teams where each contributor brings different skills and abilities necessary to accomplish the task at hand.

she lists—rulers, paint, markers, color[ed] pencils—are not the tools we would likely consider as “high tech.” They don’t convey status back on their makers in the same ways that digital tools and technologies do. This maker receives no academic, vocational, or industry credit for the kinds of making she undertakes in The Remake Lab. In the making activities, “eating,” “drawing,” and “study” each appear twice, underscoring the habitual practices of her making. While her making does involve movement, the movement encircles far fewer tools, materials, people, and places. And her experience narrative is succinct. It contains just two sentences and lacks any trace of affect, as did my observations of her interactions. She wrote, “One day in the Remake lab after I got finished studying I decided to paint a cabinet door. We did some stenciling then went over it with paint on top.”

I know nothing else about this student except the ways that she slowly and carefully dipped the bristles of her brush in the cans of paint and methodically spread it on the surface of the wood. The action of her wrist was as smooth as her face. She often seemed to lose track of time as she painted. The makerspace teachers had to remind her each day that the SMART Block period was ending so she could clean up her materials. She did this with great care, making sure to clean the brushes with cold water so as not to melt the glue that held in the bristles. She dried the brushes with paper towels and put them in a drawer instead of sticking them in an old paint-splashed tub with the other brushes.

I don’t know if The Remake Lab teachers could have done more to help this student develop other interests or to encourage her to visit other spaces like The RoboHacker Lab or The 3D Fabrication Lab. And I don’t know if they should have. Does everyone, like Gee argues, need to know how to turn pixels to into atoms? Or do his other arguments about “synchronized intelligence” (175)¹⁵ still hold true—particularly if a maker ethos is about “collaboration,” “teamwork,” “connecting,” “responding,” “cooperating,” “being honest,” “truth telling,” “taking risks,” “being respectful,” “seeking diversity,” the making behaviors that surfaced in Chapter 4 along with “enabling,” “helping others,” “upcycling” and “remaking” that materialized in Chapter 5?

If queer and feminist-inflected new materialisms have taught me anything about how to make meaning out of the material data of this study, it's that we have pay attention not only to the data like "Spheros" and "Prosthetic Hands" that have statistical and contextual weight, but we should also attend to data like "chicken wings" that helps us to understand the queer experience of makers who are oriented towards other projects and possibilities. Queer new materialisms allows me to approach this data as a set of three-dimensional layerings that I can approach and re-approach to understand making in these networks.

What I am comfortable concluding now, however, is that there is no one way to be a maker. Making and makers can take an infinite diversity of forms *if we relax the suspensory power of how they ought to materialize*. Relaxing the suspensory power, however, doesn't mean that we don't pay attention to our own role in materializing and re-materializing inequities. It means that we recognize when, where, why, and how we might be exacerbating them by ignoring the affective relationships—between human and between human and non-human actants—in our networks. In Chapter 6, I'll orient toward the question, *What do these findings mean for Writing Studies Research and Practice?* Picking up many of the yarns I've begun to knot in Chapters 4 and 5, I indicate both where more research needs to be focused and where teaching practice can be transformed.

Chapter 6: Remaking Digital Rhetorics and Writing Studies: Towards a Queer Material Rhetoric of *Composing Sideways*

While this dissertation has been in many ways about studying paracurricular composing practices as a way to better understand composing itself and to rethink what we do or might do in our writing classrooms, that work didn't materialize neatly or in a linear fashion. Rather, I needed to rethink methods and methodologies for composition research since so many of our practices are themselves based in a hermeneutic tradition that's focused on textual production and analysis, even as we have used those methods to try to understand that nebulous thing we call *process*. Therefore, this chapter begins by looking at three key concepts that I had to rethink — or that I came to rethink — in order to study those paracurricular writing practices: the affective means by which composing networks gather up, orient, norm, and move and stop composing bodies; playful research methods that have the potential to disrupt success narratives and happy stories about composing; and the importance of a tight “weave” between digital and cultural rhetorics that grounds the former in materiality. By starting with those methodological/theoretical shifts, I hope this project offers Writing Studies a material, embodied, and affective understanding of composing across digital and hybrid networks, one that helps the field pay better attention to “political ecologies of [composing] things” (Bennet) and helps to explain the disconnect between students and teachers' affective orientations around composing. By concluding with a look at those compositional practices that emerged in these academic adjacent writing spaces, I offer Writing Studies a queer material rhetoric of *composing sideways*. *Composing Sideways* is an emerging heuristic that prompts writing program administrators and writing teachers to make space for lateral composing practices. Lateral composing forestalls the disciplinary push toward vertical transfer and instead follows students' affective orientations toward composing.

Affective Composing Networks

As I discussed in Chapter 2, actor-network theory (Latour; Callon; Law) has been an important frame for tracing and documenting the emergence of digital networks, and ANT has

brought with it a methodological commitment to things or objects as actants, reformulating liberal humanist understandings of agency. Thinking with Latour, however, doesn't allow us to understand *how* actants are gathered up, *how* they move, and *how* they are oriented to and away from particular objects or horizons. In other words, actor network theory doesn't allow us to understand *how* networks become *networkings* that are capable of materializing bodies and objects, including compositions.

This dissertation project earns its significance, then, by both theorizing and providing evidence for *how* networks become *networkings* of bodies—both human and non-human—that are capable of doing the work of composing. In Chapter 2, following queer- and feminist-inflected new materialist thinkers, I argued that affects gather up human and non-human actants. Affects move in, around, and through bodies, and affects such as fear, shame, pleasure, and safety orient those bodies to and away from particular objects and horizons of potential. In Chapter 4, fear of failure was a controlling affect that oriented teachers away from digital composing technologies and moved them to create new nodes on their composing networks. In Chapter 5, play was a controlling affect, and the Spheros, as actants, gathered up new composers into the maker network and enlarged the network's reach. Affects also worked to constrain the composing network when the excess of the *Eagorilla* become *too much*. Similarly, the Sphero was picked up off the floor by those composers who were working on “real” robots, constraining its circulation when it, too, was too much. Queer affects were identified among composing tools and composing bodies, and when composers cared more about their materials and tools than their products, those affects queered the *outcomes* of composition. Finally, affects knitted together people, tools, materials, and places into composing relationships as “coolness” was layered on the 3D printer and The 3D Fabrication Lab while “safety” circulated around and through The Remake Lab and its objects and bodies.

Understanding the effects of affect on composers and composing networks, then, is a major contribution to the field of writing studies and to digital writing research more broadly. I should note, as I did in Chapter 2, that writing studies research has considered the role of

emotion in research, pedagogy, labor, and assessment, and Jacob and Micciche's *A Way to Move* notes that movement happens through an emotional engagement with others. Their work, and most other scholarship on emotion in writing studies, however, restricts feeling to a relationship between human beings and also largely restricts emotions to the personal and the cognitive domains. One of the reasons the field continues to ignore feelings in the study of writing is because we can so easily compartmentalize them and lop them off from research into writing with computers or writing assessment or writing program administration. What this study demonstrates, however, is that affect permeates every aspect of composing as well as our work with composers and composition instructors. Affect is not singular, cognitive, or solely humanistic, and it can't be separated from other concerns about composing. There are layers of affect that are always already laminated on the surfaces of composing tools, materials, and places that speak to students and teachers and tell them who should or shouldn't compose with particular tools and who and what those composing tools and place are and are not for.

In addition, affective composing networks, when attendant to queer dimensions of affect, can enrich research in digital rhetorics, particularly research in circulation studies. Historically, digital rhetorics, as a field, has been concerned with the production and analysis of digital texts. But as the field has developed, digital rhetoricians have focused more on *what a text does* rather than *what a text is*. In this vein, scholars have taken up circulation studies, considering how texts gain meaning through movement. For example, as I noted in Chapter 2, Ridolfo and DeVoss introduced the concept of "rhetorical velocity," which prompted digital composers to design for the reuse and repurposing of their work after publication. Similarly, Laura Gries developed a method for "iconographic tracking" that theorized how images accrete meaning through their circulation patterns in online contexts ("Dingrhetoriks"; *Still Life*).

This dissertation project forks that conversation by introducing Payne's concept of *networked normativity*. In this project, I have demonstrated how normativity works to shut down the circulation of objects like the Egorialla and the Sphero that may be the *wrong* objects, or that may be the *right* objects shared in the *wrong* ways, shared *too much*, or in the *wrong*

directions. By paying attention to those objects as *exploits*, researchers can read and analyze the normative structures of composing networks that constrain non-normative performances and disable the expansion or movement of the networks in particular directions. On the other hand, in the case of the maker of the prosthetic hand, my findings show how the *right* kinds of makers are accelerated by maker networks. They exploit the tools, materials, and technologies available to them and accumulate social, academic, and vocational capital through the *right* kinds of promiscuous making. While the field has so far discussed only textual objects as “in circulation,” the findings of this study broaden that concept to also include the human bodies of makers as circulating bodies. In addition, my project brings both concerns of directionality and orientation to the conversation of rhetorical tracking, providing for a richer method of analysis in circulation studies. Both the concepts of network normativity and the network exploit, which throws normativity into relief, have value for those who desire to take a queer approach to circulation in writing studies.

Future directions for affective network research in writing studies, then, might work to understand how particular cultural groups of writers and makers code specific composing tools, technologies, and materials as well as who and what gets to move and accumulate various kinds of social and academic capital in our composing networks. As the field takes up issues of access and accessibility, which is evidenced in the rich work of disability scholars Melanie Yergeau, Janine Butler, Jay Dolmage, Brenda Bruggeman, Patricia Dunn, Barbi Smyser-Fauble, Stephanie Kerschbaum, and others, we might begin to think about affective access points, barriers, accelerations, and decelerations as well. In other words, we might design research studies that ask, which composing tools are likely to cause this group to feel anxiety, to fear failure, or to fear being “outed” in some way? Which tools are likely to cause this group to feel excited or at ease, or to feel as though they are being helpful to others? Which composing bodies are moved by this network, and how? Which are slowed down, stopped, or taken out of circulation? Through what means? In writing studies, this can connect affect studies to dis/ability and accessibility in productive ways for our field and for our students.

Playful Methods for the Emergence of Queer Affects

In Chapter 3, I described the origami fortune-teller game and discussed how, as a data collection protocol, it made space for discussing queer affects such as fear of failure, loss, insecurity, and hunger. For participants in the *Remix, Remake, Curate* network, these fear-of-failure narratives included the teachers' fears of failing to be good collaborators, their fears of falling behind in facilitating a curriculum that was about networking yet was still perceived as linear, as well as fear of public failure when the wrong objects were shared too much in public communities or when bodies misaligned and weren't able to connect in online synchronous events. In the *Pop Up and Make* network, where composing happened primarily in face-to-face spaces, however, students and teachers oriented differently toward failure, perceiving it as part of the composing process with novel, yet fickle composing tools such as the 3D printers. As the student's narrative of composing in The Robohacker Lab illustrates, she felt a sense of reconciled loss when her composing tool, the iPhone, was taken by another student and when she was, presumably because of gender, left out of particular kinds of making and playing such as the boys' Sphero racing in the halls. Similarly, the students who followed their teacher into The Remake Lab, discussed both their insecurities about spending the SMART block period in the lunchroom as well as their "hunger" and the importance of sharing food while composing both discrete objects and a place of safety away from the "shenanigans" of the cafeteria.

Compared with data that was collected through the semi-structured interviews with the *Remix, Remake, Curate* teachers as well as through observations in the *Pop Up and Make* network, the origami fortune-teller game play data allowed a wider range of affective responses to emerge. These stories worked around the "happy" stories often elicited by structured and semi-structured interviews that work to produce unlikely stories that may not have been elicited by more traditional methods that operate on Initiate-Respond-Evaluate (IRE) logics (Cazden; Wallace and Ewald). Instead, these queer methods of making and game play surfaced other affective responses to composing and composing bodies. In the sciences, publication bias results in a greater likelihood of studies with positive findings being published than those with negative

findings, and Danielle Fanelli has demonstrated, publication bias has an inverse correlation to the hierarchy of the sciences. This means that as we move down the hierarchy from physical sciences to the social sciences, publication bias increases; thus, we are more likely to read research on positive outcomes in psychology and education than we are in computer science and physics. It stands to reason that Writing Studies, with its history as a helping discipline, one that, as Rebecca Moore Howard notes, produces “...scholarship [that] is important and persuasive within the field, but carries little authority outside it” might be even more susceptible to publication bias because we want to show the rest of the academy, who already doubt the authority of scholarship, that our work with writers is positive and good. While there are no such studies that I am aware of on publication bias in Writing Studies, I don’t remember the last time I read an article that discussed methodological or pedagogical failure. Perhaps if we orient our scholarly attention away from measuring success and proving our worth, we might reorient towards the “different rewards” that Halberstam argues become available to us when we embrace failure (3). This dissertation study demonstrates how, when the object of research *is not* to show composition and composition pedagogy as *effective*, we might better understand the *affective* dimensions of meaning making that are central to composing.

Materializing Digital Rhetorics as Cultural Rhetorics

By studying the affective dimensions of composing with a host of technologies and others as well as foregrounding issues of embodiment and access, this study conceptualizes digital writing and digital making through the lens of cultural and material rhetorics. The focus on affect in digital spaces and with digital and non-digital composing tools is indebted to cultural rhetoric’s commitment to embodied scholarship, and also to material rhetorical practices that move beyond the page/screen, and also beyond alpha-linguistic composing practices. Following cultural rhetoric scholars such as Malea Powell and her colleagues at Michigan State University who founded the Cultural Rhetorics Theory Lab, I express a commitment to activism and activist scholarship. In this project, I’ve worked to disrupt dominant narratives about making and

makerspaces as projects that sponsor *only* middle class white men's literacy and compositional practices. I have worked to tell the stories of making that represent the bodies and making practices of marginalized and underrepresented groups who are working across institutional, disciplinary, academic, and public boundaries to create alliances and to compose more democratic and participatory futures. In addition, this project has foregrounded the materiality of digital writing and making—a constellation of tools, materials, people, places, and histories—and makes the claim, following Bratta and Powell, that all rhetorics, including digital rhetorics, are always already cultural rhetorics. Now, perhaps more than ever, it is important to remember in our research and scholarship that digital writing and rhetoric is not just about bits and bytes and the alluring bells and whistles of digital texts. It is also about how bodies are or are not being parsed and spread across digital and non-digital networks and who does or does not benefit from the normative and normalizing tendencies of such networks.

As I noted in Chapter 2, research and scholarship in digital rhetorics and cultural rhetorics has had a productive entanglement in the discipline of writing studies. It is thinking through digital as in the Latin *digitalis*, as Angela Haas did in “Wampalum as Hypertext: An American Indian Intellectual Tradition of Multimedia Theory and Practice,” that we come to see the long history of digital writing and making that predates the advent of computers. And it is through Adam Banks's study of the DJ who crate-digs, scratches, fades, and remixes that we come to see multimodal and digital storytelling practices inside a long line of African American compositional practices that also predate the dot.coms of Silicon Valley. Yet, as I also discussed in Chapter 2, the people in our field who are having these conversations about digital and cultural making are also becoming more and more isolated. For example, in a recent social media exchange, writing studies scholars doing object-oriented approaches to technology and writing studies scholars doing cultural rhetorics approaches to technology drew lines in the academic sand. They concluded their methodological approaches and commitments were so radically different that they couldn't share intellectual space, not even for the purpose of productive critique.

In this breach, I am reminded of the Cherokee double-weave basket that Qwo-Li Driskill employs to discuss the relationship between queer and Native studies. As a rhetorical practice, the craft of double weaving produces two independent containers, but these baskets intertwine and share an edge. Driskill writes, “the numerous splints...move beyond a concept of intersectional politics” (74) because although the divergent trajectories, commitments, and histories are apparent in the “splint,” the interconnectedness of the whole object and the sense of balance between each container makes both “more complex and durable.” Following Driskill, then, I argue that we might think about digital and cultural rhetorics in the much the same way—as a double-weaving. While there are certainly “splints” between these two independent fields that move researchers toward different horizons of possibility, these two areas can be more robust repositories for research and practice when they are intertwined. Certainly, I couldn’t have conceived of this dissertation project, its methods and methodologies, without having woven together digital and cultural (queer and feminist) rhetorics. At the outset, I thought the outer wall of the digital rhetorics might be enough to answer my research questions. But as I worked with the data, I struggled with how to make sense of all the affective currents in digital composing. I needed to understand *how* actants moved in a network; thus, I needed to weave queer and feminist scholarship into my methodology. By doing so, I was able to produce new understandings about relationships between digital composers, digital composing tools, and digital composing practices. We have to keep these opportunities to produce research in the entanglements of cultural and digital rhetorics open to possibility or we risk damaging the integrity of both areas of writing studies. Driskill’s metaphor might help us to think about ourselves as digital and cultural rhetoricians who are interconnected and mutually accountable to our areas and out discipline more broadly

Political Ecologies of Composing Things

This dissertation project also makes space to consider “political ecologies of things” in writing studies research and practice. “Political Ecologies of Things” is, of course, the subtitle

of Jane Bennet's book and describes the way that things gather together in strange and powerful configurations—like the torn pieces of paper, the glue, the paint brushes, the thrown-away bar stool, the chicken wings, and the students in The Remake Lab. This ecology of bodies, both human and not, created what they named a “safe” space during the maelstrom of the SMART block period. This space and the relations that were composed in it, through sharing food and working on collaborative projects, served a political function—the care and well-being of female makers, most of whom were Black Females. Unlike The RoboHacker Lab and The 3D Fabrication Lab, the tools and technologies available in The Remake Lab—glue, colored pencils, markers, paint, and paint brushes—don't get coded as “high technology.” Similarly, the makers who hang together in that space are not coded as techno-savvy. Because the composing tools aren't new or digital, we tend to take them for granted and overlook the kinds of composing knowledge that are necessary to work with everyday materials like glue and paper. We give little recognition to the *decoupeurs* who understand their composing activities as socially and historically situated inside the school. This is a mistake, and as Angela Haas wrote, “...we must be critical of the stories we tell ourselves about being ‘technologically advanced.’ Whose definition of technologically advanced are you using when evaluating your technological proficiency?” (94).

We must also be critical of the power differentials inherent in the kinds of composing tools we deem worthy of both research and classroom integration in the field of writing studies. Why, for instance, do we have an area devoted to the study of Computers and Writing that sponsors a conference, awards, and publications, but no such area for Daybooks and Writing? Or, as one of my dissertation committee members asked, why is it perfectly okay to work with color, font choices, typefaces, vectors, anchors, and paths in digital platforms, but people get nervous if we bring markers, crayons, yarn, and safety pins into the writing and rhetoric classroom? We treat some writing tools with gravitas, capable of making serious academic meaning, and we too quickly dismiss others in both our research and our teaching. This study suggests what new ideas may emerge to shape our notions of composition if we take a both/and approach to materiality:

People matter. Robots matter. Chicken wings matter. High tech tools matter. Low tech tools matter. Feelings matter. Politics matter.

Misalignments Between the Composing Orientations of Students and Teachers

The findings in Chapter 4 and Chapter 5 of this dissertation study contribute to an understanding of the disconnect between students and teachers in the writing studies classroom, including their motivations, goals, and orientations toward composing tools, technologies, and materials. As I noted in Chapter 4, even in the academic-adjacent space of the *Remix, Remake, Curate* MOOC, teachers had a host of anxieties about failure. In fact, fear of failure drove much of the teachers' network-building activity as they were concerned with outcomes and final products, nervous about the excesses of play—particularly in the examples of *the 50 Foot Shark* and *the Egorilla*—and anxious about composing technologies, particularly digital technologies. Teachers were preoccupied with letting others down and often felt as though they were falling behind, symptoms of the pressures they felt in a collaborative yet linearly experienced model of curriculum design. Students, however, had other interests, most notably pleasure and play. Students were excited to tinker with a host of new-to-them tools and technologies ranging from 3D printers to iNaturalist apps to SoundCloud, as well as more traditional composing tools such as rulers and colored pencils and poem templates. While teachers were sometimes nervous about working outside of their classrooms and disciplines, students in the *Remix, Remake, Curate* MOOC were excited to connect and break down boundaries of classrooms, institutions, and disciplines. Students in the *Pop Up and Make* network, however, needed more explicit invitations and encouragement. This may be, in part, because this maker network was largely contained within the school. The leadership team was not successful in engaging adult mentors beyond the school in the larger community in the makerspaces as they had hoped when the project began. Both groups of students, however, were invigorated by the lateral possibilities of composing. For example, teachers in the *Remix, Remake, Curate* network materialized the processes of composing as the relational and reciprocal practices of *listening, empathizing,*

collaborating, connecting, cooperating, and sharing while the students in the *Pop Up and Make* network found ways to “stitch in” by building and strengthening peer-to-peer relationships through their composing activities. These lateral trajectories, which I’ll discuss in more depth later in this chapter, have much to teach us about how writing teachers might reorient toward writing classrooms.

These findings suggest, however, that many teachers feel underprepared to work with a broad range of composing technologies. Writing studies researchers need to better understand writing teachers’ affective responses to composing tools, and how these potentially negative affects circulate, layer, and constrain what teachers feel they can and cannot accomplish in a writing classroom. Additional research that explores those affective relationships could help practitioners to design coursework and professional development experiences for writing teachers that helps them feel more confident engaging a broader range of composing tools and technologies in their classrooms. Additional research could help the field to determine how best to address these gaps and how to better prepare new writing teachers to teach writing with a host of tools and technologies that are, as I demonstrated in Chapter 4 with the Spheros, quite literally out-of-hand.

In addition, these research findings suggest that composition, as it’s currently constructed within curricular contexts, is embodied and inhabited as a means of control. Teachers are encouraged to teach with a “classroom management” focus and teachers are interviewed and asked about their management practices, as are Writing Program Administrators. Our job, it seems, is to control writing and composing practices and products, and we and our students are both then controlled by these options. Composing practices, composing tools, and compositions practices that get “out-of-hand” like the *Remix, Remake, Curate* MOOC itself, the Spheros, the *Eagorilla*, and the *50 ft. Shark* are carnivalesque. They disrupt and transgress the proper boundaries of composition-as-control. Yet despite their anxieties about failure, teachers in these paracurricular spaces, were able to relax some of their “suspensory power” (Bennet 73), an affective movement that is necessary for materializing new interdisciplinary compositions and

new composing relationships. Writing studies researchers and practitioners might look to this project to help them imagine composition-as-collision rather than composition-as control.

Does Making Have Value for Writing Studies?

The remainder of this chapter engages the larger question of this dissertation study, “What might we learn about composing from those networks?” Writing studies researchers Kristin Arola, Kristin Prins, and Jennifer Sano-Franchini have sketched out what it might mean to take a “slow” approach to digital composing borrowed from indigenous grain selection and harvesting practices (Arola); to compose with a craft sensibility that honors the hand-labor of composing “one word, one page, one screen at a time” (Prins 153); and to compose “with greater cultural reflexivity in...digital making” (Sano-Franchini 49-50). My findings build on this conversation of maker frameworks by introducing a queer material rhetoric for composition that encourages lateral thinking, feeling, learning, and composing. I use the term *composing sideways* to signal a host of irregular, horizontal, and meandering movements which, consciously or not, defer and resist vertical transfer as the most important pedagogical outcome for a writing classroom.

But before I introduce these, I would like to return to a question I raised in Chapter 5. In discussing the Black Female maker whose iPhone was taken by another maker so that he could participate in the races, I asked, “when do Black Females get recognized as makers and leaders in this maker movement? And if or when they do, how will they be recognized and by whom?” One answer to this question comes from Debbie Chachra whose short essay in *The Atlantic* titled “Why I’m Not a Maker” beautifully and succinctly gets at one of my main points in this dissertation. Making, she argues, has always been the province of men who make things of value and significance. She writes:

Maker culture, with its goal to get everyone access to the traditionally male domain of making...further devalues the traditionally female domain of caregiving, by continuing to enforce the idea that only making things is valuable. Rather, I want to see us recognize the work of the educators, those that analyze and characterize and critique, everyone who fixes things, all the other people who do valuable work with and for others—above all, the

caregivers—whose work isn't about something you can put in a box and sell.

So it stands to reason, then, that if you don't look the part, white or male, or play the part by making things that have value as commodities, then you won't get recognized as a maker in this maker culture. With its clearly racist, gendered, misogynistic, and ableist foundations, then, what value, if any, is there for me or for the field of writing studies in continuing to use the term *maker* or *making*? Can it be rescued or reappropriated by those of us with other orientations, projects, and interests?

Obviously, some two hundred pages into a dissertation with the word “making” in the title, I think so. In 2016, the chair of the Conference on College Composition and Communication challenged the field in her plenary address to make things beyond our classrooms, signaling an entrepreneurial moment for the discipline and its research. In 2017, however, the injunction to make things returned to the fringe spaces of the conference, a Wednesday morning maker workshop which brought together those of us who were interested in queer zine-making, transgressive button-making, crochet granny square-making, transgressive cross-stitch making, LED bookmark making, and activist meme-making. The workshop's facilitators devoted a majority of the three-hour session to open-making in pop-up makerspaces which were set up in a large auditorium-style room at the conference. Our discussions following the making time focused on the rhetorical work of building public space through craft and making, archival challenges and responsibilities of doing public craft work, and the affordances and constraints of craft and maker-based pedagogies in writing classrooms and centers. In the convention program and in the discussions during this workshop, *making*, *crafting*, and *DIY* seemed to be used interchangeably by writing studies practitioners, and there was little talk of the kinds of “value-added” making that was prompted in 2016. Instead, there was a lot of storytelling, sharing, laughter—and strategizing about classrooms, programs, and local resistance movements. These were the kinds of “stitching in” practices of making that I observed in The Remake Lab at JHR where the things that were made were ancillary to the relationships that

were being built and sustained during our time there together. While cis-gendered whiteness still dominated the room, as it does the field at large, I've been encouraged by these sessions on the program, and I'm encouraged that scholars of color, queer scholars, dis/ability scholars, female scholars, and scholars with young children have found lateral inroads to writing studies professionalism through making and playing in these sorts of "fringe" spaces. Initiatives such as *C's the Day*, and pop-up maker workshops have provided those access points for collaborative engagement with the field. Perhaps making needs to fade from the entrepreneurial center, back to the margins of the profession where it can fly under the radar and fail to be anything significant or important. Instead, it can continue to materialize as one alternative edgewise entry point into the discipline.

Composing Sideways: A Queer Rhetoric for Composition

The maker networks in this study broaden our understandings of what it means to compose and underscore the multiplicity of experiences that young people have with different composing tools, materials, objects, and technologies beyond those that might come to mind most when we think of writing. As participants in these studies reported, writing happens with DNA and computer programming code, in poem templates, with electricity and circuits, in mobile application, on t-shirts, in newsletters, on vinyl, on poster, in memes, in the classroom, outside, in online and offline places. Most composers in these studies were promiscuous in their writing and making, yet most of our writing classrooms expect monogamous pairings between one tool and one writer and deep attention to one form, the academic essay. Despite a growing body of work in our field on making and crafting, and a commitment to public rhetoric, a commitment that is written into the outcome statement of East Carolina University's new course description for our writing about the disciplines course, few of my colleagues teaching Writing Foundations courses are experimenting with other tools, technologies, materials. They are committed to the academic essay produced on the computer using word processing technologies that have changed little in the last 30 years. As I stated earlier in this chapter, based on findings

from the *Remix, Remake, Curate* study, their pedagogical prudishness may stem from fear of failure with technologies, especially digital technologies.

My colleagues' unwillingness to embrace other writing tools, technologies, and materials may also stem from the larger ideological construct of what First Year Writing (FYW) is for, both in the Writing Foundations courses at ECU and in the introductory writing courses at other universities. Kerri Morris argues in "The Service Myth: Why Freshman Composition Doesn't. Serve 'Us' or 'Them,'" that FYW is saddled with the burden of a service course that is doomed to fail at the impossible task of teaching this big, amorphous thing called academic writing. Writing is conceived of as a teachable skill, and FYW constructed as a service course that obliges other legitimized disciplines. More recently, the move toward transfer as an animus for FYW has recapitulated the service argument—old wine in a new skin—by asserting that metacognitive behaviors that we teach in FYW will spiral up and also serve students in their disciplinary writing endeavors. For example, Elizabeth Wardle's longitudinal study on transfer as sociocultural activity considers how students do or do not abstract and apply what they learn in FYW in upper level courses in other disciplines. She argues, "those of us working as writing program administrators...would be irresponsible not to engage the issue of transfer" (66). Never mind the issues of inequity and injustice that writing teachers and students come into our programs wanting to engage: it is the issue of transfer that we must engage to be responsible WPAs. Composition, it seems, and particularly, FYW, is always meant for another time and another place, for other people and other bodies. The findings of my dissertation, however, show us how we might make a space for composing in the here and the now, and how to make space for compositions that matter beyond the page or the screen. These findings permission me as a writing studies researcher and practitioner to refuse service and transfer as my orientations—or my goals. They authorize my refusal to trace or to be traced by the straight and linear lines of a vertically oriented curriculum, the happy object that guarantees a return on investment in the academic system. Instead, they orient me toward the lateral possibilities of composing sideways.

I adapt the term *composing sideways* from queer theorist Kathryn Bond Stockton, who

coined the term “growing sideways” (4) to describe a host of child and adolescent activities that resist the normalizing strictures of growing up. Stockton argues that children don’t follow the linear model of growth and development that adults imagine and work to impose. Instead, children’s activity often follows an oblique trajectory of “growing sideways” instead of expeditiously growing up and growing out of queer behaviors. For Stockton, “growing sideways” means following a host of meandering paths, circuitous routes, and even dead ends that are motivated by queer affects—conflicting and multivalent movements, feelings, intentions, and desires. Stockton explores these puerile perversions which include children’s lust for candy and sweets, excessive affection for and intimacy with animals (which Mel Chen draws on in *Queer Animacies*), extravagant and wasteful spending of their parents’ money, and illicit relationships that cut across cultural barriers of gender, age, race, and socio-economic status. Much to the chagrin of their parents and society at large, children stumble through these rambling routes, and in the language of neoliberalism, they are not rewarded with a return on their or their parents’ investments in any direct or sequential way. While deviance is permitted, to an extent, for children and adolescents, success still comes in ultimately containing their sideways moves, in putting ‘childish things’ behind us. Growing sideways is one way to resist, obstruct, and delay the rapid onset of an adulthood defined and inhabited by others’ notions of what it means to grow up. For Stockton, this lateral movement is not a complete rejection of growing up where children live forever in Neverland; instead, it is a staking out of alternative paths, ramblings, and resistances. However, “growing sideways” does reject a monolithic construction of what it means and feels like to “grow up.”

Stockton’s discussion of growing up as a method for straightening out the queer body resembles both the ways we talk about “leveling up” in makerspaces and the notion of transfer in Writing Studies. In practice, both of these concepts (leveling up/transfer) are meant to norm students’ composing behaviors as they are guided in taking up the *right* tactile and conceptual tools, in composing with them in the *right* ways and towards the *right* goals that will return status markers like grades and academic success. This is traditionally how academic spaces work.

My research, however, demonstrates that academic adjacent composing spaces can provide the latitude necessary to reject linearity and futurity; as such, they provide opportunities for composing sideways. Composing sideways permissions composers to reject the ends in favor of the means, to experiment with non-normative composing technologies, objects, and materials, to form new composing configurations across geographic, racial, economic, and institutional barriers, and to follow meandering, circuitous, and perhaps dead-end composing paths without a paralyzing fear of failure.

A queer material rhetoric of composition that promotes sideways thinking, feeling, and composing, speaks most directly to the kinds of work we can do in para-curricular spaces such as writing centers and writing programs. In these liminal spaces where outcomes are more often framed as intentions, we have leeway to engage a host of partners across disciplines beyond the constraints of a single semester. My colleagues and I have written about the kinds of sideways composing or “knotworking” (West-Puckett, Flinchbaugh, Herrmann 37) that can happen when graduate students, WPA’s, and non-tenure track faculty use opportunities like the National Day on Writing (NDOW) to create pop-up makerspaces across campus. As part of NDOW at ECU a few years ago, K12 and university students and their teachers played with digital and analogue composing technologies to consider the role that writing plays in our lives. My colleagues and I leveraged this national opportunity locally to *stitch in* and build the fabric of our University Writing Program by composing laterally across social barriers that weren’t often crossed at our university. Of course we weren’t able to go it alone. This initiative required the support of a WPA who was willing to follow our irregular growth as graduate students and non-tenure track faculty, one who was open and receptive to the crash encounters of composition that happen when you cut across institutional boundaries.

While structures like disciplines and the aligned curricula of departments and schools can move students in vertical ways towards more normative kinds of learning and achievement, writing programs can also serve as powerful spaces to sponsor sideways composing. The findings from my study demonstrate how disciplinarity can work against the efforts of young

people to learn, closing down the kinds of meaning making that happens when the practices of extracting DNA are happening alongside the practices of composing poetry in codon stanzas. The sideways composing that happened in these maker networks creates the potential to disrupt disciplinary boundaries and to create engaged, participatory learning spaces that blend (and re/compose) disciplinary ways of knowing, doing, and being. These are the kinds of spaces that Karen Barad calls for when she asks us to forge cross-disciplinary alliances in order to address the multifaceted, socio-scientific issues that impact global health and well-being.

One of the most important questions to emerge from this project for writing studies, then, is how might a writing program borrow from the maker movement to serve as a model space for interdisciplinary, boundary-breaking work? The multiliteracy center may be the closest evolutionary ancestor of common descent that we have in the field, and Sheridan and Inman make the argument that interdisciplinary participation is essential to their function as well. The multiliteracy center, as Sheridan and Inman's book title implies, is focused on digitality and multimodality, however, while makerspaces broaden our work beyond the screen. This focus on the materiality of composing with a host of tools, materials, objects, and bodies has been at the forefront of my study, and it is also important for writing programs which want to eschew the de facto techno-elitism of the maker movement—and of neoliberal digital rhetorics—which I highlighted in Chapter 1.

I also know that we can compose space for this work to happen *inside*, not just alongside, writing studies' classrooms. Writing teachers can use *composing sideways* as a passive resistance to obstruct and delay those who would have us fetishize transfer. If we embrace a queer material rhetoric for composing, we might follow students as they go along with their interests, intentions, desires, and inclinations in our writing classes. This might mean that students have choices not just about topics, genres, and media, but also about the number and types of assignments they choose to compose, as well as whom they compose for and with. *Composing sideways* requires that we think differently about everything from classroom management to assessment—not because all students won't be on the "same page" or at the same place on our pacing guides;

that's never been the case anyway. Rather, it means that we are actively acknowledging and embracing that reality, instead of ignoring it or engaging in punitive measures when someone is "outed" for being out of synch. Instead, we can engage the rhetoric of *composing sideways* as a heuristic for designing for a diversity of spatial and temporal learning pathways.

For example, over the last three years, I have iterated on a digital badging system for my First Year Writing classroom (FYW) classroom that allowed students to choose the number, order, and kind of projects they wanted to complete. After completion of the badging pathway, which included opportunities to take both lateral paths to explore topics, ideas, their own writing processes and practices and to *level up* toward a capstone experience, students earned a digital badge. The number of badges they earned correlated to the grade they earned in the course. All students began with the "Habits of Mind Badge," a research project that engaged them in exploring "What are the habits of mind and body for good writing at the college level?" They researched the *Writing Program Administrators Outcomes Statements*, *The Framework for Success in Postsecondary Writing*, our *University Writing Outcomes* for writing across the curriculum, and they also interviewed consultants at the University Writing Center. Then, they composed a host of digital and print-based documents that addressed the badging pathway's central question and shared their findings with their classmates. Through this work, they created a participatory culture of writing assessment which was born from their lateral explorations of college-level writing.

From there, students chose the number and kinds of badges they wanted to earn in the course with options that included the following pathways: Citizen Science Communication, Social Justice Writer, Grammar Ninja, Critical Digital Storyteller, Writing Lives Autoethnographer, Fake New Hacker, and Maker Mentor, the latter of which involved my FYW students serving as Maker Mentors in the Pop Up Makerspaces at JHR. In that project, students negotiated written projects with the makerspace teachers and received service-learning credit at the university, extending work in my class sideways to intersect with making at the high school. My students chose their own writing groups, their peer reviewers, their partners, and their

number of collaborators, if any. This meant that on any given day, my classroom, like The 3D Fabrication Lab or The RoboHacker Lab at JHR or the G+ Community in the *Remix, Remake, Curate* network, was alive with activity, full of the practices of making.

While I have discussed the assessment practices and the design of that course's badging projects at length elsewhere (West-Puckett), here I want to highlight that, in this course, we made space for queer trajectories and compositions that took up, among other things, an emotionally exhausting election year, another devastating hurricane that disproportionately affected poor communities and communities of color in our region, and members of our university's marching band kneeling on the field during the national anthem and being reprimanded by the institution. While practicing rhetorical approaches to composing, and practicing attention to their writing processes and products that helped writers to *level up* by practicing academic writing moves, we also made space for relevant and important affective concerns that cut across the badging pathways. These cross-cutting issues and affects materialized in this course because I could "relax suspensory powers" (Bennett 72) that rematerialize FYW as a service course. Instead, FYW has the potential to become a place where students *stitch in* through the objects and the relationships they compose. Considering that approximately 20% of the students I teach in FYW are likely to drop out of college after their first year, it makes sense inside outcomes-based spaces like classrooms to provide opportunities for students to both *level up* and *stitch in* as a means of retaining and supporting composers on our campuses. What my studies demonstrate, and what we also have to remember in terms of transfer, is that public feelings about composing, about composing tools, about composition mentors/teachers move and circulate, too. We need to better understand what role those public feelings play in students' decisions to move forward in or to move out of our institutions.

Queer Objects for Sideways Composing

As evidenced in the maker networks of this study, making encourages ways of learning and composing that are predicated on talking, touching, feeling, and doing. In the

Remix, Remake, Curate network, both students and teachers found the recorded videos and demonstrations more helpful than text-based instructions for composing, and in the JHR maker network, both students and teachers ultimately rejected the *Challenge Cards* that were meant to provide inspiration and opportunities for leveling up. Instead, embodied interactions with other makers and experimentation with tools and materials spoke to young composers, particularly the young composers in the study from working class experiences and backgrounds. Therefore, we might ask, how can we provide more material and embodied points of access for students to engage rhetoric and composition?

We might start with the ways we traditionally conceptualize and teach *the* writing process. First, despite extensive scholarship around process and post-process composition (Murray, Elbow, Olson, Dobrin, Kent), we tend to use the definite article as if there were only one process, not an infinite number of processes, including a host of incubation, consumption-, and production-centered activities, which surfaced in the maker networks. We also tend to teach the writing process as if it were a process of the singular mind. For many writing teachers, writing is not in a body, with a body, or of a body that affects and is affected by the world. Instead, this process must start—and often ends—in the brain. We must begin by *brainstorming*, not *bodystorming*. The Writing Center at UNC Chapel Hill advises, “If you consciously take advantage of your natural thinking processes by gathering your brain’s energies into a ‘storm,’ you can transform these energies into written words or diagrams that will lead to lively, vibrant writing.” It’s as if brilliant ideas are just waiting to spill out “naturally” if only we can be fully “conscious” and, like the expressionists, liberate our minds from the trappings of culture and society.

Many models of process also don’t involve the material bodies of other people until drafts are already written, at which point feedback and peer review can be elicited. Peer review is placed discretely after the completion of a rough draft. If students are fortunate, instructors provide a non-evaluative review and students are able to revise again before submitting the work for evaluation. Yet some instructors even consider peer-to-peer support such as consultations in

writing centers “cheating,” as students have not relied on their own knowledge stores to produce the written product. The places and times where students and instructors are “allowed” to materially intervene in each others’ writing processes are codified in strange and particular ways.

And traditionally, concerns of publication weren’t part of the writing process at all. Writing was finished when writers revised and submitted their work to teachers or agents. The material concerns of publication and distribution were outsourced to publishers, and writers weren’t weighed down with trivial concerns like page design or choosing appropriate domain names. In the good old days, writers were free to live the life of the mind. But this is and has always been a lie. Sara Ahmed makes this argument beautifully in *Queer Phenomenology: Orientations, Objects, Others*. There, following Husserl, she demonstrates how composing—even composing in what we now conceive of as composing in a very traditional sense—is always an embodied material act. It is about working intra-actively with tools and materials. Ahmed writes, “I write, and in performing this work, I might yet become my object—become a writer, with a writer’s body, and a writer’s tendencies (the sore neck, the sore shoulders, are sure signs of having done this kind of work)” (33). The tools and materials act back on the composer, and it is at these interstices that compositional identities are formed and performed.

There is a stark difference as I move from my research in the makerspaces where tools, materials, and objects and a host of bodies circulate, and into the typical writing classroom at my university where long rows of seats and desks are anchored to the floor in an auditorium-style classroom. There is a smart podium station at the front of the classroom, a whiteboard, and a projector for the teacher to use, but nothing for the students, save the technologies that they bring with them, to write. We expect that students will engage, create, and produce in these spaces without providing the opportunities for them to move, the importance of which Susan Miller-Cochran and Dana Gierdowski illustrate in their research on flexible classroom spaces, or to engage with composing tools, objects, bodies, and materials in rich and meaningful ways. Thus, I argue, we should consider Fröbel’s Gifts as queer objects that can support *sideways composing* in composition.

According to Mitch Resnick, the LEGO Papert Professor of Learning Research and head of the Lifelong Kindergarten group at the MIT Media Lab, Fröbel's Gifts are tactile materials that help us think, solve problems, learn, and compose. First introduced by Friedrich Fröbel, the creator of the first children's kindergartens in Germany in the mid 19th century, these materials such as activity blocks, beads, and tiles for counting, patterning, and building, are better known in contemporary times as manipulatives. In discussing the importance of embodied, tactile object interaction in learning and making, Resnick states:

It doesn't really matter what you are making; you might be building a sandcastle, writing a poem, cooking a new recipe, or programming an interactive robot. What's important is that you are making something that is meaningful to yourself or others around you. Why is the activity of making so important to the process of learning? When you make something in the world, it becomes an external representation of ideas in your head. It enables you to play with your ideas and to gain a better understanding of the possibilities and limitations of your ideas. *Why didn't it work the way I expected? I wonder what would happen if I changed this piece of it?* By giving an external form and shape to your ideas, you also provide opportunities for other people to play with your ideas and give suggestions on your ideas. *Why didn't I think of that? How can I make it more useful for more people?* There is a constant interplay between making new things in the world and making new ideas in your head. As you make new things, and get feedback from others (and from yourself), you can revise, modify, and improve your ideas. And based on these new ideas, you are inspired to make new things. The process goes on and on, with making and learning reinforcing one another in a never-ending spiral. (50-51, emphasis in the original)

While manipulatives such as Fröbel's Gifts are common in primary classrooms, Resnick notes, they become less and less available as students matriculate through school. Resnick argues that digital tools can provide a high-tech solution for secondary and postsecondary students, citing Lego Mindstorms as an example and calling them a "Fröbel Gift for the 21st Century" (51).

Any tactile manipulatives, with the possible exception of computers as I've discussed, are coded as queer objects in the writing classroom. The work of future research is to determine which might support students in their oblique composing movements. Again, I resist the notion that these tools or objects must be high tech and/or digital. In the ways that the students in both maker networks composed with everyday materials such as pencils, paper, glue, dish soap, and clay, I have experimented with analog manipulatives such as hand-sewn daybooks and cardboard

automatons in my FYW classroom. For the daybook project, students brought in their old t-shirts to make covers for their daybooks, folded paper-signatures, and using cardboard, glue, hammers, and nails, they crafted their own physical places for writing. We read excerpts from *Thinking Out Loud on Paper* (Brannon et al.) and practiced the concept of the daybook as a “junkdrawer” for rhetorical scraps of thinking, writing, and other ephemera of the everyday. For the automaton project, we watched the video of the The Boy Writer (https://www.youtube.com/watch?v=bY_wfKVjuJM), one of the only surviving automatons from the 19th century who can be programmed to write a sentence, and we built our own automated machines out of cardboard, straws, and other everyday objects. While making, we discussed the meaning of “good writing” in terms of the tensions between creativity and conventions and the value of templates like the five paragraph essay that help us “construct” essays. While reading the *Frameworks for Success in Postsecondary Writing* and other framing documents in the field of writing studies, we recursively looped back around to the video of the boy automaton producing his beautiful cursive print asking, “Is he a good writer?” with the intention of complicating the equation of *beautiful* and *simple* with *good*. When these queer objects materialized in our writing classroom, they prompted spiraling discussions and a host of affects from both students and my colleagues. From bizarre student curiosity to outright disdain from my colleagues who couldn’t fathom why one might need a hammer and nails or bendy straws in FYW, these objects moved the conversations and our composing practices in what Bond might call “sideways slides” (305) as we asked critical questions about the meaning and matter of our work together in composition.

Assessing Sideways: You Know My Materials Not My Products

In *Very Like a Whale: The Assessment of Writing Programs*, White, Elliott, and Peckham argue that the portfolio “has become part of the gold standard of writing assessment” (104). Certainly, the practice of portfolio assessment has moved us away from more draconian assessment measures such as the use of standardized writing assessments and the indirect assessment of writing; however, those of us who are committed to assessment as a practice of social justice are

not ready to gild the portfolio or its digital twin the ePortfolio just yet. First, it's hard to ignore the fact that the term "gold standard" has been imported from a capitalist system of exchange in which the value of currency was based on an equivalency in gold. The overlay of a capitalist economy on our instruments and systems of assessment speaks to one of the most persistent problem with standardized assessment: it promotes inequity because it forces individuals without the same starting resources to compete for limited rewards, a social justice issue which I discussed in *College English*. Second, the term "gold standard" normalizes the writing portfolio as an assessment instrument and effectively shuts down critical inquiry into its practical application, inquiry into how data will be collected from it, and inquiry into how that data will be used with, for, or perhaps, against writing students and teachers. My colleague Nikki Caswell and I argue this point in our article "Assessment Killjoys: Queering the Return for a Writing Studies World-Making Methodology," citing Tony Scott and Bill Condon's work on the normative use of portfolios. When schools, programs, and even classroom teachers use these instruments without engaging in critical inquiry about the validity of the data, these instruments become, in the words of Audrey Lourde, the "master's tools [that] will never dismantle the master's house" (110).

However, drawing on the research of this dissertation study, I would argue that the master's tools can, when rematerialized with other intentions, other materials, and other orientations, chip away at that foundation. I'm thinking here of the Spheros that performed as playful interruptions to *real* robotics programming and as racing objects for male competitive socialization or of the *Eagorilla* that was an object of excitement and engagement for students and an object of fear and denial for teachers and scientists. These compositions disrupted the space by unsettling bodies, tool, materials, etc. In a similar fashion, I believe portfolios can be rematerialized as powerful tools for *composing sideways* if we rethink and reorient to their contents and purposes. Most writing portfolios, as Susan Callahan, Nedra Reynolds, Elizabeth Davis, Bill Condon, Diane Kelly-Riley, Norbert Elliott, Tony Scott, and my own experiences teaching writing can attest to, contain a selection of student writing from a course and a reflective

cover letter that discusses those selections in terms of the rhetorical situation and choices, writing processes, and strengths and weaknesses of the final products. Sometimes, multiple drafts are solicited in the portfolio, but these are often optional, as is the case at my own university in the FYW portfolio assessments. Students are rarely, if ever, asked to discuss the places, the tools, the technologies, the materials, and the other bodies that they composed with. Furthermore, typical portfolio assessment prompts leave little room for the spontaneous materialization of affect and orientation towards the materiality of composing that became the most important part of this dissertation study. Our portfolio pedagogies and assessments, then, reinforce a-contextual, disembodied, and spectral notions of composing.

In *Toward A Composition Made Whole*, Jody Shipka introduces a materially oriented intervention into the problem of the reflective portfolio. She advocates for the use of a Statement of Goals and Choices (SOGC) to promote metacognitive awareness about the tools and technologies of composing (118). The SOGC is meant to help composers identify their intentions and outcomes as realized in their compositions; yet it also ignores the queering potential of agentive, vibrant materiality. As I described in Chapter 2 following Bennet, and as I demonstrated in both maker networks, an infinite plurality of meaning and matter-making practices swirl and fall in the queer space of unpredictability between intention and outcome. Yet, in teleological fashion, Shipka's model equates choices made with choices realized. Her SOGC underscores the notion that composers have mastery over dead matter and static materials, and that the compositional process is a one-way street with composers molding materials without considering how objects act back on composers—their bodies, their orientations, and their compositional horizons of what's possible to (re)make. Furthermore, Shipka's SOGC neglects the embodied and affective meaning-making relationships that composers develop and layer on composing tools, technologies, and materials. Shipka writes, "The questions students are asked to address in the SOGC do not, by contrast, ask students to focus on what they learned while accomplishing a task, or how they felt before, during, or after composing a text" (118). If we are to partially understand what drives composers' intentions, inclinations, and motivations, and

better understand the materialization of a composition network in our classroom and programmatic spaces, we must make room in our portfolio assessment structures for these affective orientations, turnings, gathering, and movements to emerge. Continuing to be afraid of those queer and disorienting affects means that while we know writing and composing are highly affective activities and that assessment is a highly affective response to those activities and products, we're unable to understand the impact that affects has on composing itself.

While Shipka's work orients towards materiality, we can look to the maker movement to help us pursue a lateral trajectory into the material and embodied aspects of composing with vibrant materials. The Institute of Making (<http://www.instituteofmaking.org.uk/>) at University College London boasts a *materials library* which it describes on its website as:

a collection of some of the most wondrous materials on earth, gathered from sheds, labs, grottoes and repositories around the world. It is a resource, laboratory, studio, and playground for the curious and material-minded to conduct hands-on research through truly interdisciplinary inquiry and innovation.

The materials in the library are available to the members of the institute, which includes any student, faculty, or staff associated with the university. The materials, which are catalogued on their website in alphabetical order, include aluminium, artificial snow, a Bakelite telephone, breathable chocolate, a copper tuning fork, fluorescent paintballs, gecko tape, lacerated cardboard, machinable ceramic, natural rubber, a pewter teapot, polyurethane, silly putty, table salt, and a zebra fish. This queer collection is meant to engender an embodied, physical curiosity and hands-on approach to invention and exploration. This is a library and archive of materials that has the power to excite, to disgust, to gather up, to collide, and, like the Spheros and the 3D printers, to invite, to induce, and to provoke composition. Unlike the stacks of portfolios that are left in writing teachers' offices or in the digital drop boxes of program administrators, the composing materials are both put on display and in circulation through the infrastructure of a materials library. This both/and approach to making the materials of composition visible and portable queers the practices of product curation that have become normative in writing

classrooms and programs.

What if, instead of compiling portfolios of composed products, or *only* of composed products, and hosting portfolio showcases at the end of a semester that show off what gets made, we focused instead on the objects, materials, and affects of composing? What if we asked students to curate, display, and help us build infrastructures that could circulate their composing materials, technologies, places, tools, and the bodies that mattered to them in their composing? Could we, as writing teachers and writing program administrators, work to catalogue, display, and circulate the materials or traces of the materials, technologies, places, tools, and bodies that mattered to students in their composing? Could composing materials libraries become material resources, like the decoupage stool in The Remake Lab, for the next “generation” or semester of composers? What might this look like in the classroom and at the programmatic level? What kinds of material support might we need to accomplish this work? And finally, how might refusing or delaying the display of composed products reorient our focus on “the entanglements of composing time, space, bodies, objects, and practices” that I outlined in Chapter 2? These are big questions that this study raises for a queer material rhetoric and practice of *composing sideways* in writing studies and the kinds of on-the-ground action that chart new lateral directions for both the field and for our students and teachers looking for meaning and mattering in our discipline.

Finally, I want to return to an argument that I’ve been implicitly hinting at throughout this dissertation: that composed objects or made things don’t matter. Clearly, sometimes, they do. For example, the teacher who facilitates The 3D Fabrication Lab recently told me a story about a new student who found his way into the lab during SMART block because he wanted to print a shirt.

He asked the teacher, “Do you make shirts?”

“No,” the teacher responded. “Gildan makes the shirts, probably by sourcing cheap labor from outside the U.S., but we can print things on them. Why? What do you need?”

The student said he wanted to print something on a shirt, and with a round of questions and answers about what it was, if it was copyright free, or if he had artwork ready, the student

finally said he wanted to print a picture of his father with his name, dates, and “Rest in Peace.” He had the photo of his father on his phone, so the teacher helped him download it into the Adobe software, edit, and add his text. During this process, as the teacher guided him along, the student turned to the teacher and asked, “Do you want to know how he died?”

“If you want to tell me, I’m happy to listen,” the teacher responded.

I won’t repeat what the student told the teacher because the circumstances of his father’s death are so bizarre that they would likely compromise the student’s identity. But after he told the story, he kept talking and the teacher kept listening. The student’s life hadn’t been easy since he lost his father, and he wanted something to keep him close. At the end of the SMART block period, after outputting the artwork, testing the print, loading and running the direct-to-garment printer, and heat setting it with the clamshell press, the student had the t-shirt he had envisioned. The student thanked the teacher several times and said that this shirt really meant a lot to him. He scrambled as the bell rang to get to his next class. The teacher hasn’t seen him since.

Clearly, sometimes the things we compose do matter. But not in the ways that we tend to value them in writing studies and in education more broadly. Things like this t-shirt matter not because they meet the criteria set forth on a rubric or because we construct a reflection that shows how we masterfully and individually we molded the materials so that our outcomes could match our intentions. Things matter not because they have secret relations with other things that recede from human understanding in infinite regress. Things matter because they dis/affect us. They bring us dis/pleasure and dis/comfort and the traces of other places, other times, other selves, other bodies—both human and not. The meaning of matter is wrapped up in its affective stores and relays. This dissertation project has been one of exciting discoveries and materializations for me as a writing studies scholar-teacher, and it is, I think, an exciting time for writing studies research as we learn to *compose sideways* by tracing and letting ourselves be traced by these queer trajectories and possibilities for research and scholarship.

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APPENDIX A



EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building · Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · www.ecu.edu/irb

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: [Stephanie West-Puckett](#)
CC: [Stephanie West-Puckett](#)
Date: 1/26/2016
Re: [UMCIRB 16-000019](#)
Approaching Science Literacy

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 1/25/2016 to 1/24/2017. The research study is eligible for review under expedited category # 6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
AnnotatedBibliography8780.pdf	Study Protocol or Grant Application
CollectingDataThroughGamePlay.pdf	Interview/Focus Group Scripts/Questions
Informed_Consent_Science_Literacy.docx	Consent Forms

The Chairperson (or designee) does not have a potential for conflict of interest on this study.



Informed Consent to Participate in Research

Information to consider before taking part in research that has no more than minimal risk.

Title of Research Study: **Approaching Science Literacy: A Phenomenological Approach to Understanding Participants' Experiences in an Open, Online Collaboration**

Principal Investigator: Stephanie West-Puckett
Institution, Department or Division: Department of English
Address: 2201 Bate Building, Mailstop 555
Telephone #: 252.737.1089

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?

The purpose of this research is to better understand your experiences of science literacy while facilitating the Remix, Remake, Curate MOOC. You are being invited to take part in this research because you facilitated Remix, Remake, Curate during the 2014-2015 and/or the 2015-2016 academic year. The decision to take part in this research is yours to make. By doing this research, we hope to learn how science literacy is experienced and co-produced in open online collaborations.

If you volunteer to take part in this research, you will be one of about 20 people to do so.

Are there reasons I should not take part in this research?

I understand that I should not take part in this research if I am under 18 or if I did not facilitate the Remix, Remake, Curate MOOC.

What other choices do I have if I do not take part in this research?

You can choose not to participate. Choosing not to participate will have no effect on your role as a facilitator or on future opportunities to facilitate programming with the Tar River Writing Project at ECU.

Where is the research going to take place and how long will it last?

The research will be conducted at The Winds Ocean resort, at ECU, and at the NC Museum of Natural Sciences as necessary. You will need to come to the Winds Meeting Room at 1:00pm on Saturday, January 30, 2016. The total amount of time you will be asked to volunteer for this study is two-four hours over the next year and a half.

What will I be asked to do?

You will be asked to do the following: Participate in focus group conversations about your experience of science literacy. In the spirit of making common to our partnership, you will be led through making an origami fortune teller, labeling it with phenomena from your MOOC experience that comes to mind, and playing a rule-based game with that object and with a partner. After each "turn," you and your partner will write short experience narratives (anecdotes) about the constellations of makes, tools, people, times, and places that appear during your turn, which will be collected and analyzed by the researcher. The researcher may also ask permission to audio or video record your game play, but you do not have to give

permission for audio or video recording to remain in the study. The researcher may also contact you over the eighteen months to conduct follow-up interviews, which will be conducted at ECU or the NC Museum of Natural Sciences. The purpose of those interviews is to clarify, expand on, or interpret anecdotes of particular interest to the research project, and you can choose whether this interview is recorded.

What might I experience if I take part in the research?

Other people who have taken part in this type of research have experienced stronger community partnerships and individual capacity-building. By participating in this research study, you may also experience these benefits.

Will I be paid for taking part in this research?

We will not be able to pay you for the time you volunteer while being in this study.

Will it cost me to take part in this research?

It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?

ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- Any agency of the federal, state, or local government that regulates human research. This includes the Office for Human Research Protections.
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.

How will you keep the information you collect about me secure? How long will you keep it?

Physical data and identifying information (consent forms, origami fortune tellers, written anecdotes, interview notes) and will be kept in a locked drawer in the researcher's office. These materials will also be scanned and kept in encrypted files on the researcher's hard drives. Digital video and audio recordings will also be digitized and stored as encrypted files on the researcher's hard drive. If the researcher wishes to use any of these recordings for presentations or digital scholarship, she will contact you to ask permission on a case-by-case basis. Otherwise all data will be destroyed at the conclusion of the study.

What if I decide I don't want to continue in this research?

You can stop at any time after it has already started. There will be no consequences if you stop and you will not be criticized. You will not lose any benefits that you normally receive.

Who should I contact if I have questions?

The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at 252.737.1089 and leave a message with your contact information. You will receive a timely response.

If you have questions about your rights as someone taking part in research, you may call the Office of Research Integrity & Compliance (ORIC) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of the ORIC, at 252-744-1971.

APPENDIX B



EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building · Mail Stop 682
600 Moyer Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · www.ecu.edu/irb

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: [Stephanie West-Puckett](#)
CC:
[Stephanie West-Puckett](#)
Date: 5/11/2016
Re: [UMCIRB 16-000770](#)
Understanding Youth Composing Experiences in A High School Makerspace

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 5/11/2016 to 5/10/2017. The research study is eligible for review under expedited category # 6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
JHR_Collecting Data Through Game Play.docx	Interview/Focus Group Scripts/Questions
JHR_Letter_to_Parents.docx	Consent Forms
Student_Assent_JHR_Makerspace_Research.docx	Consent Forms

The Chairperson (or designee) does not have a potential for conflict of interest on this study.



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Dear Parent/Guardian,

I am presently working on my Dissertation in Rhetoric, Writing, and Professional Communication at East Carolina University. As part of my degree requirements, I am planning an educational research project to take place in the JH Rose Pop Up and Make Makerspaces that will help me to learn more about students' composing experiences in informal learning spaces. The fundamental goal of this research study is to find out more about how students develop and share composition and STEM knowledge in school-sponsored maker spaces.

As part of this research project in the maker spaces, your child will participate in various regular making activities in addition to focus group conversations and informal interviews over the next six to eight weeks that will allow me to be understand students' composing and STEM experiences. As this study is for educational research purposes only, the results of your child's participation **will not** affect your child's grade.

I am requesting permission from you to use your child's data in my research study. Please know that participation is entirely voluntary.

If you have any questions or concerns, please feel free to contact me at (252) 737-1089 or by emailing me at westpucketts@ecu.edu. If you have questions about your child's rights as someone taking part in research, you may call the Office of Research Integrity & Compliance (ORIC) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of the OHRI, at 252-744-1971.

If you permit your child's data to be used in my study, please return the attached form by May 15, 2016. Thank you for your interest in my educational research study.

Your Partner in Education,

Stephanie West-Puckett

As the parent or guardian of _____,
 (write your student's name)

- I grant my permission for Ms. Stephanie West-Puckett to use my child's data in her educational research project regarding composing in makerspaces. I fully understand that my child's data will be kept completely confidential and will be used only for the purposes of Ms. West-Puckett's research study. I also understand that I or my child may at anytime decide to withdraw my/our permission and that my child's grade will not be affected by withdrawing from the study.
- I do NOT grant my permission for Ms. West-Puckett to use my child's data in her educational research project regarding composing in makerspaces.

East Carolina University is a constituent institution of the University of North Carolina. An equal opportunity university.

Signature of Parent/Guardian: _____ Date _____



IRB Study # _____

Title of Study: **Understanding Youth Composing Experiences in A High School Makerspace**

Principal Investigator: Stephanie West-Puckett
Institution, Department or Division: Department of English
Address: 2201 Bate Building, Mailstop 555
Telephone #: 252.737.1089
Email: westpucketts@ecu.edu

People at ECU study ways to make people’s lives better. These studies are called research. This research is trying to find out your composing experiences in the JH Rose Pop-Up and Make makerspaces.

Your parent(s) needs to give permission for you to be in this research. You do not have to be in this research if you don’t want to, even if your parent(s) has already given permission.

You may stop being in the study at any time. If you decide to stop, no one will be angry or upset with you.

Why are you doing this research study?

The reason for doing this research is to learn more about how students compose and make things and better understand how scientific and technological literacy is developed in these makerspaces.

Why am I being asked to be in this research study?

We are asking you to take part in this research because you participated in one or more makerspaces during the 2015-16 academic year.

How many people will take part in this study?

If you decide to be in this research, you will be one of about 20 people taking part in it.

What will happen during this study?

You will be asked to participate in focus group conversations that are about one (1) hour long about your experiences making things in the maker spaces. These conversations will include:

- Making and playing a paper fortune teller game about your experiences.
- Writing or speaking very short stories about your experiences.

You may be asked to participate in a follow-up interview to learn more about your responses (20-30 minutes) and the things you’ve made in the makerspaces. You can choose if you’ve like focus group sessions and follow-up interviews to be video/audio recorded for transcription purposes. The recordings will not be shared without your permission.

Check the line that best matches your choice:

- OK to record me during the study
- Not OK to record me during the study

This study will take place at JH Rose High School and will last until the end of the 15-16 academic year.

Who will be told the things we learn about you in this study?

ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- Any agency of the federal, state, or local government that regulates human research. This includes the Office for Human Research Protections.
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.

Parents and teachers will not know what you share in this study as your responses will be confidential unless there you sure information that must be reported to parents, school leadership, and/or authorities such as illegal activity or intent to harm self or others.

What are the good things that might happen?

Sometimes good things happen to people who take part in research. These are called “benefits.” The benefits to you of being in this study may be that you help the JH Rose leadership better plan for makerspaces in the upcoming academic year and you help other teachers understand how students make and compose in informal learning spaces.

What are the bad things that might happen?

Sometimes things we may not like happen to people in research studies. These things may even make them feel bad. These are called “risks.” There are no known risks to participating in this study.

Will you get any money or gifts for being in this research study?

You will not receive any money or gifts for being in this research study.

Who should you ask if you have any questions?

If you have questions about the research, you should ask the people listed on the first page of this form. If you have other questions about your rights while you are in this research study you may call the Institutional Review Board at 252-744-2914.

If you decide to take part in this research, you should sign your name below. It means that you agree to take part in this research study.

Sign your name here if you want to be in the study

Date

Print your name here if you want to be in the study

Signature of Person Obtaining Assent

Date

Printed Name of Person Obtaining Assent

APPENDIX C

Facilitator Responses

We need to respond to the student work in a way that we pull the science and poetry concepts out of the make and include them in our responses.

Noticing the science:

I notice...

You did _____ like a scientist. I know this because you _____.

I see the science of _____ here.

I think it's interesting that you said _____. Do you have any ideas why that happened?

I like how you connected...

Have you thought about which systems...

I like how you've thought about the system of _____.

What else do you want to know?

Wow! That's an interesting observation, and I'm curious because I've never seen or heard of a _____ (do or look like or be as big as, etc.) _____. They are typically more like _____.

Here's a good resource to learn more about...

Tell me more about your practices of (observation, documentation, experimentation, etc.)...

Noticing the poetry:

I noticed you used _____ like a poet. I really like _____ (these words or phrases or lines) because...

I see how you are using poetic (language, concepts, or practices) in these lines and wonder if...

Your use of _____ in the poem was really powerful. It made me think of or remember...

Your word choice in this line _____ was really accurate and precise. As a reader, that's important to me because...

Here's a good resource to learn more about...

Here's an example of a poem similar to yours that uses, discusses, demonstrates, etc....

Noticing dis/connections between science & poetry:

Both scientists and poets appreciate or use _____. I like or am wondering about how you used _____ to create this piece. Tell me more.

How might a scientist look at _____ differently than a poet? What would the scientist focus more on here? How about the poet?

Appreciating creativity:

I like how you described _____ by doing/saying _____.

I like how you used (sensory details-sound, sight, touch, smell, taste) to describe _____.

You did a great job describing your feelings/actions/observations. I noticed _____.

I like that you chose to represent your findings using a (voicethread, poem, graph drawing, etc).

Tell me more about how you composed that...

That's such an interesting connection you made between...

Appreciating the content:

I like how you _____.
 You did a great job of _____.
 I like your _____ because _____.

Encouraging deeper thought or extension:

Have you thought/or considered about _____?
 Did you know that _____?
 What else do you want to know now?
 I wonder _____?
 What did you have to learn about to (draw, write, compose, perform) this piece?

Use the following charts from each make cycle to help you fill in specific concepts, practices, and values as you respond.

Make Cycle One: Citizen Science Goals and Objectives

	Poetry	Overlap	Science
Concepts	sensory details double voice poem - embodiment personification interpretation	perspective shifts perspective (inside looking out vs outside looking in) interpretation metaphor	Things we don't always see; nocturnal life/biology Biodiversity is all around us small things can have big impact
Practices	using 5 senses translating what you see into words to evoke imagery embodiment (bodies enacted and empowered?)	observe document keep a notebook video photo draw research interpret identify position/situate (self, object, others...) communicate reflect	observation documentation reporting

Values

compare
contrast
exploring self

Agency/voice -
politics, whose
perspectives are
privileged? scale

accuracy
unbiased observations

Value of/interest in
not knowing

What are facts/is
truth? How do you
know? Who/how
determine?
