Maker's Mind:
Interdisciplinarity, Epistemology, and
Collaborative Pedagogy

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ABSTRACT

This article considers the epistemological consequences of interdisciplinary, collaborative pedagogy through the lens of a practitioner whose goal is to theorize and contextualize her practice. The author traces connections between interdisciplinary pedagogy and the idea of Making or makerspaces. Giving in-depth examples of interdisciplinary, integrative, project-based collaborative activities that have an affinity to the concept of Making, the author concludes by suggesting some important epistemological consequences of a "Maker Pedagogy."

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My teaching partner, Lee Orlando, gestures toward a laughing 6th grade student.

"He's never even smiled in class before," she says quietly. Lee has been his teacher for over 6 months now. The student's life circumstances are challenging and there have been frequent school absences.

He continues smiling and laughing, interacting with other 6th graders and the college sophomores who sit interspersed at the table. They are brainstorming ideas for a new hero who has never before existed, creating the

hero's name, backstory, and motivations. The work is creative, playful, sometimes silly.

"This is amazing," Lee says. I think we both feel humbled by the breakthroughs, small and large, that have happened in this unique collegiate/middle school partnership (described in detail below).

I have not always practiced a highly collaborative, inventive style of pedagogy. For years, I suspect that my teaching was a bit plodding and regimented. During my first year as an Assistant Professor, I wrote lectures that I hoped were polished gems, and practiced each three times before delivering it. (Embarrassingly, this is no exaggeration.) I loosened up considerably in Year Two and even more in later years. But—to use a sports metaphor—for much of my teaching career I focused on competent execution of the fundamentals, occasionally supplemented by creative play-making. I took the rules as given. I didn't question the refs.

My teaching game has since changed considerably. Because I now teach in an inquiry-based, consciously interdisciplinary, general education curriculum, I don't tie ideas from multiple fields together and call it a day. I literally have to think differently. I also teach differently, collaborate often, build pedagogical partnerships on and off campus, and tap into the generative power of multi-age learning collaborations. I'm becoming a Maker. What does this mean for my students, my colleagues, my institution, and my professional/personal self? What might it mean for higher education as a whole?

In this article, I refer to "Maker Pedagogy" as teaching activities that are interdisciplinary, immersive, integrative, multi-age, project-based, and collaborative. Maker Pedagogy entails that students are active, moving and Making, not memorizing. The key component of Making, as I will describe below, is that it is done in concert with others. Maker pedagogy is collaborative, born of ideas brainstormed in concert with fellow teachers, scholars, students, and other partners. The creativity is reflexive; the process iterative. Ideas are tried and assessed on the ground, improved, sometimes discarded, with a view toward student immersiveness and involvement.

Before we dig into the theory of Maker Pedagogy and trace its relationship to interdisciplinarity, let's look more closely at a specific example from my teaching practice.

### *Maker Pedagogy Example 1: Othello Graphic Novel Project*

COR 120/125 Concepts of Community/Rhetoric of Community tasks 40 students, in groups of 5-7, to retell the story of Othello in graphic novel form. Students must choose how to tell the story, organize their work, create the art, find appropriate quotes from the text, and execute their vision while making

ongoing group decisions and resolving intergroup conflict. They have 5 hours to complete the project over the course of two back-to-back sessions.

Example 1 Context

The cohort system in our general education program allows first year students to get to know, and work closely alongside, 40 fellow students across two linked courses (COR 110: Concepts of Self and COR 115: Rhetoric of Self). Erik Shonstrom is my partner in designing integrative, inquiry- and-project-based collaborative learning activities for COR 110/115, and we take this task very seriously. We get students moving, interacting, and strategizing early on as we ask them to create and prototype new ideas. We also work in an iterative way, tweaking our pedagogy based on what has and has not worked in the past.

Figure 1: *Othello* With Bunnies
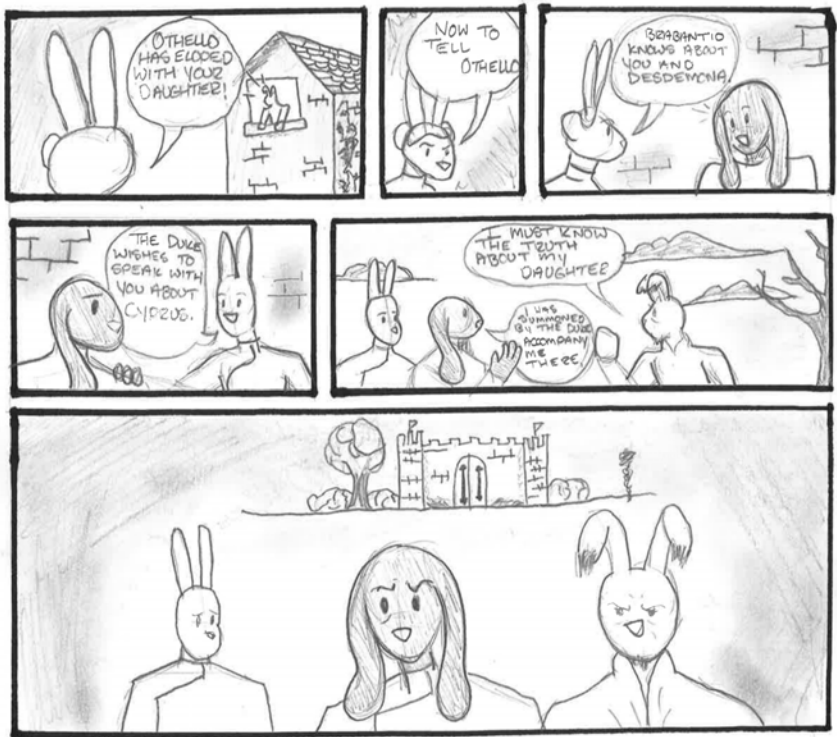
From the beginning of our partnership, Shonstrom and I have worked to teach COR 110/115 simultaneously and back-to-back on the same days. This allows us to teach our classes separately, or—as we do now every single day—join both sections together for a large, nearly 3-hour long block of time. This flexibility enables us to watch films together, go on field trips together, and

do creative projects like the Othello Graphic Novel together (see example below). Each semester, we design new, immersive, sometimes spontaneous activities for the classes. Cohorting this way is logistically challenging since it must be worked out with the Registrar both in terms of days/times that the courses are taught, and also in terms of booking appropriate classrooms. Despite the challenges, however, Shonstrom and I both believe that when done correctly, cohorting increases student engagement and retention by creating a true learning community where students feel they belong; where students engage in unusual, fun learning activities, both in and outside the classroom; and where we together create the conditions for successful collaboration and experimentation.

THE POWER OF "MAKING"

After sixteen years teaching in a traditional liberal arts college and seven years in an interdisciplinary general education curriculum, I have come to understand the key connection between interdisciplinary pedagogy and the idea of **Making**. The *Othello* graphic novel project described above illustrates the kind of "intellectual flexibility and playfulness" that characterizes interdisciplinary endeavors (Welch 2011, p. 34). Multiple skills and perspectives are brought to the learning process; many minds and interlocutors are required. Something is learned in the process of making something else.

Bullock (2014) describes Maker Pedagogy as

*an approach that utilizes the principles of ethical **hacking** (i.e., deconstructing existing technology for the purpose of creating knowledge), **adapting** (i.e., the freedom to use a technology for new purposes), **designing** (i.e., selecting components and ideas to solve problems), and **creating** (i.e., archiving contextual knowledge obtained through engaging in the process of making, as well as the actual tangible products).*

Following Bullock, McGregor (2018) refers to Maker Pedagogy as "understanding how things are made by taking them apart, and then using that understanding to put things together in different ways."

Maker labs and spaces are blossoming on college campuses. In 2014, 153 higher education institutions signed a letter to President Barack Obama, committing "to supporting Making on their campuses in a diversity of ways" (Byrne and Davidson 2015, p. 6).

Almost all [of these institutions] saw Making as synonymous with creativity, inventive, spontaneous, open, communal, collaborative and passionate exploration of personal ideas. In particular, "a spirit of creativity and

spontaneity" were seen as key qualities of the Maker Movement, which yields a "collaborative culture" … "defined by intellectual curiosity" (Byrne and Davidson 2015, p. 10).

What is a Makerspace?

According to John Spencer, a Makerspace is "designed and dedicated to hands-on creativity" where students are "actually making something" (Gonzalez 2018). "Makerspaces are informal sites for creative production in art, science, and engineering where people of all ages blend digital and physical technologies to explore ideas, learn technical skills, and create new products" (Sheridan et al. 2014, p. 505). These spaces teach students "to engage in iterative thinking, creative thinking, critical thinking," as well as how to pivot, change, revise, persevere, and solve complex problems (Gonzalez 2018). Making is also inherently interdisciplinary:

"The potential being seen at campuses across the country is the opening of the physical and mental boundaries of higher education, opening up disciplines to one another, relationships across organizations, and new ways of getting to know one another in a productive, outcome-focused enterprise" (Byrne and Davidson 2015, p. 10).

The deeply collaborative experience of Making also helps dismantle traditional academic silos:

Making "erases disciplinary boundaries" … or transcends them. At its core it fosters cross-campus experiences for students, faculty and staff and supports engaged "interdisciplinary collaboration between diverse fields, such as art, architecture, product design, science, journalism, business, and law" (Byrne and Davidson 2015, p. 11).

Sheridan and colleagues discovered something similar in their survey of three diverse Makerspaces:

[D]isciplinary boundaries are inauthentic to makerspace practice … Makerspaces seem to break down disciplinary boundaries in ways that facilitate process- and product-oriented practices, leading to innovative work with a range of tools, materials, and processes (Sheridan et al. 2014, p. 527).

In the *Othello* Graphic Novel project, students complete the assignment with tools from literature, art, history, pop culture, graphic design, and project management, among others. They are learning new ways of seeing *Othello*, transcending divisional boundaries in making a product of which they tend to be quite proud. As Roffey says: "The maker movement is about teaching and learning that is focused on student centered inquiry. This is not

the project done at the end of a unit of learning, but the actual vehicle and purpose of the learning" (Roffey).

Interdisciplinary Making and Epistemology
Making can feel revelatory for students, who learn in the academy that there have always been gatekeepers determining what counts as knowledge. Stanley and Wise note that "a given epistemological framework specifies not only what 'knowledge' is and how to recognize it, but who are 'knowers' and by what means someone becomes one" (2002, p. 188). Knowledge construction is thus connected to social acceptance and power, as thinkers such as Michel Foucault, Thomas Kuhn, and Susan Bordo have argued.

The Maker is in a unique epistemic position, however. The practice of integrating insights from different disciplines "endeavors to position [interdisciplinarity] as an effective strategy for comprehending, navigating, and transforming knowledge." (Welch 2011, p. 2). It is a "real synthesis" of knowledge and methodological approaches (Jensenius 2012). Wright characterizes this process as a rhizomatic, nonlinear, and deliberately messy approach whose goal recognizes "how different disciplines and fields of study work alongside and against each other towards the shared goal of 'meaning-making.'" (2017). Rather than seeking one objective truth or meaning, interdisciplinarians work to create insight into the question at hand from multiple perspectives. Through inquiry, there is an active process of Making and re-making knowledge rather than a process of 'discovery.'

Hence the process itself, and the environments in which it occurs, holds the promise of being more democratic and less hierarchical in terms of who can demonstrate knowledge. Interdisciplinary makerspaces— including classrooms—are immersive, playful, and iterative. As Welch says, "Interdisciplinarity engages in epistemological pluralism, the holistic amalgamation of insights from diverse perspectives" (2012, p. 34). Philosopher John Dewey understood the necessary connection between pluralistic inquiry and democratic practice, noting that "all modes of human association," including schools, must exemplify the idea of democracy (1927, p. 143).

...the future of democracy is allied with spread of the scientific attitude. It is the sole guarantee against wholesale misleading by propaganda. More important still, it is the only assurance of the possibility of a public opinion intelligent enough to meet present social problems" (Dewey 1939, p 148-149).

Ideally, knowledge creation in an interdisciplinary Maker context is democratic, with students and teachers learning from each other:

Being a maker in these spaces involves participating in a space with diverse

tools, materials, and processes; finding problems and projects to work on; iterating through designs; becoming a member of a community; taking on leadership and teaching roles as needed; and sharing creations and skills with a wider world (Sheridan et al. 2014, p. 529).

Indeed,

Making "transcends the traditional hierarchy of knowledge dissemination and cuts across faculty, staff, and student populations." In particular, it fosters engaged peer-to-peer learning (Byrne and Davidson 2015, p. 10).

The spirit of inquiry that infuses Making is analogous to the growth mindset approach chronicled by Carol Dweck. Whereas a "fixed mindset" believes that qualities like intelligence are finite, either-you-have-it-or-you-don't personal endowments, "growth mindset" maintains that qualities are cultivated through effort (Dweck 2008, p. 6-7).

When you enter a mindset, you enter a new world. In one world— the world of fixed traits — success is about proving you're smart or talented. Validating yourself. In the other — the world of changing qualities — it's about stretching yourself to learn something new. Developing yourself (Dweck 2008, p. 15).

In Making, iteration and growth is an article of faith. Sheridan et al find that Makerspaces "value the process involved in making — in tinkering, in figuring things out, in playing with materials and tools," and find that learning "is deeply embedded in the experience of making" (2014, p. 528). In the same way, students who create the *Othello* Graphic Novel (above), or engage in the multi-age Hunt Middle School partnership (below) grow their knowledge by tinkering with ideas, playing with materials, bouncing techniques against each other, never knowing precisely what will work or how, until it does — or doesn't. The learning is indeed in the Making.

Maker Pedagogy Example 2: Multi-Age Partnerships

In COR 270, Heroines and Heroes: Tween Alliance, Champlain students are partnered with Hunt Middle School 6th graders. Students are typically matched 1:1, but sometimes two Champlain students end up partnering with one HMS student. In the fifth year of our collaboration, students are tasked with creating graphic novel panels that illustrate one moment in the hero's journey of Sir Ernest Shackleton and the crew of The Endurance. One noteworthy facet of this multi-age collaboration is that students of very different ages and abilities learn to speak the same theoretical language of Joseph Campbell's hero's journey. This partnership takes place over a five

week period and is the centerpiece of our semester's work. See two different videos of this partnership in action here and here. Below is one example of the Shackleton Graphic Novel project:

Figure 2: panels from Brett and Elliott's graphic novel, 2019

Example 2 Context

COR 270 Heroines and Heroes is designed to examine what heroic stories can tell us about who we are, have been, and aspire to be, particularly in the context of the West. The beginning segment of the course is anchored by an

attempt to understand and interrogate Joseph Campbell's concept of the "hero's journey" or "monomyth" in his influential book <u>The Hero With A Thousand Faces</u>.

The very existence of this immersive teaching partnership is predicated on collaborating across disciplines, ages, and levels of instruction. (Clearly, I am also borrowing the project from the successful Othello Graphic Novel Project in COR 110.) Having known Lee Orlando for years, I knew that she was a gifted, innovative K-12 educator. I suspected that the hero's journey was a conceptual lens that she and her students might find engaging. Moreover, I believed that a multi-age partnership would be mutually beneficial for our students. Lee readily agreed, and we dove into the necessary preparations. Our first student partnerships began in Spring 2015.

COR 270: Tween Alliance is unique because it models multi-age and on/off-campus collaboration for my students; it integrates Core Division work into the external Burlington community; it requires Champlain students to become mentors; it requires that Champlain students communicate effectively and work efficiently to produce a product that off-campus audiences will see; it facilitates a melding of the creative imaginations of 12 year olds and 20 year olds; and it enables 6th graders in the city of Burlington, many of whom have never before envisioned themselves as potential college students, to make meaningful contact with Champlain College.

Lee and I hope to leverage the enthusiasm produced by the graphic novel project and subsequent Do It Yourself (DIY) Hero project with the goal of seeing how the hero's world looks through the eyes of a different age demographic. It is a unique opportunity for video game designers, artists, graphic designers, elementary education majors, filmmakers, and professional writing students (among other majors) to practice empathy, gain insight, and remind themselves what "heroic" looks like through 12-year old eyes. It is not merely about learning specific content, although that certainly has value. Indeed, it is more about learning how to see through an older/younger person's eyes, thereby creating a more creative, inclusive, and empathetic worldview. This is a key component of the lifelong learning we want for our students.

My third example of Maker Pedagogy involves collaboration and Making not by students, but by faculty members on behalf of students.

Maker Pedagogy Example 3: Interactive Digital Text
<u>Bodies: A Digital Companion</u> is an online, interactive course text created on the free, open-source <u>Scalar</u> publishing platform. For several years, COR 270: Bodies instructors at Champlain College switched back and forth amongst existing Bodies textbooks that did not precisely met the needs of our students. The idea for a new text was first envisioned as a printed reader that would encompass the major themes of the course as reflected in the various

personalized iterations that are currently being taught. Instead, the digital text that resulted combines well-known academic writing about embodiment, new essays written by Bodies instructors, and relevant media artifacts.

Example 3: Context

I helped Dr. Katheryn Wright lead a collaborative group to realize this project successfully. The digital text goes far beyond the tweaking of course materials that professors are obliged to do each semester as part of normal teaching responsibilities. Indeed, it seeks to answer the intellectual and practical question "how best to construct a Body Studies text that is interdisciplinary, inquiry-based, created specifically for undergraduates at a professionally-focused college, and is published collaboratively?"

Our goal was to enlist fellow Bodies professors to develop a text that suits the specific needs of our students and the Core Division's inquiry-and-project-based pedagogy. Many existing texts in the area of Body Studies are written for advanced undergraduate and graduate students, and tend to be highly theoretical, often assuming significant prior knowledge of disciplines like gender studies, sociology, philosophy, and anthropology. We realized that our creative, professionally-focused students would benefit from a new, interdisciplinary, fully digital approach. The creative possibilities of this approach are only now emerging.

My work on this project included a great deal of learning and networking about possible digital platforms. I organized a Bodies Working Group in which COR 240 instructors met regularly to discuss our digital text, and along with Katheryn Wright, became part of Middlebury College's Digital Liberal Arts Initiative reading group. She and I also attended the week-long Digital Humanities Summer Institute at the University of Victoria, British Columbia in June 2017, and DH@Guelph in June 2018, in order to learn more about digital humanities and solicit advice about our digital text.

Collaboration is both a prerequisite and outcome of Bodies: A Digital Companion, requiring over half a dozen Core faculty to think and design together. Ultimately, the Bodies digital text collaboration models that innovative projects are interdisciplinary, student-focused, and designed in response to existing needs. The end product is one our campus uses and other campuses could emulate. Here is one page of the Digital Companion:
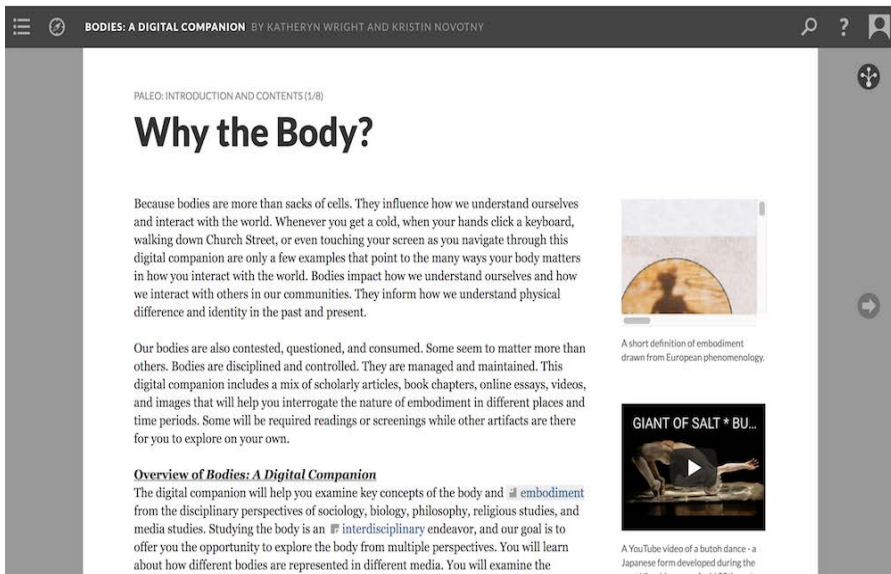
PALEO: INTRODUCTION AND CONTENTS (1/8)

Why the Body?

Because bodies are more than sacks of cells. They influence how we understand ourselves and interact with the world. Whenever you get a cold, when your hands click a keyboard, walking down Church Street, or even touching your screen as you navigate through this digital companion are only a few examples that point to the many ways your body matters in how you interact with the world. Bodies impact how we understand ourselves and how we interact with others in our communities. They inform how we understand physical difference and identity in the past and present.

Our bodies are also contested, questioned, and consumed. Some seem to matter more than others. Bodies are disciplined and controlled. They are managed and maintained. This digital companion includes a mix of scholarly articles, book chapters, online essays, videos, and images that will help you interrogate the nature of embodiment in different places and time periods. Some will be required readings or screenings while other artifacts are there for you to explore on your own.

Overview of Bodies: A Digital Companion
The digital companion will help you examine key concepts of the body and 📄 embodiment from the disciplinary perspectives of sociology, biology, philosophy, religious studies, and media studies. Studying the body is an 🎬 interdisciplinary endeavor, and our goal is to offer you the opportunity to explore the body from multiple perspectives. You will learn about how different bodies are represented in different media. You will examine the

A short definition of embodiment drawn from European phenomenology.

GIANT OF SALT * BU...

A YouTube video of a butoh dance - a Japanese form developed during the

Figure 3: "Why the Body" page from *Bodies: A Digital Companion*

THREE EPISTEMOLOGICAL LESSONS FROM MAKER PEDAGOGY

Interdisciplinary Maker Pedagogy has multiple epistemological consequences, suggested here only in brief. First, because it embodies the very spirit of growth mindset, it has the ability to empower Makers (whether students or faculty members) and encourage self-knowledge. Second, it has the power to "unMake" long-standing, often problematic knowledge hierarchies and democratize learning in multi-age collaborative ways. Third, in more sobering vein, we must acknowledge the ways in which Making is mediated —and can be undermined —in higher education.

Making, Knowledge, and Self-Empowerment

The act of Making is self-fulfilling and iterative; it gives us the impetus to make more. "The No. 1 thing that the maker movement and makers continue to generate are new makers," [Paul] Gentile says. "Once people are around the maker movement they realize they've been missing something exciting. It goes to a very human need of creating" (DiGirolamo, 2019).

The more I collaborate with Makers, and the more I make myself, the more permission and joy I feel in experimenting. I cross disciplinary boundaries more often, engage in spontaneous play, dabble in new modalities that may or may not bear fruit. Although the benefits of this practice should be obvious to an educator like me, Making has been a hard-fought personal journey.

Until the end of high school, I saw myself as more of a Maker than

my adult life would suggest. I found joy in creating: acting, choral singing, writing poetry and prose. Ironically and sadly, for many years my adult academic life didn't reflect that creativity. I was a first generation college student with a textbook case of impostor syndrome, trying very hard to find my lane and stay in it. When I entered undergraduate and eventually graduate school, I swapped a growth mindset for a fixed one. Sensing that my academic endowments weren't enough in this new environment, I tried to adopt the posture of what academics were 'supposed' to be. Clearly, that contributed to the less-than-spontaneous way I taught for many years; it was as though my mentors were perched on my shoulder, and I didn't want to let them down.

Eventually, through successes and failures, I began to shuffle off fixed expectations of what being an academic meant for me. As I collaborated with educators of diverse academic background, I became not only more diverse and experimental in my teaching methods, but more open to my own possibilities as a thinker and Maker. I also began to see the need for modeling this mindset in the classroom. As Hannah McGregor (2018) stresses, to build student capacities for Making she herself needs "to be willing to bring my own fannish affect into the classroom, and model to them what it looks like to make something because I'm passionate about it."

"UnMaking" Knowledge Hierarchies

In 1993, Edward Said lectured on the qualities of "amateurism" in a way that, to this reader, presaged a Maker mindset:

"...amateurism [is] the desire to be moved not by profit or reward but by love for an unquenchable interest in the larger picture, in making connections across lines and barriers, in refusing to be tied down to a specialty, in caring for ideas and values despite the restrictions of a profession. (Said, 1993)

The interdisciplinary, immersive, collaborative projects in which classroom Makers engage strike me as avenues for democratizing the pursuit of knowledge in ways Said and Dewey would appreciate. Interdisciplinary thinking and Making has the potential to unmoor implicit boundaries in one's academic practice, as it has mine, between higher education and K-12, between theory and practice, between being an "expert" and having beginner's mind. It has the potential to broaden and complicate epistemological beliefs (how knowledge gets created, by whom, for whom). Now more than ever, I think of my college students and their 6th grade partners as knowledge makers. Via Maker Pedagogy, I am forced to confront spoken and unspoken hierarchies of knowledge creation that my career in academe has instilled.

Debbie Chachra would likely disagree with this take on Making. She writes in *The Atlantic* that

Making is not a rebel movement, scrappy individuals going up against the system. While the shift might be from the corporate to the individual … it mostly re-inscribes familiar values, in slightly different form: that artifacts are important, and people are not … Describing oneself as a maker—regardless of what one actually or mostly does—is a way of accruing to oneself the gendered, capitalist benefits of being a person who makes products (Chachra, 2015).

Chachra further locates her teaching work in opposition to Making: "To characterize what I do as "making" is to mistake the methods—courses, workshops, editorials—for the effects" (2015). Chachra's critique is pedagogically compelling: how should a teacher properly characterize her work to produce learning without commodifying it? If teaching work is not a product or saleable artifact, what is its nature?

I maintain, though, that what is to be celebrated about Maker Pedagogy is process, not product. It is inquiry. Flexibility. Curiosity. Openness to new angles of vision. Immersiveness. Playfulness. Exhilaration. Successes and failures. Movement. Growth. It is not the graphic novel that students have produced per se, but the process of dreaming it and producing it together. Giving more students opportunities to engage in Making is a part of recognizing their existing capacities, and opening the door to discovering others. It is also to recognize how certain groups of students have been systematically limited or excluded because more traditional education formats have marginalized them.

Maker Pedagogy thus invokes an interesting, possibly disruptive set of power dynamics. As noted above, the spaces where Making happens hold the promise that, within its walls, more democratic practices might obtain.

On one hand, a professor is empowered to design the parameters of the Maker classroom, and not everything is allowed. For instance, one difference between Making writ large and Maker Pedagogy is that "Unlike many schooling structures, the work in makerspaces is voluntary; people choose which learning arrangements suit their needs, what to work on, when to work on it, and whether and how they want to continue" (Sheridan et al 2014, p. 527). However, if students are to be graded on a project, they cannot just walk away from it entirely as they might if abandoning a project in a Makerspace. The teacher holds a particular kind of power in this context.

On the other hand, the practice of Maker Pedagogy means that students have power too. In the Hunt Middle School collaboration, for example, both the college sophomores and 6th graders have equal power to determine which section of Shackleton's journey to capture in their graphic novels, or which Do It Yourself Heroes to create. They are not identical to their college counterparts, but their voices matter.

In any classroom, students and teachers are not equally situated, and education is always already inflected by gender, race, class, and age. My sense

therefore is not that Making erases power differences completely, but instead allows new power and practices to emerge, thereby unsettling typical hierarchies.

Mediated Knowledge Making: Institutional Implications

"There is no getting around authority and power, and no getting around the intellectual's relationship to them." (Said, 1993)

Inevitably, the act of Making is mediated by structural realities, and knowledge production is woven together with institutional support/commitment or lack thereof. Interdisciplinary collaborative Making requires time, space, materials, money, and institutional will. Collaborations are often stymied by the very real institutional burdens that exist.

Here are some of the logistical realities that have affected my professional partnerships with Erik Shonstrom, Lee Orlando, and Katheryn Wright:

Funding needs to be obtained, often far in advance. **Permissions** may need to be granted. **Transportation** needs to be secured (e.g., buses hired). Overlapping **meeting times** must be found. Teaching and vacation **schedules** (college vs K-12) must be taken into account. **Rooms** need to be booked, including classrooms which are large and flexible enough so that Making can happen 'spontaneously.' Longer teaching **time blocks** must be requested. **Curricular space and instructor autonomy** must exist so that teachers have the bandwidth to experiment.

Creating the conditions for Maker Pedagogy is dependent on making a case to administrators, often many months in advance. That's a familiar scenario for most academics, but *is it antithetical to the spirit of Making*? What does it mean for curricular and pedagogical autonomy? I am very lucky that for the past 4 years I've had an institutional grant source that funds transportation to and from Hunt Middle School. Should innovative pedagogy have to depend on luck?

In sum, I am concerned that such institutional burdens work to thwart atypical creative collaboration and, particularly, spontaneous Making. This affects our pedagogy, curriculum, and — most importantly — our students, privileging the status quo in curricular and pedagogical terms.

CONCLUSION: MAKER'S MIND

In the introduction, I maintained that Maker Pedagogy causes me to think differently, teach differently, collaborate often, build pedagogical partnerships on and off campus, and tap into the generative power of multi-age learning collaborations. But what does this mean for my students?

The three examples above show that my students are engaging in interdisciplinary, immersive Making in multiple projects across multiple courses and age groups. Sometimes the learning process is chaotic. But to apply a phrase from James Scott in a very different context, Maker Pedagogy embraces the "tolerance for confusion and improvisation that accompanies social learning, and confidence in spontaneous cooperation and reciprocity" (Scott 2012, p. *xii*). Part of making it work entails believing that it will work.

Colleagues within, and increasingly outside, my academic division know that I'm up for trying new styles of collaborative pedagogy. Indeed, my Making has been inspired by many of them. My closest collaborators (including Shonstrom, Wright, and Orlando) are themselves highly creative Makers. What might it mean to have more colleagues, and entire departments and divisions, reach out to each other through Making?

As a faculty member, I feel more like a Maker each day. My creativity feels less bounded both in my professional and personal lives. I don't always take the rules as given. I see beyond the fears I had in my early years of teaching, when I wanted to do everything by the book, when I searched for belonging in academic spaces by proxy via other scholars' tested methods.

Higher education itself is shifting along with our students, and a burgeoning industry is attempting to translate the needs of Generation Z to the college classroom. Selingo writes about a *Chronicle of Higher Education* report showing Gen Z students' desire for combined virtual and face-to-face learning. The "tips for developing an effective educational experience for Gen Z" are right out of the Maker Pedagogy playbook: let students tell their stories using their tools; create immersive environments; build flexible learning spaces (Selingo 2018).

Suggestions like these point to the potential of the digital humanities as a key component of both Maker Pedagogy and liberal/general education. Katheryn Wright and I are currently collaborating on a project that attempts to rethink liberal/general education through the prism of the digital humanities. In doing so, we are beginning to explore how the concepts of interdisciplinarity, Makerspaces, and place-based learning sit at the intersection of digital humanities (DH) and liberal/general education. Digitally or otherwise, we agree that "learning is deeply embedded in the experience of making" (Sheridan 2014, p. 528).

REFERENCES

Bullock, S. (2015, May 24). What is maker pedagogy? Retrieved from
http://makerpedagogy.org/en/what-is-maker-pedagogy-some-early-thoughts/

Byrne, D., & Davidson, C. (2015, June). MakeSchools Higher Education Alliance
State of Making Report. Retrieved from
http://make.xsead.cmu.edu/week_of_making/report

Chachra, D. (2015, January 23). Why I Am Not A Maker. *The Atlantic*. Retrieved
fromhttps://www.theatlantic.com/technology/archive/2015/01/why-i-am-not-a-
maker/384767/

Dewey, J. (1939). *Freedom and Culture*. New York, NY: Capricorn Books.

Dewey, J. (1954; 1927). *The Public and Its Problems*. Athens, OH: Swallow Press.

DiGirolamo, M. (2019). Makerspaces, Hackerspaces and Fab Labs: Why College
Students Should Get in on the 'Maker' Culture. *Affordable Colleges Online.*
Retrieved fromhttps://www.affordablecollegesonline.org/college-resource-
center/fab-labs-hackerspaces-makerspaces/

Dweck, C.S. (2008). *Mindset: The New Psychology of Success*. New York, NY:
Ballantine Books.

Gonzalez, J. (2018, May 20). What Is The Point of a Makerspace? *Cult of
Pedagogy*. Retrieved fromhttps://www.cultofpedagogy.com/makerspace/

Jensenius, A. R. (2012, March 12). Disciplinarities: intra, cross, multi, inter, trans**.**
Retrieved fromhttp://www.arj.no/2012/03/12/disciplinarities-2/

Klein, J. T. (2004). Interdisciplinarity and Complexity: An Evolving Relationship.
E:CO, 6 ,1-2, 2-10. Retrieved from
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.545.7711&rep=rep1&typ
e=pdf

McGregor, H. (2018, April 17). Fandom, Feminism, and Maker Pedagogy. *Hybrid
Pedagogy*. Retrieved from http://hybridpedagogy.org/fandom-feminism-maker-
pedagogy/

Roffey, T. (n.d.). Key Frameworks: Makerspace. *Makerspace for Education*.
http://www.makerspaceforeducation.com/makerspace.html

Said, E. (1993, July 14). *Reith Lectures: Representations of an Intellectual*. Lecture
presented at London,England. Retrieved from
http://downloads.bbc.co.uk/rmhttp/radio4/transcripts/1993_reith4.pdf

Scott, J. C. (2012). *Two Cheers for Anarchism*: *Six Easy Pieces on Autonomy,
Dignity and MeaningfulWork and Play*. Princeton, NJ: Princeton University Press.

Selingo, J. J. (2018, October 31). Self-Directed Learning and Augmented Reality:
How to Teach Gen Z.*The Chronicle of Higher Education*. Retrieved from
https://www.chronicle.com/article/Self-Directed-Learning-and/244968

Sheridan, K.M., Halverson, E.R., Litts, B.K., Brahms, L., Jacobs-Priebe, L., and
Owens, T. (2014).Learning in the Making: A Comparative Case Study of Three
Makerspaces. *Harvard EducationalReview*, 84(4), 505-532. Retrieved from
https://www.makersempire.com/wp-content/uploads/2018/02/Learning-in-the-
Making-A-Comparative-Case-Study-of-Three-Makerspaces-Sheridan-14.pdf

Stanley, L. and S. Wise. (2002). *Breaking Out Again: Feminist Ontology and
Epistemology*. London, UK:Routledge. 1983.

Welch IV, J. (2011). The Emergence of Interdisciplinarity from Epistemological Thought. *Issues in Integrative Studies*, 29, 1-39. Retrieved from https://files.eric.ed.gov/fulltext/EJ1101134.pdf

Wright, K. (2017). [Infographic]. How To Do Interdisciplinarity: A Quick Start Guide. Retrieved from https://champlain.instructure.com/courses/902273/files/67119894?module_item_id= 21025544

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