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Situating The 'maker Movement': Tracing The Implementation Of An Educational Trend Within Public Libraries

Abstract

Rising in popularity in last decade, the "Maker Movement" is a technologically enhanced extension of the Do-It-Yourself (DIY) movement, which focuses on the use of novel technologies such as 3-D printers and microcontrollers for the creation of personalized projects. In addition to commercial growth within this area, educational practitioners and researchers have also embraced making, often heralding as the best new way of revitalizing STEM (Science, Technology, Engineering and Mathematics) education in the United States. With the explosion of maker-based programs for youth ranging from university classes to after-school programs, most research on educational making focuses on the question of learning and pedagogy. This dissertation, however, takes a broader look at these processes by attempting to understand the institutional and sociological contexts in which this educational trend is implemented. Through a 16-month ethnography of two educational maker programs within a suburban and urban library, I examine how the structures and concepts behind Maker Movement are actively and continually translated into on-the-ground practice. As I detail, this involves both the initial negotiation of particular human and non-human actors, as well as an active maintenance of these programs through practices that I describe as 'hustling' for support, and producing 'spin' for outside audiences. While these acts are often veiled from the popular view of educational making, I argue that these 'behind the scenes' activities are foundational to practice of making. Not only do these help shape what (and how) maker activity means to participants and facilitators, but also actively shifts the nature of these libraries as institutions of public education and service. Only by understanding and acknowledging these processes, I argue, can we come to realize the potential of educational making as a productive force in the world.

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SITUATING THE 'MAKER MOVEMENT': TRACING THE IMPLEMENTATION OF
AN EDUCATIONAL TREND WITHIN PUBLIC LIBRARIES

Debora Lui

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SITUATING THE 'MAKER MOVEMENT': TRACING THE IMPLEMENTATION OF
AN EDUCATIONAL TREND WITHIN PUBLIC LIBRARIES

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Rising in popularity in last decade, the “Maker Movement” is a technologically enhanced extension of the Do-It-Yourself (DIY) movement, which focuses on the use of novel technologies such as 3-D printers and microcontrollers for the creation of personalized projects. In addition to commercial growth within this area, educational practitioners and researchers have also embraced making, often heralding as the best new way of revitalizing STEM (Science, Technology, Engineering and Mathematics) education in the United States. With the explosion of maker-based programs for youth ranging from university classes to after-school programs, most research on educational making focuses on the question of learning and pedagogy. This dissertation, however, takes a broader look at these processes by attempting to understand the institutional and sociological contexts in which this educational trend is implemented. Through a 16-month ethnography of two educational maker programs within a suburban and urban library, I examine how the structures and concepts behind Maker Movement are actively and continually translated into on-the-ground practice. As I detail, this involves both the initial negotiation of particular human and non-human actors, as well as an active maintenance of these programs through practices that I describe as ‘hustling’ for support, and producing ‘spin’ for outside audiences. While these acts are often veiled from the

popular view of educational making, I argue that these ‘behind the scenes’ activities are foundational to practice of making. Not only do these help shape what (and how) maker activity means to participants and facilitators, but also actively shifts the nature of these libraries as institutions of public education and service. Only by understanding and acknowledging these processes, I argue, can we come to realize the potential of educational making as a productive force in the world.

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CHAPTER 1

Introducing the Maker Movement:

Thinking through the Implementation of Educational Maker Programs

Introduction

On February 7th 2012, the White House sponsored a science fair highlighting the efforts of students who had won different science, technology, engineering, and mathematics (STEM) competitions across the country. Part of larger efforts within the Obama administration to promote STEM education, the fair allowed these different winners to personally present their projects to the President. Notable among these students was Joey Hudy, a 14-year old inventor from Arizona, who had previously developed a LED Cube Microcontroller Shield – which could be programmed to display different light patterns – alongside a small business that sold ready-to-make kits featuring its design. While Hudy displayed the shield at the fair, the main focus was yet another project – his “Extreme Marshmallow Cannon” – which had won an award from *MAKE Magazine*, a national publication focused on technological do-it-yourself (DIY) projects. Much to President Obama’s delight, Hudy demonstrated the project by launching a marshmallow across the State Dining Room.

Despite the fact that the fair was generally focused on a wide range of STEM topics (from projects on sheep genetics to new radiation detection techniques), the images and video of Joey and the President were prominently featured on the White House web page publicizing the fair, and circulated throughout the web. While the reasons for this were most likely associated with the visual appeal of the moment (that is, President Obama’s

surprised expression at the moment of the marshmallow launch versus his more somber demeanor listening to science poster presentations), another reason was likely Joey's affiliation with the ever-growing "Maker Movement" – a technologically enhanced extension of the DIY movement – which had been rising in popularity in both technology and education circles since the mid 2000s.

Focused on the use of novel prototyping technologies such as 3-D printers, laser cutters, and microcontrollers, the movement primarily focuses on the creation of projects – from homemade Bluetooth speakers, to makeshift selfie drones, to frozen water pipe monitors – for personal and collective use. Much of time, this rise is usually connected to the spread of hackerspaces (alternatively called makerspaces), which are communal hobby shops that allow members shared access to specialized equipment. Since the 1990s, hundreds of these kinds of spaces have sprung up in cities across the world, ranging from Vienna to New York to Shenzhen. The movement is additionally promoted by the existence of "Maker Faires" – large-scale festivals for makers, inventors, and hackers to come together and share their projects – both within the United States and internationally. Accompanying this growth has also been the creation of a new 'maker industry' – companies producing and selling products in support of such activities, whether material goods such as DIY robotics kits and sewable electronics components, or information resources such as how-to almanacs and classroom guides. There has also been an explosion of new maker-generated consumer products for sale, including open source submarine robots, "tabletop" moviemaking kits, and RFID-blocker wallets.

In recent years, educators in the United States have also taken to making, positing it an ideal solution for a range of educational problems, from a lack of student

engagement in schools, resulting from their increased focus on high-stakes testing, to the shortage of STEM workers and innovators within the nation, resulting from students' disinterest in pursuing engineering and science topics in school. As a result, there has been an explosion of maker-based education initiatives ranging from large state-sponsored projects (including DARPA's MENTOR program¹ and IMLS's funding for makerspaces and programs within museums and libraries²) to more small-scale programs, such as after-school maker clubs and workshops in schools, libraries and museums. This enthusiasm has also extended to conversations within education practitioner, policy, and research communities. Over the last few years, there have been dozens of presentations and panels about maker activities at major education conferences including the MacArthur Foundation-sponsored Digital Media and Learning (DML) conference, South by Southwest EDU, (SXSWedu)³, and the annual meetings of both the American Library Association (ALA) and the American Education Research Association (AERA). Building upon its interest in STEM education generally, the Obama Administration has also taken particular interest in educational making and related programming, with the President specifically asking for increased efforts to "encourage young people to create and build and invent" (Obama, 2009). In addition the science fair mentioned above, the Administration has supported numerous maker-specific programs such as MakerVISTA (part of the AmeriCorps VISTA program for volunteer public service), and its very own

¹ The Defense Advanced Research Projects Agency's (DARPA) Manufacturing Experimentation and Outreach program (MENTOR) focuses on developing new tools and challenges for high school students in design and manufacturing.

² Institute of Museum and Library Services (IMLS) is a government agency that acts as one of the largest funders for museums and libraries within the United States.

³ SXSWedu is an entrepreneurial conference focused on educational technology, which runs as part of the South by Southwest conglomerate of conferences and festival that run annually in Austin, TX.

White House Maker Faire in 2014. Thus, the ‘Marshmallow Cannon’ moment – which simultaneously evoked education, technology, policy, and entrepreneurialism – seemed to exemplify what the Maker Movement could be, upholding what Dale Dougherty (2013), a well-known leader in the maker community and founder of *MAKE Magazine*, had stated – namely that “the biggest challenge and the biggest opportunity for the Maker Movement is to transform education” (p. 8).

Over three years later on a June morning in Los Angeles, I found myself caught up within this world of what I call “educational making.” At the time, I was attending a workshop at the 2015 Digital Media and Learning (DML) conference. Sponsored by the MacArthur Foundation’s initiative of the same name, this conference generally attracted people who were interested in the questions surrounding youth, technology, and education. By then, educational making had infiltrated many different corners of the field with the proliferation of related programs and initiatives mentioned above, as well as the publication of scores of popular press and academic works on the subject. However, at the same time as they were supporting this new trend, a number of people were also critical of the movement. Within the workshop, for instance, entitled “Making Spaces for Equity and Social Justice,” representatives from several youth media and technology organizations (all part of the HiveNYC Learning Network)⁴ had come together not only

⁴ Originally funded by the MacArthur Foundation in 2010, the Hive NYC Learning Network is a community of over 80 different youth-focused education groups (such as afterschool programs, advocacy groups, computer clubs, etc.) located in the New York City area. The group is currently sponsored by the Mozilla Foundation, and supported by a range of other foundations and nonprofit organizations. The specific organizations represented at this workshop included: Brooklyn College Community Partnership, DreamYard Project, gadgITERATION Program at Parsons, MOUSE, and Urban Arts Partnership.

to share what they had been doing within their own organizations,⁵ but also to ask how wider efforts in the field could actually address larger societal issues within education. While these organizations tried to focus on issues such as “equity, access, and social justice” through their own activities, their particular target were those in what they called the mainstream “commercial Maker Movement,” whom they felt were not adequately addressing the needs of the underserved. This critique was presented in light of the publicly known fact of the limited demographics of the Maker Movement – as described by many, largely white, middle class and male (Bean and Rosner, 2014; Buechley, 2013). Thus, rather than continuing the perception that making was the “playful domain of privilege, which omit[ted] and obscure[d] the participation of non-dominant groups,” the workshop leaders asked how people could create more socially “inclusive spaces” for making, through re-imagined narratives and re-designed spaces (“DML 2015 – Equity by Design – Long Program,” 2015, p. 65). In this way, instead of criticizing the underlying premise of educational making (that is, providing people with increased opportunities for hands-on creation), these individuals (like many others) were instead critiquing the real world implementation of what they ultimately believed to be a positive and worthwhile undertaking.

Statement of Problem and Rationale

In this dissertation, I examine the particular phenomenon of educational making, looking particularly at the gap in between the ideals of the Maker Movement and the

⁵ These mostly included afterschool or weekend extra-curriculum programs focused on engineering, arts, and technology, primarily for people from ‘underserved’ or ‘under-resourced’ communities from within New York City.

actual translation and implementation of these ideas within real world sites. Most current educational research on making has concentrated more specifically on the actual ‘moments of making’ and thus tends to focus on the activity at the level of individual participants and programs. While this work has certainly yielded many insights within learning and teaching theory, I take a fundamentally different approach within this dissertation. Rather than focusing on isolated instances of making, I step back to take a broader look at how making is mobilized as a larger process that involves a diverse array of other actors. In this respect, I am inspired by the example of media education researcher Stuart Poyntz. In his scholarship on community-based youth media programs, Poyntz (2013) describes his desire to move beyond the singular “problem of learning” toward how these groups can actually form “an emergent ecology that serves to ‘thicken’ up public life” by “creating places of connection and belonging” (p. 91). In this way, he views educational initiatives not only through the lens of teaching and learning, but also in terms of how they can “contribute collectively to the public culture” (p. 91).⁶ In response to this call then, rather than focusing on the individual experiences of children involved in educational making, I choose a different frame of analysis – the wider institutional and sociological contexts in which this educational trend is implemented.

With regard to the Maker Movement, it should be noted here that some scholars have already started to look at this ‘mismatch’ between ideal and practice. In their dual case study of the East Bay Fixit Clinic and the One Laptop Per Child project⁷, for

⁶ Poyntz studies this process with his research group, the Youth Digital Media Ecologies Project, who analyze not only the activities of single people or programs, but also the network and interrelations between youth organizations that exist in Canadian cities including Vancouver, Montreal, and Toronto.

⁷ The East Bay Fixit Clinic is a “do-it-together, disassembly, troubleshooting, and repair” program based in Northern California (“Fixit Clinic,” n.d.), whereas One Laptop Per Child is a program, originally founded

example, Ames and Rosner (2014) describe how the organization leaders' understandings (and enactments) of making are highly shaped by their own narrow conceptions of childhood – or what Ames and Rosner call “childhood imaginaries” (p. 357). Instead of considering the actual diversity of children's motivations and inclinations when planning their educational programs, these leaders focused instead on their idealized conception of the child as creative, rebellious, and self-taught – an impression that often sprang from personal experience rather than empirical evidence (p. 364). As a result of this thinking, these programs often did not run as expected – adult facilitators were far more interested in participating in the activities than the actual children enrolled within the workshops. Instead of acknowledging their misconceptions regarding childhood, however, the leaders often explained these breakdowns in terms of those existing perspectives – for instance, blaming traditional didactic methods of schooling for tampering down children's natural inclinations to create, rather than recognizing their own roles in potentially intimidating or failing to engage the young participants.

While some may think of these moments as ‘failures’ of implementation, I advocate looking through a different lens. Though these may not fulfill people's expectations of what maker pedagogy is supposed to look like, I argue that these moments can illustrate the wide-ranging and diverse ways in which making is enacted. Whereas making for adults is popularly positioned as diverse and all inclusive (for example, recent Maker Faires highlighted everything from 3-D printing to fashion design to new agricultural techniques), making within educational contexts has often been encompassed within more simplified narratives – namely, the individual production of

out of the MIT Media Lab, which focused on developing low-cost laptops in low-income areas. In promoting hands-on technology related activities, both generally fall within the sphere of making.

personalized, technical projects that can allow one (usually a child) to build ever-greater expertise in STEM fields. This archetypical account of ‘successful’ educational making is often endorsed through academic scholarship on making, as well as echoed amongst the practitioners of educational making within different local sites. Oftentimes by emphasizing a ‘best practices’ approach to pedagogy and implementation, this rhetoric tends to promote a singular, idealized conception of what educational making is supposed to look like, or even what activities can be included under this umbrella. However, this often belies the wide range of practices that are implemented on-the-ground under the banner of educational maker activities. For example, while some educational maker programs specifically highlight the acquisition of STEM skills and competences through technical projects, other programs may emphasize different types of goals (e.g., civic participation, aesthetic expression, digital storytelling), or different materials (e.g., cardboard, clay, digital cameras). Furthermore, in addition to these more visible, “front stage” activities of hands-on construction, some scholars have also advocated considering how the usually more hidden “back stage” activities (Goffman, 2002/1959) should also be included as a part of the popular narrative. For example, in their study of Chinese makerspaces, Lindtner and Guimarin (2014), describe how the support and administrative activities of the space – which are usually conducted by women – are also integral to the process, and should be therefore be included under the banner of what counts as legitimate making. Despite being tied together under a universal label then, the purposes and practices of these activities differ widely depending on the particular context in which they are implemented. Thus, rather than thinking of the Maker Movement in monolithic and neutral terms, it is important to keep in mind the many active conceptual

and material negotiations that must occur as a result of ‘translating’ the idealized understandings of what making is into on-the-ground practice.

By taking more seriously the particular enactments that result from these particular sites, my aim is not to weaken the claims of those who are already studying making, or to critique the practice at-large. Through an ethnographic study of two library-based educational maker programs, I have two overarching goals for this research. First, I hope to highlight an alternate way of theorizing the effects or outcomes of maker-based education. As I detail, implementation involves the ongoing and active negotiation of different factors, whether human or non-human. Oftentimes, this limited by many different kinds of institutional constraints, from the vision of its staff, to the money that is actually available to the purchase of new equipment, to the different class dynamics of facilitators and participants. Rather than emphasizing maker programs as fixed objects then, I look at these at the dynamic and ongoing connections and negotiations that occur because of and through these networks of things. While others might work to describe the ideal conditions for educationally focused making, my goal here is ‘pull back the curtain’ on educational making – an idea that has often been shrouded in romance and idealism – and shine a light on the seemingly ordinary, often administrative, activities that are required for its existence, but which are usually taken for granted. By doing so, I hope to bring to public inspection those factors that might already be known, but which need to be analyzed in order to understand why the enterprise might *not* work. Only by doing this, I argue, can we hope to move forward in truly promoting the ideals that educational making espouses.

My second goal for this dissertation is to look the processes of educational trends and innovation more generally. Making is just one among a long line of pedagogical trends that have been taken up by practitioners and researchers within schools and other sites of learning. In addition to many innovations and initiatives driven by those working within education (for example, regarding policy initiatives or pedagogical techniques), this also includes the many interventions that have been generated from the outside the community. Most recently, this has included the numerous efforts to reform education emerging from the tech industry – for example, Mark Zuckerberg’s donations for the Newark School System, Bill Gates Foundation’s investment in school reform, and Lauren Powell Jobs’ (Steve Jobs’ widow) new initiative to ‘crowd source’ solutions for to ‘fix’ American high schools. Notably, many of the interventions advocated by these people include ‘solutions’ from the business world, such as new ways of motivating and compensating teachers, or measuring school accountability. Similarly, much of the interest and support of the Maker Movement also comes people from within the same world; *MAKE Magazine*, for example, was founded in Northern California by Dale Dougherty, who was formerly of O’Reilly Technology Publishers – a significant publisher of computer technology-focused publications, which are often used by those in Silicon Valley. While I do not claim that all these interventions are the same, I do hope to provide a glimpse into at least one of these “solutionist” oriented models (Morozov, 2014b) that comes from outside the education community. By looking *not only* at experience of the beneficiaries of these innovations (i.e., the learners), but *also* the diverse organizations, educators, and other practitioners who actively take up and enact these interventions, I thus work to present a kind of ‘anatomy’ of an educational trend. In

this way, I argue, we can learn more about the nature of these kinds of outside reforms, especially as they are taken up by the diverse array of formal and informal educational sites. Hopefully, this understanding will aid in developing more productive pathways for these interventions to get taken up into the future.

Research Questions and Discussion

In order to understand the particular question of implementation, I primarily draw from Actor-Network Theory (ANT), which is an analytical approach to studying how particular phenomena always result from the interactions and ever-shifting relationships between different actors, whether objects, people, ideas, or groups. Coming out of scholarship in science and technology studies (STS), ANT is an outgrowth of scholarship grounded in ideas surrounding the social construction of technology (SCOT). Whereas earlier work that analyzed the impact of technology on society tended to emphasize their fixed characteristics (and thus the inevitability of their outcomes and technological determinist views), scholars with SCOT perspectives worked to challenge these assumptions by concentrating on the ways in which the adoption or rejection of technologies are instead based entirely on the social norms, interactions and negotiations amongst people surrounding said technologies (Bijker, Hughes, and Pinch, 1987).

Actor-Network Theory steps back from this proposition by reintroducing the importance of the material world itself, considering ‘nonhuman’ actors (whether tools, places, or substances) as important as human actors in determining the ultimate impact of particular innovations or phenomenon in society. From this perspective, the approach of ANT shifts away from considering the fixity or stability of particular phenomenon

(whether “making,” countries, scientific facts, or even the idea of “the social” itself) (Latour, 2005) toward the idea that these are continually brought into being through “the enactment of materially and discursively heterogeneous relations that produce and reshuffle all kinds of actors,” which can include all manner of things, including “objects, subjects, human beings, machines, animals, ‘nature’, ideas, organisations, inequalities, scale and sizes, and geographical arrangement” (Law, 2007, p. 2). In this way, ANT is a “material-semiotic” method, which considers “how minute relations among objects” can work to “bring about” the entire social world (Fenwick and Edwards, 2012).

In being able to consider a heterogeneous network of things then, there have been some scholars who have already highlighted the usefulness of using an ANT approach toward studying educational processes and phenomenon (see, for example, Fenwick and Edwards, 2010, as well as their edited volume with different contributions from different scholars, Fenwick and Edward, 2012). For instance, this includes studies of: the spread of an interactive video teaching device in a university (Nespor, 2012), the enactment of professional teaching standards in Australia (Mulcahy, 2012); or the implementation of the International Adult Literacy Survey (Clarke, 2002). From this perspective, my goal in using ANT is to shift away from thinking of “making” as an already agreed-upon or understood practice or concept, and instead think about how it is actively enacted or “performed” (Latour, 2005) through the continually forming and shifting relationship between different actors – whether the educators or staff at a school trying to start a makerspace, the particular 3-D printers and soldering irons purchased for this purpose, or the funds that enabled this purchase won through a grant proposal submitted in the previous year. Rather than thinking of it as an all-powerful variable that will help to ‘save

education' then, educational making becomes a strategy that is invoked through the material and social relationships between networks for actors for particular reasons. How then, are all the related actors (whether humans, objects, organizations or ideas) moved in order to make educational making a reality?

Within my analysis, I therefore focus on how 'making' as a concept is translated and implemented as an educational intervention through the wide actor-network of the Maker Movement. These activities may be understood more clearly through the use of Michel Callon's (1986) discussion of the four "moments of translation," including *problematization* – the establishment of the issue into a particular framework, *interessement* – the way an "entity attempts to impose and stabilize the other actors" through its problematization (p. 62), *enrollment* – whether these actors actually shift into place or not, and *mobilization* – how the actors are "transformed into manageable entities" that can be moved to act (Clarke, 2002, p, 117). Seen through this framework, the first two moments involve the activities of the public 'spokespeople' and funders for educational making: they form ideas about what counts as educational making (problematization), and set up particular structures through which other actors can participate in this definition, such as funding or networking opportunities (interessement). In turn, 'local' sites, such as libraries or schools, are involved in the next two moments, since they work to fulfill such definitions through the establishment and continual modification of their own maker programs and services (enrollment), and their continued participation in the existing supporting systems (mobilization). This entire chain of activity is something that I will explore more depth throughout the cases presented in the rest of the proposal.

In order to help me address these issues, my research questions for this project are therefore as follows: 1) What is the process through which educational making is translated into local sites? In other words, how are concepts or ideals taken from the educational maker community actually translated into on-the-ground practice? 2) Once established, what are activities are involved in maintaining, developing, or sustaining these maker activities and programs over time? 3) How might the two above-mentioned processes (establishment, maintenance) potentially shift the nature and stability of their organizational settings into the future?

Study Design and Research Methodology

In order to answer these research questions, I conducted an ethnographic study of two separate educational maker programs within public libraries: CreateSpace at the Middletown Free Library, located in Lima, PA, and Maker Jawn at the Free Library of Philadelphia. I further describe these two sites below, including my justification for their choice, the data collected, and my methods of analysis. However, because I focus particularly how these programs interact with the wider educational maker network for the purposes of implementation, maintenance and preservation, it is first necessary to describe this larger context.

The Larger Context – the Maker ‘Network’

‘Making’ as a practice first gained popularity in the early 2000s through the proliferation of maker and hackerspaces both in the United States and abroad. These spaces are collective workshops that provide access to traditional tools such as carpentry

or metalworking machinery, audio/video equipment, and digital fabrication tools such as 3-D printers and laser cutters. Within these spaces, people are invited to work on individual or group projects of their own choosing. While these types of spaces are currently flourishing within the United States (nearly 200, according to hackerspaces.org), the idea for creating these spaces these originally came from the existence of hackerspaces in Europe. While attending Chaos Communication Camp (an international meeting of hackers), American hacker groups became inspired by communal hackerspaces that they saw in cities throughout Europe, such as Berlin and Vienna (Borland, 2007). Following this trip, a number of these individuals founded their own spaces, including NYC Resistor, HacDC in Washington, D.C., and Noisebridge in San Francisco.

Individual maker/hackerspaces often have very particular goals related to their membership. These can range widely – for example, the MIT-founded FabLabs focus on community capacity building, education and skills training, whereas San Francisco-based Tech Shops emphasize individual creativity and entrepreneurialism. As will be discussed further in the next chapter (see the section, *The Politics of Hacking and Making*), oftentimes the goals of one space may run counter to other spaces, leading to debates not only about what making is, but also what making should accomplish.

The “Maker Movement” itself as a recognizable entity came into existence alongside the launch of *MAKE Magazine* in January 2005, and the subsequent launching of “Maker Faires” – public events sponsored by *Make* – in the following year (Moran, 2011; Voight, 2014, “Maker Media,” 2014). Led by founder Dale Dougherty, the magazine was originally managed by technology publisher O’Reilly Media. However in

2013, the magazine and its related properties were spun out into a freestanding company called Maker Media. This organization currently manages several properties including: the print magazine, an accompanying website (with feature articles, blog posts, and a database of DIY projects), a publication house (which prints maker-related books), the three “Flagship” Maker Faires (located in the San Francisco Bay Area, New York City, and Washington, D.C.), as well as an online store called “Maker Shed” (which sells the company’s publications, as well as actual maker materials and tools). Because of its extensive reach in terms of media and educational initiatives, Maker Media have proclaimed themselves ‘leaders’ of the Maker Movement.

There are also numerous other organizations that comprise the landscape of the Maker Movement. These range from companies that supply related tools and materials (such as MakerBot, a popular 3-D printer manufacturer, or SparkFun, an online electronics retailer), to collaborative work websites (e.g., Instructables, a user-generated project instruction database, and Thingiverse, a site for sharing 3-D design files). In general, the creation of this maker network arises from the movement’s investment in collaboration and community. In *The Maker Movement Manifesto*, TechShop CEO Mark Hatch (2013) describes how one of the main tenets of the movement includes the imperative to share. With the growth of different online channels of communication for makers, individuals are able not only to share or display final products, but also to collaborate with others while making. This has led to the rise of new acronyms beyond DIY (Do-It-Yourself) to describe the collective or social aspects of making, including DIWO (Do-It-With-Others), and DIT (Do-It-Together). The increasing popularity of Maker Faires also allows numerous groups – from hobbyist communities to technology

start-ups – to show off and share their most recent projects and products. While these events were initially sponsored by Maker Media, independent organizations have since planned dozens of related events in American cities from Chattanooga to Detroit, as well as international versions in numerous countries such as China, Turkey, and Kenya.

Regarding its entry into the world of education, Maker Media has been a key player within that arena. As mentioned earlier, Dougherty (2013) has been very public about his interest in bringing making into educational contexts, stating that the Maker Movement's "biggest challenge and the biggest opportunity" is to assist in changing education (p. 8). While *MAKE Magazine* had generally focused on an adult audience, from their establishment, "Maker Faires" have always encouraged an 'all ages' audience, providing a wide range of hands-on activities and workshops for youth ranging from 'learn how to solder' booths to interactive science demonstrations. The events have generally attracted groups from schools (e.g., after-school robotics teams), as well as educators themselves (through providing lectures and resources for teachers), which are often featured in an entire section of the Faire dedicated to youth called the "Young Makers Pavilion."

Maker Media has additionally promoted their relationship with the education community through the creation of both Maker Camp and the non-profit spinoff Maker Education Initiative. Maker Camp is an online 'camp' run by Maker Media in partnership with Google Plus, which features series of online resources that can be used by individuals, families or organizations over the summer in promoting maker-based education activities. The camp features interviews with numerous guests including inventors, scientists and artists, as well as daily DIY projects drawn from Makezine.com.

The camp also incorporates a camp-specific social network on Google Plus that allows participants (or “campers”) to communicate with the organizers of the camp as well as other participants online. Here, campers are encouraged to troubleshoot with one another, share pictures and video of projects, as well as suggest other possible ideas for making.

Based in Oakland, California, Maker Education Initiative (also referred to as “Maker Ed”) is a non-profit organization affiliated with Maker Media. Dougherty is the chairman of Maker Ed, which was formed in response to the “Education to Innovation” campaign, an initiative of President Obama to promote academic achievement in STEM subjects. The organization focuses specifically on capacity building within the Maker Movement network. As such, they manage several different initiatives, each with individual goals: Maker Corps, for supporting aspiring maker teachers and mentors, Maker VISTA (in cooperation with the federally-funded AmeriCorps program), for organizing maker networks in low-income neighborhoods, Open Portfolio Project, for the creation of standards for maker-based education assessments, and the Young Makers program, which focuses the maker activities of youth themselves. They also curate a publically available “Resource Library” for those in the educational maker community, which provides access to collection of resources focused on different topics such as “Projects & Learning Approaches,” “Making the Case,” and “Getting Started” (“Maker Ed’s Resource Library,” 2016). They have also produced several guides for those in the educational maker community, including *Makerspace Playbook: School Edition* (2014) and *Youth Makerspace Playbook* (2015). These will be further discussed in the subsequent chapters of this dissertation.

In addition to these initiatives, there are also many other organizations and groups that focus or support educational-based making. These include a large number of independent educational maker programs and makerspaces, some of which are within existing educational sites (e.g., schools, libraries, museums, community centers, etc.), and some which exist independently (e.g., the Curiosity Hacked program in Oakland, California, The Hacktory in Philadelphia, Pennsylvania). These are mostly supported, whether informationally, financially or materially, by larger organizations, which include both commercial and nonprofit enterprises. For example, this ranges from technology developers and retailers (e.g., littleBits, a developer and distributor of open-source modular electronics kits also provides project ideas based on their technology) to professional development organizations (e.g., the National Writing Project, who has hosted a maker-focused MOCC, Massively Open Online Collaboration), or governmental support departments (e.g., the Institute for Museum and Library Services, who have provided a whole host of grants for the development of maker programs and makerspaces). Thus, despite the fact that Maker Media is perhaps the most ‘visible’ of the maker ‘brands’, there is a wide range of other organizations that are actively involved within the educational making network.

The Sites – CreateSpace and Maker Jawn

The bulk of this study is drawn from an ethnographic study of two programs: CreateSpace in the Middletown Free Library and Maker Jawn in the Free Library of Philadelphia. Both are what I call “educational making programs,” or planned opportunities for individuals, or more specifically library “patrons” (what CreateSpace’s

head calls the users of the library), to engage with maker activities. These include both ‘high’ and ‘low’- tech engagements with different creative projects (from tabletop robots to paper mache sculptures), along with the relevant tools and technologies for producing these (whether 3-D printers or hot glue guns). Both have generally focused on engaging youth (primarily upper elementary to high school age), though have also accommodated adults and families to different degrees (this will be discussed in further depth in Chapter Three). In terms of setting, both are housed within public libraries, and are generally well connected to the wider ‘maker network,’ either through their funding and support systems (they have received grants and material support from some of the organizations mentioned above), or their networking activities with other maker organizations and communities (e.g., informal partnerships through joint programs, presentations at academic and professional conferences, articles and interviews in popular press publications).

Despite these surface similarities however, these sites have profoundly different contexts. They are situated with separate institutional systems and distinct geographic locations. Middletown Free Library (MFL) is a single-branch library located in Middletown Township, a middle to upper-class suburb located outside of Philadelphia, Pennsylvania. There, the median household income is \$86,082 (compared with \$53,482 nationally), with a highly educated population (48.6% of people aged 25 or above have at least a Bachelors degree, compared with 29.3% nationally), and where most of the population is white (92.3%) (“U.S. Census Bureau,” 2016). Free Library of Philadelphia (FLP), on the other hand, is a large urban system that encompasses 61 branches that are located throughout the different neighborhoods in the city. The city is significantly more

ethnically and racially diverse (41.0% White, 43.4% Black or African American, 12.3% Hispanic) than Middletown Township. Within the city, the median household income is \$37,460 (which is notably lower than the national average), and 24.5% of people aged 25 or above have at least a Bachelors degree (which is slightly below the national average) (“U.S. Census Bureau,” 2016). Specifically, Maker Jawn is located within 3 to 6 local branches at a time, and primarily ensconced within the “North Philadelphia Cluster” of the city (a designation of FLP), which is generally a more economically depressed area in comparison with the city at-large (i.e., with a significantly lower average household income). As will be discussed in depth within Chapter Three, this profoundly influences not only who the participants and staff of the programs are, but also the structure of the program itself – CreateSpace is primarily structured as a series of independent workshops, running a few times a month, focused on specific technology topics or projects, whereas Maker Jawn is predominantly a free-form afterschool program, running two to four times a week, where youth are encouraged to pursue their own creative interests and projects.

This study is therefore structured as a *comparative case study* (Miles, Huberman, and Saldana, 2013) where I engaged in *purposive selection* (Maxwell, 2004) of CreateSpace and Maker Jawn. That is, while there are enough similarities between the basic categories of the sites in order to form a basis for comparison (both are educational maker program situated within a public library), they are each composed of a distinct network of actors (staff, participants, neighborhoods, library system, organizational mission, etc.) and can thus illustrate the varied ways in which educational making can be enacted and “performed” (Latour, 2005).

Participant-Observation and Interviews

Drawing from the main activities that comprise ethnography, my data for this study are primarily drawn from the *participant-observation* and *interviews* that I conducted at both sites (Hammersley and Atkinson, 2007). Over the course of 16 months (May 2014 – September 2015), I spent time at both CreateSpace and Maker Jawn, through to differing degrees and capacities, at different times. These different conditions are described below.

I visited CreateSpace throughout almost the entire fieldwork period. These visits were most frequent during the first summer between July – August 2014 (from two to three times a week), and more sporadic during the school year from September 2014 – April 2015, around twice a month. This matched with the overall schedule of their program; since they mostly deal with school-aged children, they run programs more often in the summer and less frequently during the school year (usually bi-weekly). I also regularly worked as a volunteer at CreateSpace. This mostly involved assisting the main facilitator of the program, Mary Glendening (who also the Library Director of MFL) with programs during the summer and occasionally during the year. I also occasionally ran these programs by myself. This included one early evening workshop focused on ‘pixilation’ – a stop motion animation technique that involves posing people – in August 2014, in order to fill in for Glendening who was out of town. I also ran two longer workshops focused on ‘electronic textiles,’ including: a two-day family workshop in March 2015, for creating LED-enhanced felt bracelets, and a five-day workshop for youth in Summer 2015, as part of the “TechniGals” program, for producing ‘interactive’ pillows (this summer program will be discussed further in Chapter Four). I additionally

participated in a ‘community’ advisory planning meeting for “TechniGals,” and casually met with Glendening throughout this period, where we often discussed logistics and planning of the program.

While I spent fewer months in total at Maker Jawn (from February to August 2015), these visits were much more concentrated. In addition to visiting their afterschool maker sessions (from one to two times a week, spread between the different branches where the program is run), I regularly attended their weekly staff meetings throughout this period. Additionally, I attended several of their professional development and training sessions during this time, including three “tinkering sessions” for staff, and two training sessions for the “Summer of Making” initiative in Summer 2015 (these will be discussed further in both Chapters Three and Four), as well as public events they participated in, such as the “Kensington Sculpture Derby” (a local arts event in Philadelphia, for which MJ participants created projects), and FLP’s “All Staff Day” (where MJ staff held a workshop on making activities for the rest of the FLP staff). I also did some volunteer work for the program, working on a Maker Jawn presentation for the International Society for Technology in Education (ISTE) 2015 conference, and assisting as a facilitator at an outreach event (with the Nonprofit Technology Resources group in Philadelphia). Finally, as mentioned at the start of this introduction, I also attended the Digital Media and Learning conference in Los Angeles alongside several staff members of Maker Jawn. During this time, I not only attended panels and workshops with staff, but also had several informal conversations with them about the state and progress of their program. This was in addition to the dozens of conversations that I had with MJ staff about these issues throughout the period of January to August.

In addition to this participant-observation, I also interviewed the staff of both programs. These semi-structured interviews (Drever, 1995) typically lasted from 25 to 70 minutes, and generally focused on topics including: the goal/purpose of the programs; their personal understanding or definition of ‘making;’ how the program fits in within the library at-large (with its mission); the on-the-ground logistics of running maker workshops/sessions; general information on the funding and support-seeking activities of the programs, as well as their opinions of these activities; and their process of producing media or sharing information about the program to outside audiences.

Considering the differing structure and history of these programs, these questions necessarily differed for each site. For example, because of its larger online presence, at Maker Jawn I specifically questioned staff about their contributions to the program’s online website, including blog posts and curriculum. I also asked about specific initiatives within each program (e.g., Maker Jawn’s “Summer of Making” program versus CreateSpace’s “Maker Camp” program). Questions also differed according to the role of the particular staff member. For instance, I asked administrators more about the institutional and funding history and activities of program, while I focused more on the day-to-day logistics of running maker activities with the others. Finally, questions were additionally influenced by my ongoing analysis of the data during my fieldwork. For instance, only in later interviews did I end up asking about funding or support-seeking opportunities, once I realized how central these were to the day-to-day functioning of these programs.

Regarding the number of people interviewed, these differed at each site based on the significantly different sizes of the programs themselves. CreateSpace primarily relies

on the staff time of one person, as well as other staff and volunteers who are occasionally pulled in as needed. At CreateSpace, I therefore conducted three interviews, including Glendening (the main facilitator and leader of the initiative), and two other MFL staff members (the Youth and Adult Services Librarians), who had occasionally assisted with programs in the past, and who were becoming more integrated to the program just as I was leaving. Maker Jawn, on the other hand, is comprised of a much larger team of around 15 staff (the exact number ebbed and flowed throughout my fieldwork), including two administrators and a corps of maker “mentors,” who facilitated programs on the library floors. There, I conducted 13 interviews, including nine mentors, and three administrators: Sarah Winchowky, the current Project Coordinator (who directly manages the staff), Theresa Ramos, the Program Development Coordinator (who oversees the overall direction of the program), and K-Fai Steele, the former coordinator of Maker Jawn (who was integral to the founding of the program, but who left a few months before I began my fieldwork). While at Maker Jawn, I also briefly interviewed Isamar Ramirez, an outside consultant who was hired by Ramos to develop a reading-focused initiative called “Summer of Making,” which took place toward the end of my fieldwork. This initiative is further discussed in Chapter Four.

Data Analysis – Tracing the Associations

As I mentioned earlier, the research questions for my analysis included looking at how sites implement, develop and sustain educational maker programs. Within my fieldwork, I initially focused on collecting data surrounding the actual maker workshops and sessions held at both sites, that is, where the staff worked with members of the

general public on maker activities and projects. However, as time progressed, I came to see how questions of implementation and sustainability were inherently related a series of (usually administrative) tasks that mostly involved efforts of staff to link their work (explicitly or implicitly) to the wider educational making network.

Following Latour's (2005) ANT-based methodological approach then, I actively worked 'trace the associations' between CreateSpace and Maker Jawn with other sites and actors within the educational making network. In terms of analysis, Latour describes the particular importance of working to "keep the social" flat by not taking for granted the difference between the supposedly 'global' places of the network (that is, where ideas may be disseminated or controlled from) and the 'local' sites (where ideas are taken up). Thus, rather than assuming that the centrality (or marginality) of site results from some essential characteristic then, it is important to examine *how* these sites are actually situated within the network through particular processes or acts. In other words, it is important to consider how a site 'position' can be understood through how it performed and enacted through specific activities, movements, or materials – for instance, how the headquarter offices of a corporation are only given prominence through active processes such as the dissemination or receipt of company memos or manuals to other smaller local offices. ANT analysis therefore involves looking at how the "the assemblage of all the *other* local interactions distributed elsewhere in time and space... have been brought to bear on the scene through the relays of various non-human actors" (p. 194). As Latour describes, one of the most important actors here includes "forms," or object which "simply... allow... something else to be transported from one site to another" (p. 223). He alternatively calls these forms "*articulators* or *localizers*" (p. 194), and may include

things such as architectural blueprints, online articles, or voting ballots. Through an examination of these forms, one can discover the “*structuring templates*” of these associations and translations (p. 196).

Drawing from this approach, my analysis took place in three parts. First, I examined the associations that were formed within the immediate network of the programs, that is, not only within the programs themselves (including staff, participants, the tools and materials they used) but also the surrounding environmental contexts, including the library itself (whether the branches or the larger institution), and its encompassing neighborhood. Second, I stepped back to look at the relationship between the programs and the wider educational maker network. This included looking at the *activities* of program staff in connecting to the network (such as partnerships they formed with other groups, grants proposals produced for outside organizations, engagements with online maker project databases, or new initiatives generated), as well as the related *forms* through which these activities or engagements were translated elsewhere. These included not only the forms that travelled *inward* – including project instructions or lesson plans drawn from maker websites, calls for project collaborations or proposals (often in exchange for financial or material support), and general ideas or concepts surrounding the idea of what making actually is – but also the forms that travelled *outwards* – such as promotional materials including program websites, photos, videos and other media posted on social media, curriculum and project instructions, online articles and interviews, and conference presentations.

In terms of looking at these ‘forms,’ my analysis did not only encompass examining at their content, but also looking ‘in between the lines’ at the processes and

assumptions involved in creating these forms. Specifically, I looked for the “structuring templates” (Latour, 2005) of these programs, considering how these templates *shaped* these forms, as well as *were shaped by* these forms – for example, how the production of curriculum at Maker Jawn was driven by a need to demonstrate existing activities to a wider audience, but how it also eventually ended up shaping what kinds of activities that mentors were likely to pursue. In this way, my analysis draws from Annelise Riles (2000), a law scholar and anthropologist, and her work of NGOs in international contexts (in particular, Fijian bureaucrats and activists preparing for and participating in the United Nations Fourth World Conference on Women in 1995). Within her study, *The Network Inside Out*, Riles describes her experience encountering the multiple ‘documents’ of this domain, including newsletters, meeting notes, survey questionnaires and data, organizational charts, and funding proposals. As she notes, these “ubiquitous” artifacts are often ignored by anthropologists (p.xiii), despite the fact that they work to both generate and comprise “late modern institutional knowledge” culture (p. 16). The reason why this occurs is because it is assumed these artifacts are already “known,” and thus, understood, since they are essentially endemic to our own “knowledge practices” as social scientists (where we too encounter grant proposals, meeting notes, and survey data) (p. 4). In this way, she argues, we are already “inside” this network and engaged within the reality of this world. Rather than taking these artifacts for granted however, Riles advocates working to “get outside” these artifacts (p. 16), in order to “render [them] ... accessible ethnographically” (p. 6). Only by doing so, can we work to “apprend what is already too familiar” and thus gain real understanding into how these practices, and indeed this culture, works.

From this perspective, my analysis of the implementation and maintenance of these programs involves looking at activities with which we might be “familiar” (e.g., looking for funding, the production of conference presentations), and working to make these analytically accessible. Only in this way, I argue, can we work move beyond the outwardly visible instantiations of educational making where ‘kids are making,’ to the actual mechanisms that are at play both establishing and maintaining these programs. Thus, while this study is an ethnography, I do not aim to provide the ultimate “thick description” (Geertz, 1977), which purports describe “complete and total knowledge” about educational making or even these particular programs (Jackson, 2013, p. 153). Instead, I follow John L. Jackson’s (2013) lead in producing a “thin description,” wherein I am deliberately taking a “constructively thinned, theorized, concretized, or dislodged” look (p. 16) with the aim of uncovering those essential, but seemingly already familiar, activities of establishing and sustaining these kinds of programs. It is only through this process, I argue, that we can arrive at more productive ways of rethinking, reshaping and reforming educational making for the future.

Outline of the Dissertation

This dissertation is divided into six chapters. Within Chapter Two, I provide a review of the relevant literature both with regard to the Maker Movement at-large and educational making specifically. As such, it is divided into two main parts. First, I consider the ‘ethos’ of the Maker Movement, and how it is been shaped by its relationships with different practices including entrepreneurship, crafting, and hacking. I also detail the ideological history of the movement, from its current “technological

solutionist” underpinnings within Silicon Valley (Morozov, 2014b), back to its roots within the counterculture-turned cyberculture movements of the 1960s and 70s, which generally emphasized a technologically-enhanced “communitarian ethos” (Turner, 2006). Second, I move onto an examination of the idea of educational making itself. Specifically, I look at how the making has been taken up by numerous research and practitioner communities, including those who study Learning Sciences, Literacy Studies, and Informal Education. While educational making is often posited as a new intervention, I illustrate how it resonates or rearticulates many of the main tenets of these different fields regarding learning and pedagogy. Finally, I conclude the chapter by asking about the educational purpose of makerspaces. While educational making is often been posited as a public good (whether in supporting the nation’s need for STEM workers, or in promoting community or equity), it is also just as often been positioned as a private good, intended to service the needs of individuals who are interested in social mobility and self-sufficiency. From this perspective, it is important for those who promote educational making to figure out which of these aims they promote, both conceptually and in practice.

In the following three chapters (three to five), I move onto developing the cases of CreateSpace and Maker Jawn itself. These are arranged in line with the data analysis steps that I described above. Chapter Three – *Establishing the Trend* – looks specifically at the establishment of these programs, in terms of how educational making as a practice is enacted through the immediate network of the staff, participants, materials and tools, and space themselves, as well as the surrounding space and network of the library, as well as the neighborhood and geographic location of the programs. As I describe, a useful way of understanding all these associations involves looking at two axes of influence: 1)

the *organizational structure* of the program vis-à-vis the library at-large and how this influences who facilitates the programs (i.e., its *staff*), and 2) the *neighborhood situation* of the program and how this influences who the *participants* of the program are, in terms of both demographics and what they expect or require. Thus, while CreateSpace and Maker Jawn seem similar from the outside, in that they generally employ comparable tools, materials and projects, they are significantly different both in terms of their structures and purpose. From this perspective, each program also potentially shifts the role of the libraries themselves as public institution. Many within the library world have made numerous claims about the benefits of bringing making into these institutions. However, I argue that this depends on the particular enactments of educational making that are performed, as well as the particular context of the libraries in which they are implemented, particularly how they already function as spaces of public education. Thus, while CreateSpace does work to transform Middletown Free Library into kind of self-enrichment ‘destination’ for its middle-class patrons through its series of introductory maker workshops focused new and novel technologies, Maker Jawn extends the Free Library of Philadelphia’s existing role as community service provider, by offering its more ‘under-resourced’ youth ongoing, afterschool opportunities for hands-on self-expression and creative mentorship.

In Chapters Four and Five, I move onto the questions of maintenance, or how these programs work to sustain themselves over time. From another perspective, this involves looking at how these programs connect to the wider educational maker network, including 1) how they responded to external calls for participation and engagement (e.g., grant proposals, collaborative partnerships), and 2) how they provided contributions back

to this network, whether intentionally or unintentionally (e.g., grant reports, blog posts, online media postings). In Chapter Four – *Maintaining the Trend*, I focus on this first group of activities, or the acts that I call “hustling” for support. Connecting the idea of hustle back to its colloquial contexts (hustling ‘on the street’), as well as its business contexts (the ‘entrepreneurial hustle’), I use this term to describe managerial attempts within the programs to move around actors – whether people, objects, or spaces – with the aim of capitalizing upon external sources of funding, materials, and other support. As I describe, there are several different *types* of hustling activity that occur at CreateSpace and Maker Jawn. These included both *tangible* shifts – including changing the tools and materials, audience, or structure of existing activities, as well as *discursive* shifts – including finding different ways to describe existing activities, or including separate practices under the umbrella of making. While these kinds of hustling moves are common within commercial, for-profit organizations, I detail how this becomes more difficult within the context of mission-driven organizations (including CreateSpace and Maker Jawn) since it potentially involves ‘pivoting’ away from their original goals. As I illustrate however, the potential for this practice to destabilize the program depends on both the nature of its mission (i.e., how easy it is to accommodate), and the organizational structure of the programs (i.e., the ‘distance’ between the decision-makers and on-the-ground workers). As will be demonstrated, CreateSpace has a generally stable foundation for these hustles since it is predominantly run and maintained through the work of a single person, and also has an easier-to-accommodate mission of technology acquisition and access. Maker Jawn, however, differs because it is a much larger organization. Here, the ‘managerial distance’ between administration and workers is significant, thus

increasing the chance that hustles may not be accepted by staff. Additionally, Maker Jawn's mission depends primarily on building relationship between program participants and the maker mentors, and is thus, harder to sustain over time. As a result, the hustles perpetuated at Maker Jawn are much less stable, and seemingly not sustainable in the long term, at least in regard to the current staff that it employs.

In Chapter Five – *Documenting the Trend*, I move onto yet another maintenance practice, documenting program activities and sharing these with outside audiences. This is what I call “producing spin.” As I define it, producing spin includes the practices of recording, translating and representing program activities, often inscribing them within desirable narratives that ‘fit’ within the larger educational maker network. While this activity is integral to the practice of hustle, I argue that it is analytically important in and of itself, since it often shapes and influences not only what a program is, but also what it becomes throughout time. Within the chapter, I start by detailing the particular processes of producing spin, which includes both the *recording activities* (e.g., taking notes, creating sign-in sheets, photographing events) as well as *translation activities* (writing blog posts, producing ‘best practices’ documents, writing curriculum or project instructions). I then move onto describing the productive power of producing spin. As I detail, activities that are made ‘legible’ to outside audiences – whether interactions with popular ‘maker’ technologies such as 3-D printers or easy-to-explain creative projects – are often promoted and kept. On the other hand, ‘illegible’ activities – or those which do not ‘fit’ into the desired narratives – are often hidden, and occasionally eliminated, despite the fact that they may benefit the program internally. These might include, for example, unexpected ways of successful engaging with participants, or seemingly

mundane, yet powerful, ways of incorporating digital technologies into people's everyday lives. Despite these potentially detrimental effects however, there are also positive outcomes that result from the actual practices of trying to 'fit' activities into the popular narrative. This includes, for example, providing staff members constructive outlets (such as writing blog posts or curriculum) through which to deal with the inherent 'messiness' of facilitating educational making, or ways of personally inscribing meaning into these activities. In this way, the acts of producing spin, which were originally focused on relationships with external audiences, can work to shift people's internal sense of commitment, both to the program itself and the larger 'cause' of educational making.

Chapter Six serves as the conclusion of this dissertation. There, I briefly summarize my findings from throughout the study, and move onto some broader issues concerning the stakes of this kind of analysis when considering educational making as a kind of trend that is implemented within many different sites. I first start by describing how the Maker Movement, while focusing on hands-on work, can generally be understood as a media phenomenon. Using James Carey (2008/1989) discussion of the transmission and ritual views of communication, I highlight how the Maker Movement has become both a vehicle through which ideas and content are disseminated, as well as platform upon which shared ideas about the values and benefits of making are built. Following from these ideas, I then move onto describe how making likewise functions as a kind of commercialized brand. While participants do use the maker label as a way of uniting and energizing different people, it is also undeniable that it is used as kind of acknowledged, sanctioned brand through which objects (including 3-D printers and maker kits) as well as programs and activities (such as CreateSpace and Maker Jawn) are

sold. From this perspective, one should be weary when considering how these market logics are similarly transported into the funding and support of these programs. I conclude the chapter by addressing how the community may work to challenge these commercialized movements. After bringing up a few practical solutions, I also describe the way in which scholarship that focuses on issues of implementation and logistics may also work to solve this issue. As I argue, only by bringing to light the mechanics of how the Maker Movement and other brands works, can we truly move toward better solutions and effects.

CHAPTER 2**Examining the Trend:****Exploring the Concepts behind the Maker Movement and Educational Making****Introduction**

Within my dissertation, I focus particularly on the webs of making that are enacted on the ground. However, these webs are ensconced within the larger discussions surrounding both making and maker-based education, which circulate in various communities ranging from government, industry, and academia. Because of the ‘networked’ nature of the Maker Movement (that is, the numerous press, social websites, and online communities focused on making), much of this rhetoric helps to inform and shape what people actually do within local sites, such as CreateSpace and Maker Jawn. Within this literature review then, I highlight those circulating discourses surrounding making as formulated by those in both the maker and education communities.

Given these intertwining trajectories of education and “making,” this literature review utilizes a genealogical framework (Foucault, 1978) to trace the history and assumptions behind the Maker Movement, as well as their relationship to theories surrounding learning, education, and schooling. In contrast to traditional historical methods, Foucault describes genealogy as a process that “refuses the certainty of absolutes” (p. 87) and instead tries to understand the ways that seemingly fixed concepts are actually constructed from “heterogeneous layers” (p. 82). Thus, while “making” is conceived of as a stable concept by many within the Maker Movement, by considering it from a genealogical perspective, I attempted to illuminate how the term has been

constructed from both related and disparate discourses. In this respect, this analysis is aligned with my emphasis on ANT as a research method, in that it is not concerned with ‘objective’ history or essentialized concepts, but rather the diverse contexts from which an idea has been shaped.

In terms of sources, I focus on a range of texts including popular press works (books, handbooks, online articles, blogs), and press coverage of the maker movement (drawn from Google alerts of “Maker Movement,” “Maker Education,” which I monitored from April 2014 to Oct 2014). I also looked at how these conversations carried over into scholarly work, mostly within the realm of Communications and Educational research. While reading through these sources and my notes, I engaged with thematic coding in order to identify the major ‘narratives’ or assumptions regarding what making and educational making is. I then situated these within larger, related cultural movements and theoretical frameworks. By identifying these, I work to highlight both the contexts and assumptions that inform those who identify with, and who are involved with enacting the Maker Movement on the ground.

In terms of structure, this chapter is divided into two parts. First, I look at the rhetoric surrounding the “Maker Movement” generally. I start by looking at the ways that making has been discussed from within the community itself, focusing on texts ranging from academic articles, popular press books, newspaper articles, and websites. Though discussion on making emerges from several different groups (the high-tech industry, amateur hobbyists, etc.), I highlight the major themes that emerge from within this discourse, including claims about the ‘new industrial revolution’ and increased opportunities for entrepreneurialism, as well as the nostalgic and social dimensions of

making, as drawn through its connection to the ‘Indie Crafts’ community. I also examine the connection between making and the related practice of hacking, something that brings to light discussions about the political potential of these practices.

Second, I move onto a discussion of the educational maker community, first providing a brief overview of the context itself. Then I focus on the main discussions surrounding making and education that circulate both within academic and education practitioner communities. Specifically, I describe three streams of education research focused on making and makerspaces: Learning Sciences, Museum Education, and New Literacies Studies. Then, considering the fact that making is often implemented in outside-school, “informal” educational spaces (e.g., libraries, museums, community centers), I describe the ways in which scholars have discussed how learning occurs in these spaces and how this perspective may be used to understand educational making. Finally, I discuss the diverse goals of maker-based education, as espoused by those in these research circles as well as people working in the field. By highlighting these numerous purposes, I illustrate the ways in which these might occasionally work to contradict each other, and thus complicate the question of who educational making is for.

The Maker Movement “Ethos”

In general, the rhetoric surrounding the Maker Movement has been developed through a diverse number of communities, including those in the tech industry, the ‘Indie Crafters’ and the hacker community. While these groups have emphasized the potential benefits of making for society – whether in the economic, affective, or political realms of

life – they have at the same time occasionally disagreed about what comprises the maker ‘ethos’ or maker practice. These confluences and tensions are discussed further below.

Entrepreneurialism and the “New Industrial Revolution”

As prompted by Chris Anderson (2012), the former editor of *Wired* magazine and the author of the book, *Makers: The New Industrial Revolution*, the Maker Movement is popularly thought to have heralded a new era of manufacturing and innovation (Lipson and Kurman, 2013; Barnatt, 2013). Much of this is due to the fact that fabrication and manufacturing technologies previously only available to large companies are now commercially available for individual consumers, alongside easy-to-use design software. As a result, people can now more easily prototype their ideas, whether smaller objects like fashion accessories and toys, or larger-scale products such as racecars or surveillance drones (Anderson, 2012).

Anderson (2012) argues that the increased availability of manufacturing technologies and rise of maker culture has thus led to the creation of a wide array of specialized products that might not have existed within the traditional confines of mass manufacturing. Oftentimes, these products are produced in smaller batches (hundreds or thousands rather than millions) and sold online. In this way, the Maker Movement continues another trend that Anderson (2006) traced nearly ten years ago in his bestselling book, *The Long Tail: Why the Future of Business is Selling Less of More*. Applying the statistical “long tail” toward the sale of products in the age of the Internet, Anderson argued that decreasing costs of manufacturing and distribution alongside increased ease and affordability of targeted marketing allowed for the increased

production of specialty products. Whereas Anderson previously focused on niche media and entertainment products, he now argues that this idea may be extended to the world of physical production.

Within *The Long Tail*, Anderson (2006) additionally described the new “business aggregators” of the transformed market – entities that collect “a huge variety of goods and make... them available and easy to find” (p. 88). These include the now-dominant online retailers such as Amazon, eBay, and iTunes, but now within the Maker Movement there is a newer model of marketing and distribution. The crowd funding website Kickstarter has allowed individual manufacturers to market specialty goods, as well as raise money for production. In the Maker Media-published book, *Zero to Maker: Learn (Just Enough) to Make (Just About) Anything*, David Lang (2013) describes how he and his friend Eric Stackpole morphed their hobby of creating underwater remotely operated robots (ROVs) into a career through use of online networks such as Kickstarter. By tapping into the “distributed Research & Development community” of makers online, they were able to design an open source ROV kit, which was eventually marketed, sold and distributed by starting a campaign on the site (Lang, 2013). The most popular products launched on Kickstarter thus far have include an e-ink “smartwatch,” an open-source video game console, and a set of miniature gaming figurines (Kosoff, 2014).

Because of these supposed economic opportunities afforded by the Maker Movement, the United States government has also become interested in encouraging this practice. As previously mentioned, the Obama Administration has actively supported the Maker Movement, partnering with Maker Media’s nonprofit education spinoff, the Maker Education Initiative (described in the Introduction). They have also hosted a “White

House Maker Faire,” alongside the first “National Day of Making” in June 2014. One of the main reasons for this support, as detailed by Thomas Kalil (2013), the Deputy Director of the White House Office of Science and Technology Policy, is the potential for the Make Movement to promote the “economic well-being” of the United States through the training of STEM workers of the future. Not only can these individuals help address the “grand [science and technology] challenges of the 21st century,” such as declining fossil fuels or increasing rates of cancer (p. 15), but they can also help increase the potential for new industries and new jobs (p. 13-15).

Internationally, other nations have also promoted making for the purposes of economic growth. As described by Lindtner and Li (2012), the Chinese government has supported numerous maker initiatives within their country, including the founding of hackerspaces in cities including Shenzhen, Nanjing, and Shanghai. It may be argued hackerspace culture has generally been associated with sentiments not usually supported by the Chinese government – namely, interest in free and open information within in the context of deregulated markets (this is discussed further in the section below, *The Politics of Hacking and Making*). However, Lindtner and Li (2012) have detailed the ways in which Chinese government support of hackerspaces falls along the parallel lines of “open source manufacturing,” or the sharing of production specifications amongst manufacturers in order to lower costs for the promotion of innovation and market competition. Thus, while the Maker Movement has often been connected to democratic aims (again, see the hacker/maker section below), Chinese support of maker culture supports an alternate, yet compatible system of understanding that still fits comfortably within the confines of the movement.

In general, the Maker Movement's emphasis on the utopian potential of technology as well as its zeal for entrepreneurialism, aligns with a perspective that Barbrook and Cameron (1996) have labeled "Californian Ideology." As they detail, this ideology sprang from the mixing of the "cultural bohemianism of San Francisco" with the "hi-tech industries of Silicon Valley" in the 1970 and 80s. In his book *From Counterculture to Cyberculture*, Turner (2006) further describes the ways in which the rise of this perspective resulted from the early connections between these groups and the science and technology academic community – relationships, argued by Turner, heavily fostered by technology guru Stewart Brand. One of the most visible displays of this confluence of ideas was the publication of Brand's *Whole Earth Catalogue*. Published throughout the late 60s and 70s, this popular, award-winning book series curated a list of the 'tools' (digital and otherwise) one would need to survive in the transforming, post-war, networked, and increasingly consumerist world – ranging from pottery wheels and hiking shoes, to personal computers and synthesizers.

Additionally inspired by mathematician and cybernetics founder Norbert Wiener, those aligned with this perspective were also convinced that the logic of information systems could itself be used as a tool to improve society (Barbrook and Cameron, 1996; Turner, 2006). Seen within this light, all items within the catalogue were not merely objects but – following Marshall McLuhan (1964/1994), who was also widely read by those within the community – also bodily extensions that would allow one to 'engineer' a better life for one's self. These ideas also found traction within the computer hacking communities that arose from the 50s onward – groups that were eventually incorporated into the technology communities of Northern California (Cameron and Babrook, 1995;

Turner, 2006, Levy, 1984/2010). Since the Maker Movement sprung from Silicon Valley, it can thus be seen an inheritor of this Californian Ideology – a sentiment supported by Brand himself (as cited by Morozov, 2014a), who has stated that ‘makers’ are the contemporary versions of ‘hackers’ that he supported back in the 1970s.

Another perspective that arose from this community, which has since taken root within the Maker Movement, is the idea of self-sufficiency. Within the logic of Californian Ideology, as long as people had access to the proper tools (whether physical, digital, or informational), people could work to solve their own problems. In other words, all issues could be addressed, not through state or outside intervention, but through the use of the suitable tools and/or engineering design thinking and logic (Barbrook and Cameron, 1996; Turner, 2006). Bolstered by the hackers’ interest in self-education, this thinking also encompassed the idea that consumerism – that is, buying the ‘right stuff’ – could pave the path toward self-liberation and emancipation (Morozov, 2014a). Indeed, this way of thinking led to the creation of what Barbrook and Cameron (1996) describe as the “virtual class” – a new group of individuals equipped with the right tools who could write their own futures by carving out a living as the knowledge workers of the late 20th century. This idea is perhaps more recognizable as Richard Florida’s (2002) description of the “creative class” today.

Within Anderson’s (2012) current formulation of the ‘new industrial revolution’, these members of the virtual/creative class are not only the leaders within the new knowledge economy, but also the inheritors of the dying manufacturing industry. By connecting knowledge of the market generated through the Internet with an ability to rapidly manufacture products, makers are positioned to shape the economic future of the

market. Blurring the lines between different sectors of industry additionally reflects the makers' alignment with Californian Ideology. Moving away from previous business practices such as strict hierarchies, division of labor, and life-long opportunities for stable employment, members of the new Silicon Valley elite instead emphasized "flattened structures, long-term employment by short-term project-based contracting, and professional positions by complex, networked forms of sociability" (Turner, 2006, p. 239). In turn, all of these changes work to support their growing embrace of a deregulated, free and open market. As Barbrook and Cameron (1996) highlight, this has cultivated a culture of rabid "libertarian individualism" – something evidenced by *Wired Magazine's* embrace of neo-conservative, right-wing politicians including Newt Gingrich, as well as the rise of well-known libertarians within Silicon Valley such as entrepreneur Peter Thiel (who bankrolled Ron Paul's last presidential election). Despite the community's initial allegiances to the New Left counterculture and oppositional politics, Silicon Valley's "techno-libertarianism" (Turner, 2006, p. 232) might thus be seen as yet another factor which influences the rise of the Maker Movement in the United States.

Crafting and the Nostalgic Dynamics of Making

While the mainstream arm of the Maker Movement focuses on new and novel technologies, the affective benefits of making are more connected with those within the movement who emphasize traditional and artisanal craftsmanship. Many have linked this latter branch with the 'Indie Crafts' scene – a community that rose slightly prior to the mainstream Maker Movement, but which has since been incorporated within it. Whereas

the Maker Movement stemmed from Silicon Valley and the technology industry, the Indie Crafts scene resulted from the mixing of the radical ‘lo-fi’ punk culture of the 70s and 80s, with the DIY/hobbyist culture that focused on the domestic arts (Spencer, 2008; Gauntlett, 2011). This scene, which began in the mid-1990s, was mostly driven through the efforts of ‘radical’ women crafters, who were mostly art school graduates looking for alternate directions for their work. Challenging the values of the gallery-based art world, members of this community instead put their efforts into producing handmade ‘everyday’ goods (clothes, jewelry, home decor) that could be directly sold to people with a similar philosophy and aesthetic, either through specialty fairs (e.g., “Renegade Craft Fair,” “Blissful Revolution Arts & Crafts Bazaar”), or crafts-oriented online marketplaces (including Etsy or BuyOlympia.com) (Levine and Heimerl, 2008). While there had long been related spaces for independent craftsman selling wares (e.g., the network of more ‘mainstream’ arts and crafts fairs throughout the United States), or home enthusiasts interested in crafting (e.g., as demonstrated by the existence of popular crafts retailers such as Hobby Lobby, and Michael’s Arts and Crafts), this particular wave of crafting was distinct because of its demographics (mostly white women in their 20s and 30s, connected with the urban, underground art scene), and its philosophical underpinnings (affiliations with anti-capitalist and radical feminist communities).

While there are still branches of the Indie Crafts scene that exist independently, much of its activity has been subsumed into the Maker Movement within the last few years. For example, one of the major publications of the Indie Craft scene, *CRAFT Magazine*, was actually a Maker Media property and printed alongside *MAKE Magazine*. However, the print version of this magazine was cancelled in 2009, and the content was

subsequently incorporated into the main magazine's online site. This integration of activity has also been seen within Maker Faires, which often highlights more "traditional" crafts such as sewing, jewelry making, and artisanal cooking and farming, alongside more "high tech" practices such as soldering and robotics. The fairs also features numerous hybrids of old and new, such as "E-textiles" – the practice of incorporating electronic components into clothing and fabrics, and "Steampunk" projects – a sub-genre of science fiction that focuses on steam-powered machinery and the aesthetics of the Victorian era. Other pockets of maker culture, including the DIY websites Instructables.com and DIY.org, also feature both high and low-tech making.

Alongside their embrace of these techniques and aesthetics, the mainstream Maker Movement has also adopted the nostalgic perspective of the Indie Crafts scene into their rhetoric. As Dougherty (2013) states: "while technology has been the spark of the Maker Movement," it is also allowed the "renewal of some deeply held cultural value... to make" (p. 7-8). This desire to connect old and new is further reflected in Chris Anderson's (2012) contention that the 'new industrial revolution' of the Maker Movement is really just a return back to the 'cottage industries' the pre-industrial economy. Because of these sentiments, Gauntlett (2011) connects the present-day Maker Movement with the older Arts and Crafts movement of the late 19th and early 20th century. Rejecting the increasing industrialization of society at the time, this movement was a design and aesthetic trend that originated in England and eventually spread throughout Europe and into the United States. For those within the Arts and Crafts movement, a return to traditional craftsmanship and artisanal techniques could counteract the "alienation" that factory laborers felt from the products of their labor (Marx,

1844/1992). Clearly, the present-day Maker Movement's emphasis on becoming "producers of things, not just consumers of things" (Obama, 2009), as well as the active rejection of "the idea that you are defined by what you buy" (Dougherty, 2013) echoes this desire of this earlier movement.

This quest to redefine the line between production and consumption additionally engages long-existing discussions about the dichotomy between (and/or intersection of) the spheres of pleasure and labor within the DIY culture. Originating as a middle-class diversion, the hobbyist practice of handcrafting and interest in 'Do-It-Yourself' work that rose throughout the 20th century in the United States was conceptualized as existing separately from the world of labor (Gelber, 1999). However, as Anderson's comment on cottage industries illustrates, the rhetoric of the Maker Movement emphasizes shifting DIY practice back into the economic marketplace – specifically, how to make a living through activities previously relegated to the realm of pleasure. Much of this emphasis is currently seen through the popular press – within the last few years (and perhaps as a result of the global economic collapse of 2008), there have been numerous books that focus on transitioning one's hobbies into one's profession (e.g., Malinak, 2012; Chapin, 2012; Mateo Ilasco, 2011; Sutton, 2011; Anderson, 2012; Lang, 2013).

One of the most notable of these works is the *New York Times* bestseller, *Shop Class as Soul Craft*, where author Matthew Crawford (2010) describes his own pursuit of 'meaningful work'. This is highlighted through a discussion of his personal career trajectory – from his doctoral studies in the history in political thought at University of Chicago and his work as a director of a Washington, D.C. think tank, to his current occupation as a motorcycle mechanic living in Virginia. In discussing the benefits of

working with one's hands, Crawford focuses specifically on the notion of individual agency. Physical craftsmanship, he argues, allows people to tangibly control one's surrounding objects and environment – something he has labeled being the “Master of One's Own Stuff” (p. 54). In this way, by focusing on the actual experiences and “psychic satisfactions” afforded by tangible, hands-on work, Crawford works to contradict society's increasing reliance and emphasis on post-industrial ‘knowledge-based’ work.

Education scholar Mike Rose (2005) has similarly worked to challenge ‘traditional’ assumptions regarding the value of hands-on versus more conceptual work through his scholarship on vocational education. Focusing on trades work such as carpentry and plumbing, Rose (2005) describes the kind of diagnostic, critical thinking and problem-solving skills that are inherently developed through this kind of labor. Thus, despite contentions that knowledge work involves greater mental capacity, he highlights how both types of work require high levels of cognitive engagement. In this sense, Rose's scholarship resonates with the work of sociologist Richard Sennett. In *The Craftsman*, Sennett (2008) works to challenge the traditional dichotomy between thinking and making by claiming the “intimate connection between hand and head” (p. 9). Only by working with one's hands on tangible objects, he argues, can someone become a more engaged and critical thinker – a perspective that Sennett grounds within the developments of the age of Enlightenment. Whereas most people highlight the development of abstract rationality as the key outcome of the period, Sennett posits that it may be better described as the era in which people learned to become more efficient craftsmen. This work, in turn, refined people's “basic capabilities to specify, question, and open up” (p. 291) and

thus allowed them to become more engaged citizens – something, Sennett argues, which ultimately benefits the project of democracy at-large.

Like Sennett, David Gauntlett (2011) – a media scholar and Maker Movement advocate – has also explicitly connected making to wider societal benefits. In his 2013 NY Maker Faire talk, as well as his book *Making is Connecting*, Gauntlett has described how his view of making encompasses not only physically connecting materials, but also connecting with others, as well as one’s “social and physical environments” (p. 2). While Gauntlett discusses making in the context of more ‘traditional’ crafts such as knitting and papercraft, he also focuses many of his arguments on digital making and the capacity for people to share and circulate these products. In this respect, he focuses on the positive effects of making in terms of creating communities. Relying primarily on Robert Putnam’s (2000) definition of “social capital,” Gauntlett (2011) argues that the act of producing and sharing projects (usually on the Internet) had enabled a resurgence of those “social networks and the norms of reciprocity and trustworthiness” (p. 19), which were previously on the decline (as discussed by Putnam). Making, then, not only supports individual feelings of well being (p. 115-116), but also can create the foundation upon which positive social change can occur (p. 184).

Despite the sentimental rhetoric of inclusion that is pushed by the Maker Movement, it is important here to note the critiques regarding the relationship between the mainstream maker movement and the Indie Craft scene. Despite the fact that its activities and some of its perspectives have been incorporated within the movement, crafting tends to be overshadowed by more technological activities. For example, within both the Makezine site and past Maker Faire, high-tech activities seem to take more

precedence over low-tech activities – there are more articles and booths dedicated toward the former than the latter. Some have argued that this has serious implications not only with regard to what activities really count as making, but also who are considered the ‘real’ makers (Lindtner and Guimarin, 2014; Bean and Rosner, 2014; Buechley, 2013). As Bean and Rosner (2014) have argued, despite its appeal to “any kid with a laptop,” the demographics of who actually are involved in the Maker Movement are much more limited. Whereas women formed the majority of the Indie Crafts scene, the Maker Movement is mostly driven by and directed toward middle-class (white) men, often with professional or educational backgrounds in science or engineering. In her examination of *MAKE Magazine* covers from Jan 2005 to Oct 2013, for example, Buechley (2013) found that out of the 36 people represented 85% were male, whereas 15% were female. This is something – Bean and Rosner (2014) argue – that is not surprising, considering how the movement is essentially a mirror of the technology and engineering industry. It should additionally be noted, however, that there is a startling lack of racial and class diversity within both movements (for example, according to Buechley, 100% of the people represented on *MAKE* covers were white).

Besides alienating these women crafters, the radical politics of the Indie Craft scene have also been diluted through the less progressive politics of the Maker Movement. One of the major tenets of the former, for example, is its feminist viewpoint. For many within the scene, crafting was a way to ‘reclaim’ of the domestic arts; rather than being forced into traditionally ‘feminine’ activities such as sewing and cooking due to lack of options, crafters are now actively choosing to learn and participate in these pursuits. Many crafters additionally work to challenge the status quo of the art world - for

example, pushing against notion that ‘women’s’ crafts could not also be considered legitimate artistic practice (Levine and Heimerl, 2008). Occasionally these crafters will create objects that directly carry these messages – for example, Whitney Lee (2005) (as profiled in the Indie Crafts documentary and book *Handmade Nation*) works to challenge male misogyny through her design of kitschy, purposefully ‘throwaway’ latch-hook rugs featuring soft-core porn images. Discussions of the universality of making, however, dilute the aesthetic particularity and radical perspectives of this scene.

Relatedly, many people have argued that the anti-capitalist perspective of the Indie Crafts movement has also been subsumed by the commercialism of the Maker Movement. For many within the scene, the act of producing handmade objects and interacting face-to-face with buyers counteracts the abstraction that is felt through mass production and global capitalism (Levine and Heimerl, 2008). This stance of “conscious consumption,” however, seems to contradict the entrepreneurial focus of the Maker Movement discussed within the previous section. While Anderson emphasizes one’s ability to eventually scale-up production of one’s creations through the Internet, many of the women within the Indie Crafts scene purposefully emphasize the one-of-kind nature of their handmade objects, and the intimate relationships that can be forged through hand-to-hand exchange of goods. In sum, while there are affinities between the acts of high-tech making and low-fi crafting, it remains to be seen how the tensions between underlying philosophies of these communities will eventually be combined, or if one will eventually cancel out the other.

The Politics of Hacking and Making

The act of defining the Maker Movement inevitably encompasses the act of elaborating the differences between making and hacking. Many have often conflated these two terms, something most readily seen through the interchangeability of the terms makerspace and hackerspace (Cavalcanti, 2013). Popular distinctions between making and hacking, however, usually deal with their main objects of engagement. Making is a more general term, used within the current Maker Movement to describe a wide range of activities that involve the high or low-tech construction of some final project or product. Hacking, however, is often used more precisely. In its most common usage, it describes digital computing activities, and oftentimes the illicit or illegal activities related to said work (St. Leger, 2011). It also can be used to describe modifications to some already existing systems, processes or objects – including, for example, the popular practice of “phreaking” (or hacking the phone’s network system) (Levy, 1984/2010), “life hacking” (creating strategies for increasing one’s productivity or efficiency) (Gordon, n.d.), to “IKEA hacking” (reconfiguring existing IKEA products into custom furniture) (Rosner and Bean, 2009).

Beyond these denotative differences, hacking as a concept also has had a longer and more developed history than making. As detailed by journalist Steven Levy (1984/2010) in his popular book *Hackers*, the term was first used to describe a small group of students at MIT intensely engaged in working with large mainframe computers available at the university. Levy details the rise of this ‘hacker culture’ throughout the 1950s to the 1980s, from the halls of MIT and Stanford to the corporate offices of Silicon Valley. While some contest Levy’s description of hacking, it is still recognized as an

important narrative by the community itself (Coleman, 2012), especially with regards to its description of the “hacker ethic,” or the principles that informed how hackers interacted with technology and each other. This ethic includes support of open access to technology and information, mistrust of authority, confidence in the utopian potential of computers, interest in the aesthetics of computing, and belief that programming work speaks for itself beyond the credentials or background of its creators (Levy, 1984/2010). Coleman (2012) describes the ways in which this ethic has carried into the current thinking of the free and open-source software development (F/OSS) community of hackers today, with their even more developed liberal ideology, emphasizing stronger beliefs in individual autonomy and civil liberties as supported by limited government intervention and universal law (p. 2).

The history of the hacker community therefore encompasses a spirit of social and political radicalism. Alongside an enduring sense of playful subversiveness that pervades the community (Coleman, 2012), this is the vision that permeates contemporary press discussion of hackers today – seen in the press coverage of Bradley (turned Chelsea) Manning, Julian Assange and Wikileaks, Edward Snowden and the National Security Agency (NSA), and discussions of online identity theft generally. Paradoxically, these discussions around the illicit or illegal acts of hackers (although only a small part of the larger hacker community) circulate alongside the increased use of the term to promote more mainstream goals (Schrock, 2014). Rising in popularity, “Hackathons” are events where computer programmers, entrepreneurs, designers and social activists, gather together in order to collaborate on technology-based projects. Goals for these hackathons range from creating new products (e.g., apps, web companies) or experimenting with

particular technologies (e.g., APIs, computer languages), to engaging with social causes (e.g., fixing education, transforming public transportation systems). Ironically, the second annual White House-sponsored “National Day of Civic Hacking” – which asked participants to work together in building technological tools to help local communities using publicly released information (Heyman, 2014) – took place only a few months after publication of Snowden’s revelations about NSA surveillance in *The Guardian* (Schrock, 2014).

Making, on the other hand, has a much shorter history as a ‘branded’ term than hacking. As described by Gui Cavalcanti (2013) – the founder of Artisan’s Asylum, a makerspace in Somerville, Massachusetts, Dale Dougherty had initially wanted to call his magazine “Hack,” but was convinced by his daughter to use the term “Make” instead. Whereas hacking seemed to imply a more exclusive and elite feeling to her, making seemed to be more inclusive term – not only with regards to the type of people who could be involved (novices and experts) but also the range of projects that could be included (technical or otherwise). According to Schrock (2011), one important distinction highlighted within these communities is the intended goal of the activity itself. In emphasizing their lower barriers to entry, the Maker Movement tends to promote having fun or learning for its own sake as the main outcomes of the production process. In contrast, hacker communities generally stress the need for specialized training and knowledge (Coleman, 2012), something that stresses the “technical prowess and reverse engineering” required to participate, as well as desire to create “art” through their work (Schrock, 2011). Cavalcanti (2013) further emphasizes the difference between hackers and makers; whereas makerspaces may tend to focus more exclusively on the process and

products of production itself, people in hackerspaces may be more committed to particular ideologies that accompany their work – whether the hacker ethic, liberalism or another form of thinking – as well as a particular intra-group mentality or culture (Schrock, 2011).

This distinction between the seeming ‘neutral’ stance of makerspaces versus the more ideologically engaged stance hackerspaces can more readily be seen when comparing spaces in Europe versus the United States, as discussed by Grenzfurthner and Schneider (2009). Although American hackerspaces and makerspaces are often grouped together and oftentimes have affinities with one another, Grenzfurthner and Schneider (2009) describe how the spaces in the United States are distinctly more commercial than their counterparts in Europe. Arising out of socialist countercultural movements (e.g., May 1968 and Prague Spring), many European hackerspaces worked to fulfill the need for anti-capitalist and anti-authoritarian spaces. This stands in contrast with makerspaces of the United States, Grenzfurthner and Schneider (2009) argue, since those sites just “copy-past[e]” the “structural features of these ‘indie’ movement outputs” into their “capitalist developing laboratories” (para. 11). Indeed, the rise of for-profit, entrepreneurially focused spaces within the United States seems to support this idea. For example, while the makerspace franchise TechShop markets itself as a hackerspace, it actually emphasizes its fabrication and prototyping capabilities for the purposes of entrepreneurialism (“Tech Shop,” 2014). Additionally, the growing market of products surrounding the process of making – tools, equipment, ready-made DIY kits, as well as products (and startups) resulting from makerspaces – confirms the contention that making is a highly commercial enterprise in the United States. This has led some to conclude that

making less a ‘movement’ (social or otherwise), than an all-encompassing brand, both with regards to its scope and its commercialization (Bean and Rosner, 2014).

Attached to this thinking is the general critique of the apolitical nature of the Maker Movement at-large, something that also follows the general critiques of Californian Ideology. Despite Silicon Valley’s initial roots within the radical countercultural thinking of the New Left (Turner, 2006), numerous scholars have the distinctly apolitical perspective of the technology industries that have since arisen from these efforts. While much of their initial work rested on claims of egalitarian potentials of technology, additional beliefs regarding possibilities of self-sufficiency and personal liberation has made the community less interested in collectively working against the problems of structural inequality (Turner, 2006, Morozov, 2014a). For example, Turner (2006) highlights the general lack of interest within Silicon Valley in diversifying the racial or class backgrounds of those who participate, as well as investing in civic or state-run networks of support above or beyond private or personal resources. In this sense, the activities of many within this community generally work to further already existing structures of privilege and advantage.

Within the Maker Movement specifically, dissecting the supposed claims about the egalitarian potentials of the movement can further reveal this tendency. According to Anderson (2012), the rise of consumer-grade prototyping technologies provides social benefit because it allows for the ‘democratization’ of manufacturing. However, Morozov (2014a) has critiqued these claims being greatly exaggerated. Even though hackerspaces technically allow general access to these technologies, the spaces themselves are often hard to find since they are often minimally advertised, and located in low trafficked

industrial neighborhoods (Schrock, 2011). Because of this, these spaces are really only available to those already in the know. Additionally, the economic opportunities that supposedly arise from participation in online maker networks may also be limited. Despite Anderson's (2012) claims that everyone has a chance at turning a profit by outputting their ideas, participation in the movement actually occurs at a cost – whether by paying membership fees at a makerspace, or having enough time to dedicate to creating a perfect prototype. As Rose (2014) describes: “By and large, the Makers Movement [sic] is a middle-class movement. Working-class folk have not have the luxury of discovering making and tinkering; they've been doing it all their lives to survive.”

Furthermore, while Kickstarter and other crowd-sourced funding platforms supposedly allow for greater individual exposure within the marketplace, Morozov (2014a) points out how much social and cultural capital (as described by Bourdieu, 1984) is required in order to succeed even within these sites. In the growing “attention economy” of the web, only those who have the right connections will actually be seen or heard. Numerous Kickstarter projects have become successful only through the initial popularity of its backers – whether for television actor-turned-movie director Zack Braff in support of his second feature, or the future endeavors of already well-known media properties such as PBS's *Reading Rainbow* or UPN/CW's *Veronica Mars*. Other products on Kickstarter have additionally come out of already existing entrepreneurial circles. The “Pebble” e-ink watch, for example, which is one of the most successful Kickstarter projects of all time, was initially developed out of one of the top startup incubators and accelerators, Y Combinator. Thus, rather than increasing access for those who are

normally excluded from these circles, the entrepreneurial landscape of the Maker Movement just expands opportunities for those already involved or connected to these communities. According to Morozov (2014a) then, the ‘radical’ impulses and ideologies of the hacker community are thus replaced by the Maker Movement’s continued support of the status quo.

There are some within the maker community, however, who directly work against the apolitical tendencies of the mainstream Maker Movement. A new mode of practice – ‘Critical Making’ (highly connected to the previously discussed idea of both ‘Civic Hacking’ and hackathons) – specifically positions hands-on material engagement and creative production as methods through which to conceptualize and investigate “the critical social, cultural, and political issues that surround and influence the movement of information processing capability into the physical environment” (“Critical Making Lab,” 2013). Oftentimes, this practice includes use of new technologies for alternate, “participatory politics” – something most prominently demonstrated by the use of social media during the Arab Spring protests. Thus, like earlier tendencies within Californian Ideology, there is an emphasis of self-sufficiency and governance, or what Hartley (1999) calls “DIY Citizenship.” In this sense, Critical Making can be linked with the previously discussed fringe movements of DIY culture, which emphasized punk music and alternate ‘zine publishing as alternate channels through which to challenge the existing institutions of the day (Spencer, 2008). Examples of projects and initiatives that fall under the banner of Critical Making include things like F/OSS activities, fan activism, citizen journalism, and the creation of digital political-themed art.

Here, it should be noted that the radical ethos of Critical Making and Civic Hacking are more directed toward the outcomes of making/hacking than the actual demographic makeup of maker/hacker communities themselves. The demographic of those involved in Critical Making – i.e., people who have appropriate technological training, access to high-tech equipment, and the time to work on these projects – might still be used to demonstrate the class exclusivity of makers/hackers. While this is not to deny the actual change that occurs as a result of these activities, it is still important to notice the relatively homogeneous class backgrounds of those involved, and how this can influence the outcome of their products. Wolfson (2014) discusses this potential problem in his study of the early Internet initiatives of American activist circles. He argues that the social position of the activists themselves – specifically white, male, and middle class – shaped not only the kinds of activities they participated in, but also the assumed role of technology and media in promoting social change. Because they often did not directly experience the material or resource deprivation that they fought against, the activists and technologist involved in these early initiatives focused on more abstract needs such as ‘having a voice’, or embracing flatten structures of organization, rather than emphasizing on-the-ground material needs and logistics. This is an impulse, Wolfson argues, that continues to drive digital social activism today. In looking at Critical Making, then, it becomes important to interrogate how the actual demographics of those involved and their associated perspectives/assumptions help to shape the activities being promoted. While there are some in the Critical Making camp who actively reflect on these issues, it remains to be seen whether or not the movement at large will follow in their footsteps in actively working against the exclusivity of those involved in these practices. Wolfson’s

own project, the Philadelphia-based Mobilizing Media Project, actively works against this instinct by engaging people in the community to participate in issues that directly concern them, as well as providing educational and training programs in technology and media training. Certainly, efforts within the educational maker community to broaden participation to people normally excluded by mainstream maker efforts (e.g., girls, the “under-resourced” low-income students, minority groups) also follows within this trend.

Learning in the Maker Movement

Locating Educational Making

From our current perspective, there seems to be natural affinity between making and education. However, hackerspaces (as earlier sites of making) did not always promote formal relationship with those in the education community, despite their continual emphasis on the processes of self-education.

As discussed earlier, hackerspaces, makerspaces and the Maker Movement grew out of the New Communalist/Californian ideology, which emphasized the process of self-improvement and enrichment through the use of tools (Turner, 2006). As detailed by Gauntlett (2011), this idea could therefore be connected to education, especially in light of the views promoted by social critic and philosopher Ivan Illich. A major proponent of the homeschooling movement of the 1970s, Illich (1971) critiqued the standardization of education through the formal institutions of schools. Schools created societal dependency on large institutions, he argued, rather than promoting local, self-directed approaches to learning and living. Thus, efforts to transform education would not involve changing what happens in schools, but instead creating alternate community-based education

systems. According to Illich (1971), these could involve series of “learning networks,” where communities could share and swap access to educational resources including tools, objects and people. In *Tools for Conviviality*, Illich (1973) further describes the how this kind of educational experience of sharing would lead to a new sense of autonomy for people, or “freedom to make things among which they live, to give shape to them according to their own tastes, and to put them to use in caring for about others” (p. 11). In this respect, Illich’s thinking also aligned with ethos of the hacker community, who not only mistrusted authority and promoted decentralization, but also promoted universal access to technology and information. In creating localized community spaces for self-education, contemporary hacker/makerspaces of today can thus be thought of the realization of Illich’s ideas (Gauntlett, 2011).

While hacker/makerspaces promoted the idea of education among its adult participants, recognition of the educational potential of making for children can be traced to the rise of *MAKE Magazine* and Maker Faire. Both these enterprises increased the accessibility of these practices for the general public. In the year when *MAKE* was founded (2006), journalist Tim Simmers wrote: “The new Make magazine exposed a growing underground community of inventors, hackers and geeks who thrive on tearing things apart and rebuilding them -- or making their own stuff from scratch” (para. 3). Maker Faire further expanded the reach of making for younger participants. While the magazine focused specifically on adults, the event was designed in order to attract an “all ages,” “family-friendly” audience, outside the magazine’s typical readership base (“Maker Faire Bay Area 2006,” 2006; Drieu, 2007). From this perspective, Maker Media and their non-profit spinoff Maker Education Initiative (described in the Introduction) are

central players within the ‘educational making’ network. However, other groups of people have also championed and supported this practice, including both educational practitioners, scholars and researchers. These efforts and affinities are described further below.

Researching Learning within Educational Making

Over the last few years, the academic community has worked to advance making as a pedagogical strategy. For the most part, scholars and practitioners in this arena connect making with previously studied learning theories and strategies such as hands-on problem solving, crafting and creative expression, and use of innovative technologies (Blikstein, 2013). While there is a shared consensus about the ineffectualness of traditional, didactic methods of schooling (often called “instructionism”) (Sawyer, 2006), different camps within the education research community have emphasized different aspects of the making process. While the lines between these categorizations are blurry, they can loosely be separated into the following categories of Learning Sciences, Museum Education and Literacy Studies.

Learning Science is an interdisciplinary field focused on the processes of learning, which draws from cognitive science, psychology, computer science, information science and anthropology. Mostly interested in STEM education, learning scientists attempt to combat “traditional classroom practices” and instead emphasize what they call “deep learning” (Sawyer, 2006). Whereas instructionism often positions students as blank slates (tabula rasa) onto which knowledge is imprinted, deep learning is based off findings within developmental psychology about the internal processes of knowledge

construction. Mostly advanced by child psychologist Jean Piaget, this theory of individual epistemology – where people learn by actively reflecting upon external experiences and relating this back to prior knowledge – is called “constructivism” (Piaget, 1950).

Rather than emphasizing making as a unique and novel innovation, learning scientists interested in these practices thus highlight the conditions believed to support deep learning that occurs in these spaces. These factors include: a focus on educative experiences or ‘learning by doing’ (Dewey, 1938/1997, Greeno, 2006, Montessori, 1964), more ‘authentic’ and situated, rather than abstract, contexts for learning (Brown, Collins, & Duguid, 1989, Lave and Wenger, 1991; Cole and Wertsch, 1996), and greater opportunities for self-direction and ownership over the learning process. Because of this, the kind of learning that occurs in makerspaces is often described interchangeably alongside other ‘deep learning’ pedagogical strategies. For example, maker-based learning is often put under the larger umbrella of project-based learning (e.g., Venable, n.d., “IMLS Talking Points,” 2014; Waters, 2014; Stamper, 2014), which itself was a pedagogical trend that emphasized situating learning in real-world problems and through hands-on work (Krajcik et al., 1994; Blumenfeld et al., 2000). Within learning sciences, activities that have explicitly been classified as maker activities range from robotics (e.g., Resnick and Rosenbaum, 2013), interactive textiles (e.g., Peppler and Bender, 2013), game design (e.g., Vasudevan & Kafai, 2016), and digital fabrication (e.g., Blikstein, 2013).

Highly related to the learning science approach is museum education. Many individuals who study and work within museum education (especially those within

science and technology-focused organizations) also have training in the learning sciences. While Learning Sciences at-large may emphasize the overall conditions of learning, scholars focused on STEM museum education are usually more focused on the physical design of museum spaces and the objects within that space. In particular, some museum education researchers may focus on how learning and knowledge construction occur through interaction with and design of tangible objects – a process described as “constructionism” (Papert and Harel, 1991) within Learning Science. Following the constructionist line of thinking, museum education researchers and practitioners might ask: what kinds of “objects-to-think-with” (Papert, 1980) do we provide and through what means?

An example of this genre of research comes out of the Children’s Museum of Pittsburgh. A leader in the educational making movement, the museum’s research focuses on the physical design of their makerspace, called “Makeshop.” Partnering with the University of Pittsburgh Center for Learning in Out of School Environments (UPCLOSE), the museum reflected on the best principles for design that came out of their long process of prototyping the space. Their findings mostly deal with how to best “scaffold” (or support) people’s experimentation and tinkering within the shop through particular workstations or interactive objects (Brahms and Werner, 2013). Similar research has also emerged from the Exploratorium Science Center in San Francisco, where they have worked to develop basic design principles for their “Tinkering Space.” These specifications including suggestions for physical space design, types of activities, and training of workshop facilitators (Petrich, Wilkinson, and Bevan, 2013). It should be noted here that museum-based research (because of their reliance on one-time visitors

rather than regular students) is also heavily focused on the problem of audience attraction and retention, in addition to the issues of learning and teaching.

The Literacy Studies community has also actively studied making activities and makerspaces. Most of the scholars working in this area are inspired by New Literacy Studies (NLS) – a field that first developed in the 1980s and 90s. Instead of privileging the ‘traditional’ conception of literacy as the “autonomous” set of skills that reside in individuals as a cognitive phenomenon (Street, 1984), NLS looks at literacy as a social practice, wherein skills are always situated in particular discourses (Gee, 1996), which are always grounded in particular cultural and ideological assumptions that enact relations of power (Street, 1984). With the rise of the Internet, some NLS scholars expanded their focus by looking at processes of communication and expression within digital contexts. Thus, beyond language, literacy also came to include ways of using and interacting with these new digital tools (Kress, 2003; Knobel and Lankshear, 2006). Much of this work falls under the banner of New Literacies or “Multiliteracies” Studies (Cope, Kalantzis & New London Group, 2000), and has often been funded through the Digital Media and Learning (DML) initiative headed by the MacArthur Foundation. These studies focus on a wide range of youth practices including online writing (e.g., Black, 2008), uses of social networks (e.g., Watkins, 2010, boyd, 2014), or producing and sharing online videos (e.g., Buckingham and Willet, 2006; Jenkins, 2008).

Within this community, interest in these online practices has since led to the creation of numerous teen-focused, digital-creation workshop spaces in libraries and museums throughout the country called “Learning Labs” (O’Connell and Humke, 2011). These spaces usually follow the YOUMedia model based in the Chicago Public Library

(which was also funded by the MacArthur Foundation). Despite their emphasis on digital media, however, conversations about these spaces have recently morphed into conversations about maker-based education. As a result, Learning Labs are now understood by many funding and academic organizations as a type of makerspace (“IMLS Talking Points,” 2014). While the previously mentioned Learning Science-based maker research tends to focus on more cognitively based outcomes (i.e., what are kids learning), research in this area tends to emphasize self-expression and community building (although it should be noted that self-expression is also a key tenet of constructionism). For example, Mia Zamora (2014), the Director of the Kean University Writing Project, describes the ways in which writing and other types of creative expression should now be positioned as a form of making, which can in turn be supported through literacy-focused makerspaces. National Writing Project blogger and EdTech Librarian Buffy Hamilton (2012) additionally speaks of the ways that makerspaces can promote avenues for community partnerships, collaboration and creation. For this reason, while schools have occasionally become interested in makerspaces, libraries at-large (whether public or private) have been forging strong ties with the Maker Movement – something discussed further in depth in the next chapter.

Educational Making as an ‘Informal’ Enterprise

Because educational making and makerspaces often occurs outside of standard school contexts, it has drawn the attention of scholars who generally focus on the related concepts of ‘informal education’ and ‘lifelong learning’ – concepts that have both been on the rise in the last few decades. Primarily positioned in opposition of ‘formal’ school-

based learning, informal education looks beyond the confines of compulsory education toward what some call “free-choice learning” (Falk and Dierking, 2000). This phrase highlights the ways in which learners themselves, as opposed to outside forces, take the lead not only in what content is chosen, but also where and when learning occurs. This interest may be seen as extension of John Dewey’s (1916/2012, 1938/1997) well-known promotion of the idea of “learning by doing” or through personal “experience” in the early 20th century, which subsequently formed the foundation of the progressive education movement in the United States. While these ideas have shaped classroom pedagogy throughout the past century (through many of the methods suggested by Learning Scientists, discussed earlier), many scholars and education practitioners have also applied this idea to the range of educative experiences that exist outside of school.

One of the main streams of inquiry within informal learning has been the diversity of sites where learning can occur. On one hand, scholars have discussed the learning that inherently happens through everyday experiences, whether hiking through the woods or interacting with family members (e.g., Mills and Kraftl, 2014). Some have labeled this kind of experience as “non-formal” education, and focus specifically on how these processes regularly outside of structured educational systems, such as within indigenous communities in the developing world (Rogers, 2004). On the other hand, scholars in this area have also studied explicitly ‘designed’ educational spaces – such as museums, zoos, and libraries – as different sites for informal education (Falk and Dierking, 2000). While these spaces present particular kinds of content, they are voluntary, and emphasize freedom of choice and movement within their structure. In a museum, for example, a

visitor has numerous options not only in terms of what exhibits to see, but also to what depth, and in what order.

Closely related to these studies of museums and zoos is research regarding informal education that focuses on STEM content. Scholars from within Learning Sciences have mostly led this initiative – see for example, the influential report “Learning Science in Informal Environments: People, Places, and Pursuits,” written by the Committee on Learning Science in Informal Environments, sponsored by the National Research Council (Bell et al., 2009). As detailed within this summary report, scholars in this area are interested not only in the role of personal motivation in learning, but also connecting what happens in these spaces with existing curriculum and content standards. In this way, scholars in this area are primarily concerned with developing standards of measurement and evaluation (and quantifying the outcomes) for these informal educational experiences. Because most of the academic research on educational making comes out of this community, it thus becomes important to consider these promoted discourses of success and failure, especially with regard to how these can shape on-the-ground enactments of making.

Personal motivation is also a key characteristic of informal education. In studying this area, many scholars have drawn upon linguist and literacy scholar James Paul Gee’s (2004) idea of “affinity spaces,” which describes a “place or set of places where people affiliate with others based primarily on shared activities, interests, and goals... [rather than] shared race, class culture, ethnicity, or gender” (p. 67). These common interests may, for example, include playing a particular video game, knitting, or supporting a social cause. According to Gee (2005), affinity spaces may also be thought of “semiotic

social spaces,” since they are arenas in which people develop and utilize shared systems of meanings (p. 216). Gee (2007) describes the educative potential of these types of spaces – here, shared passions can lay the groundwork for motivated engagement with ideas.

Highly related to this idea is the concept of “participatory culture” (Jenkins et al., 2006) – an idea which primarily arose from within Communication and Media Studies, but which also describes engagements with common interests. As opposed to ‘consumer’ culture, participatory culture exists as a result of people’s contributions to, rather than consumption of, some kind of shared culture (popular or otherwise). In this respect, this idea is highly related to the concepts of “prosumption” (Toffler, 1980) and “produsage” (Bruns, 2008). For example, participatory culture is often used to describe online communities where displaying and sharing self-produced works is the main activity of choice. In terms of education, scholars studying both participatory culture and affinity spaces have highlighted the unique and dynamic structures of participation, validation, and meaning that occur within these realms, thus pointing out their pedagogic potential above and beyond the more hierarchical and fixed character of typical school settings.

Expanding upon these concepts of affinity spaces and participatory cultures is the idea of “Connected Learning,” which has recently become popular within education research and practitioner communities. Promoted by MacArthur Foundation’s Digital Media and Learning (DML) initiative, Connected Learning describes the entire ecology of learning opportunities that exist for youth – the networks that exist between personal interests, peer/friend groups, and academic life (“Connected Learning,” n.d.). Instead of emphasizing the type of learning that can happen within individual sites then, this

concept focuses on the inherent links between all learning experiences. Education, in this respect, is not an isolated process that occurs within a school or a museum, but instead an activity that is infused in all aspects of life. It should be noted here that the DML Connected Learning initiative has, as a result of creating this conceptual framework, acted as an umbrella under which many previously disparate informal learning communities have united. Their weekly webinar series, which has been running since March 2012, has featured scholars and educators who have focused on a wide range of topics, including video game design, creative writing, and civic engagement, as well as varied communities and groups, including educational makerspaces.

Beyond diversity of location, informal education has also been used to describe the entire process of learning that occurs throughout one's life, a process has been described as “Lifelong Education.” Initially stemming from the concept of “Adult Education,” learning in this arena initially emphasized vocational and workplace training. Much of the work in this area was inspired by the Lave and Wenger’s (1991) studies of what they call “communities of practice” or groups that share some concern or passion for an activity, which they improve upon through working together over time. While this idea is similar to the idea of an “affinity space,” Lave and Wenger’s (1991) work initially focused on the development of workplace communities including Yucatán midwives, Liberian tailors, and US Navy quartermasters. In particular, they identified particular structures that help define communities of practice, whether casual apprenticeship arrangements, which were based on what they called “legitimate peripheral participation” (Lave and Wenger, 1991), and shared repertoires of knowledge and meaning (Lave, 1998).

In addition to professional forms of learning, Lifelong Learning has also been used to describe voluntary practices of self-enrichment that occur independently of established communities. Newer impulses to this end can be seen within the increased interest in self-directed, or “DIY” education. Oftentimes tied to the hacker community and the Maker Movement at-large, this trend advocates moving outside the usual institutions or pathways of credentialing, and seeking out alternate, free or open source resources of education (Kamenetz, 2010). The rise of Massive Online Open Courses (MOOCs) within universities has also driven these activities – while some of these are intended to be part of existing degree programs, most are offered as free-standing courses. Related to this trend is the rise of what some people call “Edupunks,” or people interested in participating in “student-centered, resourceful, teacher- or community-created” educational initiatives (Downes, 2008). The ethos of this group corresponds with the earlier discussed perspectives of homeschooling advocated by Illich (1971,1973) – including an interest in community engagement, progressive politics and a move away from more formal, “corporate-sourced” educational programs (Downes, 2008). In highlighting how learning can occur outside of schools within ‘informal’ spaces then, all of these perspectives can thus be brought to bear on educational making as a pedagogical practice.

The Educational Purpose of Makerspaces

Moving beyond its effects within the particular spaces of classrooms or libraries, people who affiliate with the Maker Movement have also generally described the role of the phenomenon within national life. Along with the pedagogical effectiveness of

making, many educators and policy makers have stressed the importance of the Maker Movement vis-à-vis STEM (Science, Technology, Engineering, and Mathematics) fields at-large. In this respect, support of educational making engenders particular assumptions and ideologies regarding the connection between science, technology, and the nation – something seen throughout the history of state-supported STEM education in the United States.

Fears about global competition have long figured into the narrative surrounding the importance of science and mathematics education. After the Soviet launching of Sputnik in 1957, governmental interest in science and technology education in the United States was famously amplified throughout the Cold War (Kirst and Wirt, 2009). The National Defense Education Act (NDEA) was passed in the same year to support science and engineering education in order to address widespread fears that the American education was being outpaced by the Soviets. Over twenty-five years later, similar fears were again ignited by the rise of the Japanese technology industry as a national economic ‘threat.’ This led to the creation of the influential, but controversial, policy report, “A Nation at Risk: The Imperative for Educational Reform,” written by Ronald Reagan’s National Commission on Excellence in Education in 1983. Outlining how the American school system was ‘failing’ its students and the nation, the report offered a number of policy suggestions, the most prominent of which addressed content requirements and performance measurements. The term ‘STEM’ itself was developed in the 1990s to help label these kinds of reforms in science and technology education.

Because of those recommendations, “A Nation at Risk” is generally credited with jump-starting the standards and accountability trend of educational reform over the last

few decades, alongside the implementation of ‘high-stakes’ testing (Goldstein, 2014). With the passing of ‘No Child Left Behind’ (NCLB) in 2001 (under George W. Bush) and the ‘Race to the Top’ contest for federal education funding in 2009 (under Barack Obama), this controversial focus on performance-based measurement for schools and teachers has continued above more organic or holistic measures of accomplishment and success. The government’s continued interest in international science and mathematics education rankings additionally illustrates this perspective (namely, scores from the Programme for International Student Assessment, or PISA). Thus, despite claims that support of STEM education is ‘neutral’, this history illustrates how education reform is always implicated in decisions about what values are worthy, or not, of state attention (Giroux, 1994).

Discussions of maker-based education should therefore be framed within this narrative. On one hand, current interest in makerspaces and maker ‘pedagogies’ can be seen as a turn away from the accountability and standards ethos. Rather than relying on high-stakes testing and strict definitions of what counts as STEM content, maker-based education focuses more on constructivist principles of self-driven learning, supposedly presenting a more ‘authentic’, organic and holistic approach to STEM education. The incorporation of arts education into discussions around educational making – as illustrated by the move in many discussions from STEM to STEAM education, with the ‘A’ representing the arts – supports this. In this respect, making is positioned as something that can enrich educative experience beyond the ‘teaching to the test’ culture spurred by the reforms described above.

On the other hand, support for making also reaches beyond these questions of educational measurement and content distinctions toward larger issues regarding society and the nation. As discussed earlier, the Obama Administration has framed the value of the Maker Movement in terms of democracy and the economy (Kalil, 2012). In keeping with the discourse about the ‘new industrial revolution’, this includes assertions about global economic competition: through development of new industries and new innovations, the United States can create new jobs as well as maintain international economic dominance. Additionally, making (and STEM education generally) is thought to promote the public’s ‘science literacy’ skills, or their ability to meaningfully engage with contemporary science and technology policy issues (Kalil, 2012). Making is therefore positioned to serve dual roles – first, to better people’s personal lives by providing higher quality educational experiences, and second, to better society by creating more capable and productive citizens.

The tension between public and private educational needs have always existed within the framework of state-sponsored education – something discussed by educational historian David Labaree (1999). Building off the initial ideas that helped to generate the American public school system, many have continued to stress the idea that education can generally promote democracy. In the past, this argument involved the provision of basic literacy and numeracy skills, but now also includes basic science and technology literacy. Education from this perspective is framed as a public good, which helps to promote a democratic society through the production of capable and engaged citizens. However, Labaree (1999) also highlights the way that education has been framed in economic terms. By creating a more productive workforce, education is implicated in the

larger purpose of what Labaree calls “social efficiency.” In terms of the Maker Movement, interest in social efficiency specifically focuses on the need for building a larger STEM workforce in the United States, as well as encouraging a wider range of students into careers in the field. Statistics concerning the decreasing number of STEM majors and the increasing number of foreign STEM workers in the United States are often invoked to this end. In helping individuals to fulfill necessary “market roles,” education is still framed as a public good within this social efficiency framework – by creating the conditions for a healthy, well-functioning economy, it still works to serve the general good.

Education can also be positioned a private good – in other words, a commodity that allows individuals to become more social mobile. According to this thinking, a person may improve their (or their children’s) chances against others in the employment marketplace depending on the quality of their education. Rather than promoting equality then, education framed from this perspective yields a system of highly stratified and unequally distributed resources (Labaree, 1999). The school choice/charter school movement is a clear result of this perspective, alongside the increasing encroachment of independent, private, or corporate interests within the education sector. Here, individual needs take precedent above collective interests within the educational marketplace.

How, then, might educational making be positioned as public versus a private good? For the main ‘spokespeople’ of the Maker Movement, educational making is actively framed as a public good. The motto of Maker Education Initiative (or MEI, the non-profit spinoff of Maker Media) is “Every Child a Maker.” Numerous maker groups have additionally focused efforts toward broadening participation within the Movement,

whether for girls (who have been shown to lose interest in STEM subjects after a certain age) or under-resourced communities (for example, minority, urban or rural students). For example, Maker VISTA (a program sponsored by Maker Education Initiative) focuses on building makerspace-based networks in low-income communities in cities throughout the United States. There have been other efforts increase accessibility to maker-based education by cooperating with the public school system – whether by building physical makerspaces in schools, or incorporating the ‘maker’ ethos into school curriculum through special lesson plans and projects.

Despite these efforts however, the Maker Movement still mostly engages with homogeneous, middle-class population (Rose, 2014; Bean and Rosner, 2014). Not only are there financial costs involved in participating (e.g., makerspaces membership fees, materials costs) but also limitations with regards to access and knowledge (as mentioned earlier, finding makerspaces or maker activities requires first knowing what they are). In this respect, educational making programs (many of which are seen in out-of-school environments such as libraries, museums or makerspaces) just extend the slate of already existing educational programs (e.g., afterschool workshops, weekend activities, summer camps) for children of a certain social class.

Despite this contention maker-based education seems to support the existing status quo however, Rose (2014) points out the actual convergences between these programs and the vocational education programs, which traditionally serve the working class. Many of the skills taught in educational maker classes are very similar to the skills taught within vocationally-focused courses – whether in electronics, welding, carpentry, or even improvisational problem solving with tangible materials. Furthermore, vocational

education as a field has been undergoing its own shift in recent years. While earlier efforts in this area focused on teaching specific skills in the trades, in recent years there has been an emphasis on increasing the academic content of these courses. This prepares students not only to go into their chosen trade, but also to be flexible enough with their skills and knowledge that they may go into multiple professions, many as-yet-undiscovered (e.g., new jobs to go along with new industries) (Rose, 2014).

Considering this convergence between educational making (which add tangible construction skills to academic content) and vocational education (which adds academic content to tangible construction skills), what is actually accomplished through the promotion of educational making? In other words, what values underlie the promotion of these initiatives, and are these are actually addressed through their on-the-ground practice and performance? Considering Anderson's (2012) claims about the entrepreneurial spirit of the Maker Movement or the Obama Administration's (2009) claims about the importance of supporting STEM education, are educational making programs just another form of vocational education, meant to funnel all involved into middle-class science and technology work? Or, are these programs meant provide emotional or affective benefits regardless of future career pathways – whether for a future lawyer or a future plumber? The shifting economic climate of globalization further complicates the answers to these questions. While a college career used to guarantee higher earnings over one's lifetime, the former stability to middle-class knowledge work has been challenged due to globalization and outsourcing. At the same time, the need for service-based, skilled trades work is ever growing in the United States, and has challenged the contention that college is the best choice for everybody (Rose, 2014).

In this respect, questions surrounding the purpose of these programs bring us to the fundamental question of what is actually ‘educational’ about this movement, and what is the role of education in the future lives of its participants, as well as society at-large. Clearly, the simplistic claims about the overall benefits of educational making, as promoted by those in the center of the movement, do not suffice in answering these questions, and it remains to be seen how these tensions will surface (or not) in the implementation of maker programs in the future.

Conclusion

In the next section, I move onto describing the on-the-ground enactments of this rhetoric of the Maker Movement and educational making within the actual sites of CreateSpace and Middletown Free Library. As will be seen, many of the popular and academic ways of understanding the goals and purposes of making significantly shape not only how these programs were founded, but also how they have continued to define themselves over time. From this perspective, these programs do not exist as isolated entities, but sites which are continually connected to one another through the perpetuation of these narratives within the larger ‘maker’ network.

CHAPTER 3**Establishing the Trend:****The Mechanics of Implementing an Educational Maker Program****Vignette – An Afternoon at Kensington Branch Library**

From the outside, one of the first things I notice about the Kensington branch (a site for Maker Jawn) is how accessible it is – it is mere *steps* away from the subway, and seems to be situated right in a heart of a thriving neighborhood, a commercial strip with a corner convenience store and a mom-and-pop pharmacy, enclosed by a residential neighborhood. Standing there, I cannot help but to compare this to the geography of my other field site, the Middletown Free Library (host of CreateSpace). While the neighborhood around Kensington seems full of people, the blocks around Middletown seems almost devoid of life by comparison. Enclosed on one side by a parking lot and the other side by a used car lot, that library is merely one block from a busy five-lane thoroughfare, the Baltimore Turnpike. As Jason Fialkovich, MFL’s Youth Services Librarian, once joked with me, even walking to a nearby restaurant involved “taking your life in your hands,” since there were virtually no sidewalks or easy crosswalks either coming into or leaving the library (fieldnotes, 3/11/15). I silently note the difference: while Middletown Free Library is car-friendly, Kensington welcomes people on foot. As a kind of confirmation, several children trundle past me just as I walk into Kensington, seemingly coming from school with book bags on their backs.

Looking over, I quickly get called into the children’s section of the library where Kenny Guglielmino – a staff member of Maker Jawn (MJ) – is sitting at a low kids’ table.

He has a pink and yellow plastic lei around his neck, something that seemingly matches the brightly colored decorations that surround him. “Looks like a celebration in here,” I comment. Over the last few days, he explains, kids in the branch have been preparing for Dr. Seuss’ birthday, which just happens to be today. When I turn around, I notice that kids working on a variety of arts and crafts projects: tissue paper flowers, drawings on construction paper, and the finishing touches of a cardboard birthday cake. Hannah Holby, another MJ staff member, arrives, and explains that they are about to start yet another celebratory activity – baking actual birthday cupcakes to share that afternoon. I silently acknowledge that she’s wearing a felt hat that makes her look just like Seuss’ famous Cat in the Hat. “But if you want,” she continues, “I actually have a few minutes to talk before then.”

I proceed to explain that I am just here to observe, though it would be nice to hear more about the kinds of projects that the kids at Maker Jawm usually make. In response, Hannah tells me that they generally focus on creative projects that incorporate arts and crafts materials, as well as digital technologies. Sometimes the projects are pre-defined and structured (like the birthday decorations), but other times they are less prescribed and driven by the kids’ own interests (like a bow and arrow made from popsicle sticks I encounter later in the day). Occasionally, they are also driven by the season. She pulls out her smartphone and brings up the Maker Jawm blog.

“So for example, we made some digital valentines last month that we shared around the different branches.” I look down at her phone and see a grid of Valentine’s Day inspired moving images – an arrow piercing a surprised heart, a lobster-like creature trying to catch flying hearts while tromping through the city, a bunny rabbit made of

hearts sending out a message of love (Holby, blog post, 2/11/15). She proceeds to explain how, using a free GIF program online, they had transformed basic construction paper art pieces into little animated videos for sharing online.

While sitting there, I continue to compare this space and these activities to what I had seen during previous months of fieldwork at CreateSpace (CS). There too, I had seen kids working on similar projects: stop motion animation, arts and crafts decorations, baked goods. However, the feeling of both spaces was just *different*. While CreateSpace workshops were occasionally held on the library floor, for the most part they were held in the basement multi-purpose room – a kind of nondescript, white and grey space that hosted events from lectures to movie screenings to library board meetings. Each time there was a workshop there, the CS facilitators moved around the white plastic tables and foldable chairs to create the space anew. This room at Kensington, on the other hand, seemed like the total opposite; filled to the brim with books, papers, pencils, crayons, backpacks, jackets and people, it just felt more lived in, a palimpsest of the ebbs and flows of different kids' lives. Here, the walls and shelves were lined floor to ceiling with projects made by MJ participants, whereas at CS, I mostly saw kids bring home their creations to show off to their parents and siblings.

Thinking back, I recall a workshop at CS where I saw this impulse on full display. Experimenting with the library's 3-D printer for the first time, kids (and parents) were shocked to learn that even a seemingly small pendant design would take at least half an hour to print, not to mention the extra time it would take to wait for everyone else's design to come through. While one girl pleaded with her parents to wait for her design

finish, I remembered how another boy greedily palmed his freshly printed object, staring at it with wonder and ready to bring it home.

Back at Kensington, I hand the phone with the Valentine's Day gifts back to Hannah. "So is this different from what you've seen at that suburban library?" she asks.

"A bit." I answer.

"You'll have to tell me about it sometime." She starts to usher the kids together on the library floor. "But first we've got to get these cupcakes started."

Introduction

In this chapter, I primarily seek to answer the first research question of the dissertation – namely, how do individual sites implement educational maker programs in their spaces? Put more specifically, how are ideas about making transformed – or *translated* – into actual practice through the diverse sites that choose to implement maker programs? As can be seen from the anecdote above, even if different sites are essentially doing the same activities, there are ways that the actual implementation and structure of these activities actually vary based on the unique circumstances of the organizations themselves. How might these differences be conceptualized? Additionally, considering the numerous claims made surrounding maker activities, how might this implementation fulfill or fit in with these larger goals? Within the library world specifically, numerous advocates of making have described how this activity has the potential to alter the nature of the institution itself, such that the library becomes "space for creation, not just consumption" (Britton, 2012). If this does indeed occur then how and to what extent does this process happen?

In order to answer these questions, I rely here on the approach of Actor-Network Theory (ANT). As I described in the introduction, ANT has long been used to dissect the processes of translation. Instead of taking for granted any truth, reality, or finality of facts then, advocates of ANT emphasize how “everything in the social natural worlds” can be understood as “a continuously generated effect of the webs of relations within which they are located” (Law, 2009, p.141). In other words, nothing exists a priori to their practice within these webs. A citizen’s vote or a speed bump on the road is only what it is because it is situated within a large web of rules, conventions, relationships, and movements between people, places, and things (Latour, 2005). Likewise, a library does not exist until there are bricks that form its walls, books that fill its shelves, and people who agree that it is, indeed, a library.

Looking at educational making through this lens of translation then, I first consider how ‘making’ as a practice – or maker programs at-large – are enacted through certain movements, relations or associations between the relevant ‘actors’. For example, when the Middletown Free Library holds a maker workshop under the name of ‘CreateSpace’, how do the people, things, and places that comprise the library shift in order to support this activity? Moreover, how might these networks of things (which itself compose the ‘library’) constantly be re-constructed through this active production of making – in other words, does the library itself change as result of this “performance” (Latour, 2005)? While many have made assertions about the productive potential of these maker programs to change the nature of libraries, I consider the actual mechanisms through which this might occur.

With these aims in mind, this chapter is divided into two main parts. First, I focus on the issues of implementation itself. I begin by looking at how making has been popularly understood by those in the Movement, and also how questions around implementation has been addressed within the literature. Following this, I move onto describing how making is actually put into practice within the two distinct, yet related, sites: CreateSpace (CS) at Middletown Free Library (MFL), and Maker Jawn (MJ) at the Free Library of Philadelphia (FLP). While these programs look very similar from the outside, I illustrate that they actually differ significantly because of the distinct compositions of these places – not only because of the goals and intentions of the people involved, but also because of their distinct organizational structure, environmental factors, and unique composition of their staff and patrons.

In the second half of the chapter, I begin to look at how implementation of these programs works to shift the nature of institutions in which they are implemented. While the rest of the dissertation considers this question from the perspective of the actual people who are involved with CreateSpace and Maker Jawn, here I look at the effects of this implementation on the library itself as a public institution. As I will describe, there have been numerous claims made about the transformative potential of bringing making into libraries. In this section, I ask: in what way do the actual mechanisms of implementing CS or MJ fit in with, or fulfill these promises? As I will demonstrate, the answer to this question depends greatly on the very distinct and particular contexts of the two libraries in question – one, a suburban space emphasizing individual pursuits for self-enrichment, and the other, an urban space emphasizing social justice and community equity. Thus, while the two programs are united under the seemingly universal banner of

‘making’, they end up being unique programs that accomplish different goals, vis-à-vis both their patrons and the library as a public institution.

Transforming Making into Organizational Practice

While the individuals and organizations that affiliate with the Maker Movement are diverse, there are several fundamental assumptions that circulate about the nature of making and maker pedagogy. First is the idea that making actually involves producing some kind of object – an artifact that oftentimes incorporates technology, whether it is a 3-D printed figure, a knitted scarf, or a tabletop robot. Second, in keeping with its do-it-yourself (DIY) roots, the idea of educational making contains the assumption that students can be self-motivated and self-directed when participating in this activity – thus distinguishing it from what supposedly occurs in ‘traditional’ results-oriented, instruction-heavy classrooms (Dougherty, 2013). Finally, making is premised as fundamentally educational since such ‘makers’ will inherently learn *something* – whether it is soldering, electronics, or design thinking – through the process of active production. Oftentimes, what people learn are topics that may be encompassed by the popular acronym STEAM – Science, Technology, Engineering, Arts, and Mathematics (Honey & Kanter, 2013; Peppler & Bender, 2013).

While these principles might have initially seemed straightforward, many involved with the Maker Movement have recognized the need to address issues of implementation – how can organizations create conditions that enable the acts of making described above? In keeping with the DIY nature of the movement, numerous authors and organizations have attempted to provide generalized guides on how organizations

may easily set up their own makerspaces and maker programs – see for example, the Maker Education Initiative’s (MakerEd) several iterations of their ‘Makerspace Playbooks’⁸, as well as other publications such as *Invent to Learn: Making, Tinkering, and Engineering in the Classroom* (Martinez and Stager, 2013); or *Make Space: How to Set the Stage for Creative Collaboration* (Doorley and Witthoft, 2011). For the most part, these how-to guides provide actionable steps for organizations interested in providing the ideal conditions for self-directed production and experimentation. Within the *Makerspace Playbook: School Edition* (2013), for example, there is an entire chapter dedicated to ‘Roles’ that looks at how organizations can support “new kinds of teacher(s)” (p.17) who can, in turn, support making as process. This includes both “shop hosts” – people who are both knowledgeable about and control access to shop tools, and “mentors” – adults who guide students throughout the process of implementing their own projects and designs (p. 19).

Others, however, have been more interested in presenting contextualized, case-based approaches to describing the process of implementation. For instance, the collection, *Design, Make, Play: Growing the Next Generation of STEM Innovators* (Honey and Kanter, 2013) is filled with diverse contributions illustrating the particular efforts of museums, libraries and science centers to implement educational maker programs. Notable in this and similar volumes is the diversity of approaches and activities they include under the banner of ‘making’. In *Design, Make, Play*, there are

⁸ These are freely available online resource guides (from makered.org) that include the *Makerspace Playbook: School Edition* (2013), which focuses more on formal school contexts, and the *Youth Makerspace Playbook* (2015), which builds upon the work from the previous playbook, and focuses on a wider range of formal and informal educational spaces such as museum, libraries, and community-based organizations.

descriptions of a wide range of activities – from playing with at-home electronics kits (Resnick and Rosenbaum, 2013) to guided live action games with others (Kanter, Honwad, Diones, and Fernandez, 2013) – as well as diverse pedagogical approaches – from the design of an ‘Ultimate Block Party’ in New York’s Central Park (Zosh et al, 2013) to a STEM-focused project-based high school in Texas (Zipkes, 2013). Additionally, in their second edition of the Makerspace Playbook (Maker Education Initiative, 2015), MakerEd has similarly expanded their view on maker programs, stressing the diversity of settings, materials and tools, and arrangements of educational maker programs – thus moving away from its primary focus on high-tech fabrication tools toward a wide range of activities from gardening to electronic music making. In describing these diverse contexts then, these volumes thus provide a sort of “panoramic” view, attempting to describe the “totality” of the Maker Movement (Latour, 2005).

Despite these different approaches to explaining implementation however, both emphasize how making can be transplanted into existing settings. Discussion around how maker activities can, in turn, transform these environments and contexts themselves is missing. In this chapter, I therefore ask: how do the particularities and actualities of implementation shift not only the arrangement, but also the structure, meaning, or mission of the organizations themselves? In other words, how does a library makerspace change the ways that the library functions, and eventually, what it *is* within the context of public life?

In order to look more closely at this process, I draw from De Certeau’s description of strategies and tactics. In his understanding of how people engage with culture, De Certeau (1984) describes how particular efforts to promote the official

characteristics of activity and practice may be understood as “strategies” put into place by those in power (whether “a proprietor, an enterprise, a city, a scientific institution”) (p. xix). This may include prescriptions for the ‘proper’ way of walking through a city streets or reading a novel. Seen in this light, the act of defining ‘making’ as a practice – as set forth by the guides mentioned above or the numerous ‘manifestos’ on making (Dougherty, 2013; Anderson, 2012; Hatch, 2013) – may be understood as a certain kind of strategy. Rather than limiting what may be included however, this strategy works by unifying seemingly diverse practices (from robotics to gardening to knitting) under the all-powerful banner of ‘the Maker Movement.’ In this way, ‘making’ is something that is made to be seemingly universal (and therefore, fundamental). In a similar way, how libraries at-large have been promoting the Maker Movement also works as a *strategy* through which they reinforce the interconnected trajectories of these two entities: libraries and the Maker Movement. This includes efforts by national organizations such as Institute of Museum and Library Services (IMLS) and American Library Association (ALA) to connect the idea of makerspaces with the future of libraries – something that will be further discussed within the second half of this chapter.

In contrast to these strategies, De Certeau additionally offers the idea of “tactics,” or ways that everyday people can “appropriate,” or make use of, seemingly pre-determined materials (whether a city street or a novel) in ways that might contrast their ‘proper’ use (p. xix). As he argues, these tactics (which comprise “the practice of everyday life”) can therefore create counternarratives to the official strategies set forth by those in power: for example, how fans of a particular television series may promote alternate interpretations of the main narrative (Jenkins, 1992), or how city dwellers use

shortcuts to bypass busy city streets (De Certeau, 1984). From this perspective, I therefore argue that *how* a particular organization adopts ‘making’ within its space may be considered a particular kind of *tactic*. Thus, I ask: how does MFL and FLP appropriate the idea of ‘making’ for their own purposes? In what way does it either support or contrast the main messaging of the movement, as well as its own role as a public institution? In order to answer these questions, I begin by describing the actual mechanics of establishing both CreateSpace and Maker Jawn below. Following this, I move onto asking how these activities either fit in with *or* fulfill general claims surrounding the impact of educational making on public libraries at-large.

Implementing Maker Programs at CreateSpace and Maker Jawn

In order to address the specific question of how CreateSpace at MFL and Maker Jawn of FLP implement educational maker programs, I begin by focusing on the actual projects that participants in each program have created. As stated earlier, one of the essential features of making is actually producing a tangible artifact, whether digital or physical. By grounding my analysis in a discussion of these projects, they serve as a stabilizing, analytical “clamp” (Latour, 2005) through which to examine the multiple and dynamic associations being formed through the process of enacting maker programming.

For clarity of analysis then, rather than highlighting the entire range of projects created by program participants, I start by describing the film and video projects that both programs have launched. At CreateSpace (CS), I look at the Lego-inspired stop motion animation films that were produced during workshops at the library, and at Maker Jawn (MJ), I focus on “Juice of the Week,” a talk show produced during the after school maker

sessions at the Widener branch of FLP. It should be noted here that the status of these films within these programs differs considerably: whereas MJ has dedicated a larger proportion of their overall resources toward audio/visual projects, at CS, the production of films is just one among many different activities that are offered. I argue, however, that it becomes useful to examine the different production of these films precisely because it enables one to highlight the distinct conditions within these programs and organizations that allow these variations to occur.

Each section below begins with a short description of the film projects in question, and then moves onto tracing their production within the programs. Through the perspective of ANT, one can see how the production of the films results from a unique series of relations or associations between the distinct ‘actors’ – whether the film crew of “Juice of the Week,” the basement rec room of the Middletown Free Library, or the iPads and cameras used in both library systems. Interestingly, both programs have similar inanimate actors (i.e., materials and tools), but significantly different physical spaces, staff, and patrons. Thus, in order to provide a clearer comparison between these two network ‘performances’, I concentrate on two axes of influence: 1) the *organizational structure* of the maker programs and how this shapes the nature of its *staff*, and 2) the *physical location and space* of these programs and how this influences the *demographics of the participants* of the programs.

LEGO Stop Motion Videos – CreateSpace at MFL

The stop motion videos that I describe in this section come out of the workshops held at the Middletown Free Library as part of their maker programming, officially called

CreateSpace. During the time I observed and participated in the program, there were three workshops that expressly focused on creating stop motion videos, all which relied on use of the iPad app “LEGO® Movie Maker,” which was released in early 2014, shortly after the popular, full-length stop motion animation film, *The Lego Movie*. The different workshops had different themes: one was centered around the characters and settings of the popular kids’ video game *Minecraft* (fieldnotes, 5/15/14), while another focused on a stop motion technique using posed live actors called ‘pixilation’ (fieldnotes, 8/14/14). The animations described here were generated within the third workshop, which emphasized the use of Lego building bricks and characters themselves (fieldnotes, 7/24/15). As with most other stop motion animation software, the LEGO Movie Maker app prompts people to take multiple pictures (using whatever materials one desires), which are then compiled into an animated sequence. It additionally allows users to create opening and closing title sequences, and to add pre-recorded ‘action movie’ scores.

As with many of the other CS workshops I observed, this event only had a handful of participants. At first, there were only five boys (including a pair of brothers) present, but then half an hour into the workshop, another sibling group of two boys and a girl arrived and joined the group. All of the children were around 7-13 years old. In terms of structure, this workshop also followed the usual CS format. The session ran for an hour and a half, beginning with a brief group introduction to the activity at hand. Then, everyone was quickly ushered into the creation of their own videos using the library’s stock of iPads. While the library’s collection of donated Legos were available to use, participants were also welcome to bring their own materials – the two brothers and sister,

for instance, each brought their personal Lego collections, complete with their own carrying cases.

As a volunteer assistant for the workshop, I helped some of the younger participants with creating their videos. This included tasks like suspending a Lego man on a piece of string to make it look like he was ‘somersaulting’ in the air, as well as creating a ‘stormy sea’ background out of blue and grey construction paper for a pirate-themed video. I also provided some minimal ‘just in time’ instruction for participants and their parents, including how to move characters in between frames, and how to keep the iPads steady for filming using a cardboard stand. Most of the older kids, however, were interested in figuring out the process on their own. Eventually, attendees ended up creating 1-3 stop motion videos either by themselves or with some support from parents/adults in the room. Overall, the videos were extremely short, ranging from only 5-30 seconds long. Different stories and settings chosen within the workshop included: a battle in a grassy field, a disco dance party, a motorcycle race, and a marathon in a city. All of these were automatically saved onto the library iPads, though some were also emailed to parents upon request. As far as I know, none were ever posted online.

In terms of understanding the conditions under which these films were created, one of the main factors includes how CreateSpace is organized in relation to library at-large, and how this influences the staffing of these workshops. Like most public libraries, Middletown Free Library offers a range of activities beyond just access to books and other print materials. This includes both adult programs (such as yoga, writing classes, and lectures), as well as youth programs (such as storytimes, movie nights, and themed clubs). In this respect, CreateSpace is yet another series of activities for children and

teens offered, except they focus primarily on ‘maker’ activities and tools. The founding of this program (or what the library calls a “pop-up makerspace and digital media lab”) (“CreateSpace@MFL,” 2016) resulted principally the efforts of Mary Glendening, the Library Director of MFL. Inspired by another library’s makerspace that she read about online, Glendening decided to apply for a Library Services and Technology Act (LSTA) Creation Grant soon after assuming her position in 2012 (Glendening, interview, 9/2/15). After winning the grant, she launched CreateSpace in 2013, using the technology and materials purchased through the grant including 3-D printers, iPads, scanners and audio/visual recorders.⁹

As a single branch library, MFL only has ten staff members. Thus, there are no employees who are solely dedicated to CreateSpace – everyone who helps out does this in addition to their main job. Throughout the time that I observed CS, Glendening acted as the Library Director of MFL at-large, as well as the main facilitator for the maker programs.¹⁰ However, she occasionally receives assistance from other staff including the children’s librarian (Jason Fialkovich) and adult programs director (Laura Kuchmay), as well as some of the circulation staff. She also sometimes draws from a small core of outside helpers and volunteers – who either have individual maker experience, or just a general interest in teaching. Glendening’s husband, for example, is an audio engineer who has taught several electronic ‘beatmaking’ workshops for CS. Similarly, a local parent, interested in making, taught several family-focused engineering-focused

⁹ The overall funding efforts of both CS and MJ are something that will be directly addressed and discussed further in the next chapter, which focuses on the organizational ‘hustle’ for support.

¹⁰ Glendening’s involvement with the on-the-ground facilitation of these programs has likely shifted since my fieldwork; as she told me last summer, the library board had since asked for her to focus more exclusively on her management duties (fieldnotes, 7/27/15).

workshops¹¹ that I observed from Summer to Fall 2014. Additionally, I led several workshops on ‘electronic-textiles’ and animation during my fieldwork.¹² This assistance also sometimes results from bartering – in return for allowing him to borrow one the library’s newest 3-D printers (CS currently has seven), Glendening once got a patron to agree to teach a workshop as part of CS programming (fieldnotes, 7/27/15).

While many ‘how-to’ makerspace guides suggest hiring skilled and experienced workers to facilitate making programs, this is often not a possibility for small spaces such as MFL with limited staffing funds. As the main facilitator of CS, Glendening is often tasked with teaching a range of skills and tools, with which she might have limited prior experience. This includes, for example, 3-D printing (which she taught herself during her spare time), different digital programs (GIMP, Silhouette Studio, Tinkercad), and different tools and materials (Dremels, Sugru, littleBits). Occasionally, she attends other workshops at other makerspaces in order to gain additional skills and experience (e.g., an ‘e-textiles’ workshop at the “Department of Making & Doing” in Philadelphia) (Glendening, e-mail, 3/23/15). Likewise, staff and volunteers (myself included) are also often tasked with learning skills very shortly before particular workshops. For example, I only learned how to use the LEGO Movie Maker app a few days prior to leading the pixilation workshop in Summer 2014, which mostly resulted from my casual experimentation with the tool at home. Thus, rather than providing ongoing opportunities

¹¹ Projects for these workshops included mousetrap-powered cars, a homemade trebuchet, and an LED-enhanced ‘art piece.’

¹² Specifically, I led one workshop on pixilation techniques (stop motion animation using posed actors) on August 14, 2014, as well as two longer workshops on e-textiles. These included a shorter workshop (March 30-31, 2015) focused on creating a light-up bracelet, and a longer workshop (August 3-7, 2015), which was part of the five-day long summer program “TechniGals,” and which focused on programmable, interactive clothing and pillows.

to seriously engage with maker tools or materials, programs at CreateSpace generally emphasize first-time introductions to new technologies and skills.

As a result of this introductory focus, the goal of these workshops is often to create a simple take-home project with easy-to-learn (and easy-to-teach) steps, for instance, an LED-embellished bookmark or a perpetual motion water bottle fountain. Throughout the time of my fieldwork, most of these projects were drawn from different online resources, including the “Maker Camp” website, Instructables.com, and DIY.org.¹³ As I came to observe, feasibility was fundamental factor in selecting these projects – in other words, if they could be accomplished within the time allotted (usually one workshop period), and if the tools or materials needed were actually available. For instance, Glendening choose the perpetual motion fountain for one workshop because she knew she had access to the necessary materials (clay and empty water bottles, which she actually asked staff members to save throughout the week), as well as the appropriate tools (rulers and a drill) (fieldnotes, 7/7/14). Hence, while many maker handbooks and manifestos speak of the importance of participant-driven learning and project selection, the making that occurs at CreateSpace is primarily determined by facilitator and space capabilities.¹⁴

¹³ These three online resources provide maker project instructions. While Maker Camp and DIY.org both focus on youth, Instructables.com focuses on an all ages audience.

¹⁴ One should note, however, that Glendening does try to account for MFL patrons’ interests over time – she regularly solicits feedback and comments about what people want to learn and make and uses that to plan future workshops. This model, however, is different from the initially disseminated (popular) idea surrounding what an educational makerspace should be – for instance, within previously mentioned *Makerspace Playbook: School Edition* (2014), the ideal makerspace described includes individuals working on projects totally of their own choosing, and their own timing. It should be noted that MakerEd (the publishers of the playbook) have since expanded this model, allowing for a vast range of different structures and practices to be included within definition of educational making (including more instruction-based workshop models) – something which is highlighted through the second handbook, *Youth Makerspace Playbook* (2015).

Another major staffing influence on CS programming is Glendening's own long-standing experience as a librarian. She has a Masters in Library Science, and has worked in different libraries for over two decades. Thus, rather than thinking of herself as a "teacher," Glendening actively claims her position as a professional librarian – someone who helps others locate and discover resources for their own personal learning (Glendening, interview, 9/2/15). This approach, for example, was very clear within the Lego movie workshop. Instead of explicit instruction or detailed explanations, Glendening provided participants very basic introductions to the particular tools and materials, before giving them ample time to figure out the process out on their own. While many of the films suffered from a number of technical issues (e.g., too few frames, excessive camera shake, and abrupt shifts in character movement), it is notable that several participants still ended up creating multiple videos during the course of the workshop. Many even spoke about downloading the app so they could make more films at home (fieldnotes, 7/24/15). Going along with Glendening's educational perspective then, CreateSpace workshops generally emphasize *initial* exposure and exploration, rather than mastery, of maker tools and practices.

The physical space and location of the program further influences the implementation of CreateSpace programs. This can be seen not only with regard to the type of program that it provides, but also its scheduling and its participants. As mentioned at the start of this chapter, MFL is a small, single story building situated within a suburban community, located next to a heavily trafficked, multi-lane road (the West Baltimore Turnpike). As mentioned earlier, walking to the library can actually 'dangerous' because the lack of sidewalks and size of surrounding roads (fieldnotes,

3/11/15). While there are few buses that service the area, most of the library visitors seem to come by car.¹⁵ As a result of this, visits to the library are highly intentional; patrons often have explicit reasons for coming to the library, whether to borrow or return books, or to attend an event. Thus, while some libraries (especially in the city) can provide open-ended, “drop-in” programs that depend on daily foot traffic, Middletown Free Library (like other suburban spaces) has to provide pre-planned activities in order to attract patrons into their space. CS programming is therefore structured as a series of discrete, individual workshops that focus on specific projects or tools. These topics are purposely chosen in order to attract visitors, and have included: producing an audio podcast, learning Arduino programming, and learning how to use Dremel rotary tools.

Because of this structure, participation in programs is primarily driven by advertising. The workshops are publicized within the library through print posters and calendars, as well as online through the library website, Facebook, and targeted email listservs. There is almost always an online sign-up system for each workshop, with a limit set at the how many people can participate. This is not to say, however, that all workshops are popular; several times throughout my fieldwork, programs were cancelled beforehand due to lack of sign-ups. In terms of scheduling, workshops are usually 1.5 to 2 hours, and take place around 3 to 5 times a month. These are usually organized into particular ‘series’, which have included *Maker Camp* – a summer program based of an online initiative sponsored by Maker Media and Google Plus, *Little Bits Workshops* –

¹⁵ Notably, Glendening has actually tried to get school buses to stop at the library to increase youth visitation to the library. However, as she told me, the school district has not complied with her request, citing it as a question of “liability” (fieldnotes, 3/19/15).

which are based on use of modular robotics kit of the same name¹⁶, *DIY Club* – based off activities taken from the skills-based, youth-focused website *DIY.org*, and *Minecraft in Real Life* – which features projects centered around the popular children’s videogame *Minecraft*.

In terms of participants themselves, CreateSpace programming is generally geared toward youth and their families. As such, attendance in programs is particularly dependent upon the involvement of parents and/or guardians, who must accompany their children to the library. In order to accommodate adult work schedules then, maker workshops are usually held in the evenings, but finish early enough to accommodate family dinners and homework (usually running from 5:30 to 7pm). Parents and guardians are therefore a constant presence, whether they are reading or working on the main floor, sitting and observing at the back of the workshop room, or actively collaborating with their kids. Within the stop motion animation workshop, for instance, several parent/guardians were present: one boy ended up working with his aunt (who brought him to the workshop) for the entire period. Oftentimes, this parental involvement extends past the boundaries of the program – numerous times, I witnessed adults ask about additional resources, materials or tools they might buy in order to continue the work of kids at home. The aunt mentioned earlier, for instance, actually downloaded LEGO Movie Maker onto her iPhone, and informed me that they would continue working on films into the future.

In general, the involvement of parents/guardians in CS workshops seemed indicative of their overall engagement in their children’s lives. Oftentimes, I witnessed

¹⁶ CreateSpace is a “global chapter” of the Little Bits company – this activity will be discussed further in the following chapter on ‘hustling’ for support.

adults shuttling kids in between different activities: parents bringing their kids late or taking them out early from MFL programs in order to attend other events including sporting events/lessons (karate, swimming, tennis), or other cultural events (a festival at Church). This is not particularly surprising considering the demographic background of the patrons. As described in the introduction, Middletown Township is a middle to upper-middle class suburb, with a highly educated population. As described by Annette Lareau (2003), this behavior – the fostering of children’s growth through incorporation of organized activities, or what she calls “concerted cultivation” – is a prominent feature of middle and upper class parenting in the United States. CreateSpace is therefore designed to fit into type of parenting and suite of activities – it is just one among many pursuits designed for the personal enrichment of its young middle class participants.

Juice of the Week – Maker Jawn at FLP

“Juice of the Week” is a talk show that was launched out of the Widener branch program of Maker Jawn (MJ) in Fall 2014. The show features kids talking about a wide variety of pop culture topics including sports, video games, celebrities, and music. The first episode was produced collaboratively over a few weeks by a team of youth, who took on different roles such as: developing a concept for the show, creating a title sequence, acting as on-air talent, and shooting and editing the show. According to Goda Trakumaite, the MJ staff member who primarily assisted with this project, the project was originally intended as a series of multiple episodes. However, only one episode has been posted online in the last year (“Juice of the Week,” 2014). This is partially due to

some members of the creation team moving away, in addition to work on other ongoing projects that are also occurring at Widener.

While I did not observe the creation of the first episode, I did witness the filming of a potential sequence for a future episode of the show (fieldnotes, 3/8/15). While MJ sessions are occasionally is structured around a particular activity (for example, the discussion of Dr. Seuss' birthday at the start of this chapter), most of the time, it takes on a more unstructured format. For instance, the filming of the Juice of the Week segment did not result from preplanning, but instead from the particular circumstances of the day. On this afternoon, there happened to be two inciting events: two 11-12 year old boys who were talking about their favorite sneakers with Guglielmino (the MJ staff member mentioned earlier), and a 15-year old newcomer, Nadia¹⁷, was looking for something to do. Trakumaite had been giving Nadia a quick introduction to the space, showing off the MJ supply closet full of materials and tools, and explaining that these were available for any project she wanted to pursue. After hearing about the film projects at Widener however, Nadia showed interest. In response, Trakumaite suggested working on a new episode of "Juice of the Week" that focused on shoe reviews – something which could bring the boys and Nadia together. All three agreed, and proceeded to film. While the two boys spoke about their favorite sneakers on camera, Nadia acted as the camerawoman. The session ended before there was time to edit. It is notable that this sequence has not yet been posted online, generally due to lack of immediate interest and involvement in other projects (field notes, 8/28/15). Rather than being seen as failure of execution though, one could consider how this indicates how closely the program is tied to the

¹⁷ This is a pseudonym to preserve the confidentiality of the participant.

whims and ever-shifting interests of its young participants (even if that involves abandoning some projects in favor of others).

As with CreateSpace, the creation of this film can be understood through the lens of the organizational dynamics of MJ, especially in relation to the city library at-large, and how this influences the staffing of the program. Maker Jawn is just one among dozens of programs that have been implemented within the larger organization of the Free Library of Philadelphia (FLP). The program initially began through the efforts of a small team of FLP staff, including: Theresa Ramos, Khaleef Aye, Barbara Tate, and K-Fai Steele, who eventually became the first manager of Maker Jawn¹⁸. Inspired by growing interest in the Maker Movement within libraries, the team applied for support from MakerEd's national Maker Corps program to help form a team of maker mentors in Summer 2012. Initially, these mentors staffed FLP's newly established "Hot Spots" of North Philadelphia – library-run community hubs that provided people in the neighborhood with computers and internet access. However, the program eventually expanded out of these Hot Spots into several established branches of library system (7 out of the 61 total citywide) through the support of other grants and city funding.¹⁹

As a result of its relative size and the fact that does not represent a 'core' library function (like book circulation), Maker Jawn functions as a relatively independent organization within the larger system of FLP. As such, the staffing of MJ is separate from regular library hiring: rather than supporting a specific branch, employees of Maker Jawn

¹⁸ Of these four people, only Theresa Ramos is still involved in Maker Jawn. Her role within the program is further discussed in the following chapter. K-Fai Steele left the Free Library of Philadelphia in September 2014, though she still maintains ties to MJ staff as a coordinator for the National Writing Project's YOUMedia Learning Labs Network, of which MJ is a member.

¹⁹ Again, the funding efforts (and subsequent shifting of people and materials) of MJ and CS will be discussed further in the next chapter, which specifically focuses on the practice of 'hustling' for support.

are hired for the sole purpose of supporting this program. While the number of staff has fluctuated throughout the years, at its height (and when I started to observe the program in February 2015), it employed 15 part time workers. As described by Steele, the initial criteria for hiring these individuals was not only their experience in arts and technology, but also their willingness to “listen” to youth and “understand them and meet them where they are at” (interview, 3/7/16). This ethos is evident in the official title of these staff members, who are called “Maker Mentors” rather than teachers or leaders – something which harkens back to MakerEd’s philosophy of promoting informal mentorship, rather than formal instruction, within maker programs (Hlubinka et al., 2013). While some of the staff previously worked at the library in different roles (for example, at least three worked at library computer help desks), it is notable that none of them have library degrees (contrast with this CreateSpace’s leader, Glendening).

The creation of *Juice of the Week*, as well as the other projects at MJ, is therefore highly influenced by the background and interests of the Maker Mentors. For example, as explicated by MJ mentor Meredith Sellers, her prior interest in the early handcrafted cinema of the Lumière Brothers, as well as her background in painting (she has an MFA from Penn), affected her work within the program (interview, 4/15/15). This influence can clearly be seen through her assistance of the two MJ films – “Where the Spooky Things Are” (a retelling of the famous children’s book “Where the Wild Things Are”) and the “Plan 19 from Outer Space” (a short sci-fi film) – which both featured handmade sets and costumes. Not only is this true of filmmaking, but a wide range of other creative practices including electronic music production, fashion design, gardening, and video game design, in which mentors have interest and training.

Rather than basic introductions then (as seen in CreateSpace), the Maker Jawn program emphasizes ongoing and potentially deeper engagements with creative tools, materials and practices. Through the program, MJ participants are regularly provided opportunities to improve their skills over time. From this perspective, Nadia's participation in the production of "Juice of the Week" was part of a longer trajectory during which she was welcomed into the maker community at Widener. In a subsequent maker session at the branch, for instance, I saw Nadia working with other girls to develop a collaborative sculpture (fieldnotes, 4/5/15). Malik²⁰, another teen participant of Widener, has specifically developed his filmmaking skills through multiple years of attending MJ. Not only has he had the opportunity to work on his own two-part, feature-length sci-fi gangster film, for which he is a scriptwriter, director, and editor²¹, but he has also expanded his skills through participation in the Scribe Documentary History Project for Youth in Philadelphia – something that he was encouraged to apply to by Trakumaite (Malik Interview, 4/24/15). This illustrates yet another facet of the program: because many of the staff members are working artists, they oftentimes connect the work of MJ to their existing artistic/creative networks within the city. In spring of 2015, for example, the entire MJ mentor team coordinated their efforts in order to participate in the Kensington Kinetic Sculpture Derby – a local arts festival that takes place in Philadelphia. At multiple branches, Maker Mentors worked with kids to create paper mache sculptures that were eventually displayed at the festival.

²⁰ This is a pseudonym to preserve the confidentiality of the participant.

²¹ Part I of this film premiered at a public event at Widener branch on May 6, 2016, alongside the MJ-sponsored, youth-driven "Future Fashion Show."

Perhaps as a result of its founding premise and organizational structure, staff training in maker skills, tools, and materials is also something that is stressed within Maker Jawn. As opposed to CreateSpace, where Glendening and other instructors might be learning certain tools and skills immediately before teaching them, at MJ, staff members have regularly participated in “Tinkering Sessions” where they focused on different skills and competences as an explicit part of their professional development.²² Shortly after I started observing the program in February 2015, MJ staff members held a two part Tinkering Session focused on their newly purchased A/V equipment (including a camera, tripod, LED lights, and audio recorder) (fieldnotes, 2/25/15; 3/25/15).²³ Other Tinkering Sessions have included a range of projects and skills, including 3-D printing, stop motion animation, and printmaking. In turn, the experience gained by staff through this training is passed to the kids over time. For instance, within two different branches and with different mentors, I saw the same printmaking activity using Styrofoam plates, developed by Maker Mentor Lauren Pakradooni for a Tinkering Session (fieldnotes, 2/25/15; 4/29/15). In this way, many projects done in Maker Jawn are often designed ‘in house’ rather than drawn from external ‘maker’ sources (such as websites or how-to guides, as seen with CreateSpace). This has been supported MJ’s increased requirements to create and post original curriculum/lesson plans onto their public website.²⁴

²² Originally, these tinkering sessions were held once a week. However, they have become less frequent due to shifts in staffing and program focus. This is further discussed in the next chapter.

²³ For these sessions, Trakumaite taught the others how to use the new Canon VIXIA camcorder, and then asked them to shoot a short fictional scene as training on how to teach kids about filmmaking. She also created a checklist specifically for kids using the camera (including how to focus or how to add effects) – something that Nadia eventually used during the filming of the “Juice of the Week” segment.

²⁴ This responsibility and lesson plans will be discussed in Chapter Five, which focuses on ‘producing spin.’

The physical location and space of the branches where MJ occurs also profoundly influences how making is implemented within this context, as well as how these programs are structured. As with all of branches of FLP, the 7 branches of Maker Jawn are ensconced within local neighborhoods, often within walking distance of where kids live and go to school. For the most part, they are easily accessible by public transportation. Because of this, MJ has what Glendening of CS²⁵ calls a “captive audience,” or an audience that regularly comes to the library, who always “need something to do” (interview, 9/2/15). As several Maker Mentors commented to me, these branches often serve as a ‘safe place’ for kids to hang out after school (fieldnotes, 2/2/15), something that is relevant since the neighborhoods where MJ branches are located (North Philadelphia, Kensington, Fairhill) have among the higher violent crime rates within the city (within top 13 of 57 neighborhoods) (“Crime in Philadelphia – Philadelphia Inquirer,” 2016). At the library, kids can hang out with their friends on the library floor or participate in one of the numerous programs that exist. For instance, in addition to MJ, there is related program that occurs simultaneously called LEAP After-School, a long established program that provides homework assistance, computer literacy, and library skills for students grades K-12.²⁶ In terms of MJ attendees, participants range from upper-elementary to high school age.²⁷

²⁵ Coincidentally, Glendening previously worked within the FLP system at the Rodriguez branch, one of the sites of Maker Jawn, several years before she went to Middletown Free Library.

²⁶ Incidentally, since my fieldwork ended, Maker Jawn entered into a formal partnership with LEAP, which involved combining the efforts of both programs within certain branches.

²⁷ As part of the Free Library of Philadelphia, MJ actually employs teens to officially assist with programs as “Teen Leadership Assistants” (TLAs). However, there are also teens that participate in Maker Jawn on their own, who are not a part of this program.

Because of the frequency of after school visitors at these branches then, Maker Jawn is structured as free form, drop-in, after school program that run several hours a day, 2-4 days a week, depending on the branch. Throughout the sessions, kids are free to join or leave at any point. As mentioned earlier, mentors may occasionally offer a prepared activity, but oftentimes, even this can morph into a more open-ended session. For instance, one day when I was visiting the Lillian Marrero branch Maker Mentor Sari Widman had brought a collection of Altoid tins for the purpose of making wind chimes. However, none of the kids who came that day were particularly interested in this activity. Instead, some ended up playing on iPads, while another girl made a wooden block sculpture. One girl eventually played with the tins for a while before deciding to make a mini drum set out of them (fieldnotes, 3/25/15). In general, the openness of the program is perhaps seen within the naming of Make Jawn itself. As described in their website, “jawn” is a term that “originated in the Philly hip hop scene,” and which can be used as a substitute for a wide range of nouns, depending on context, for example: “Let me get a piece of that jawn?” and “That Frankenstein remix jawn be tight!” (“About Maker Jawn,” 2016). From this perspective, using the word ‘jawn’ therefore promotes freedom of choice and interest.

As with CreateSpace, most projects created by kids tend to be independently driven, and are completed within a short period of time. However, unlike CreateSpace, there is additionally more opportunity for larger scale projects, which require collaboration and more in-depth work, due to the structure and demographics of the program. For instance, almost all of the film projects of MJ take place over multiple sessions and involve many people. The production for the first episode of “Juice of the

Week” and “Where the Spooky Things Are” each lasted a few weeks, whereas Malik’s gangster sci-fi film has been production (on and off) for over a year at Widener.

Furthermore, participants have assumed distinct roles with regard to production, whether costume and set design, cinematography and editing, or acting on screen. Kids collaborations within MJ are additionally bolstered by their personal relationships with each other, often developed through ongoing, regular attendance at MJ. Throughout my fieldwork, I constantly noticed a team of regulars at each branch; these have included the family of homeschooled siblings and cousins who drive many of the projects at Kensington (Sellers, interview, 4/15/15), the teens who make up the main production team of Malik’s film at Widener, and the multiple boys who make the core participants of MJ at the Cecil B Moore branch.

At CreateSpace, on the other hand, I saw kids much less regularly. This was partially because CS workshops occurred less frequently (a few times a month rather than everyday), but also as a result of the participants’ more packed schedule of organized activities. In general, this highlights yet another distinct characteristic of Maker Jawn in relation to CreateSpace. As discussed in the introduction, whereas CS is located in a middle class suburb, MJ is situated within of Philadelphia, in some of the poorer neighborhoods of the city (North Philadelphia and Southwest Philadelphia). Rather than practicing the “concerted cultivation” parenting style of middle and upper class parents then (Lareau, 2003), many parents of MJ participants tend to be more hands-off. Several of the mentors that I questioned said that they had rarely encountered parents at the library (Widman, personal communication, 2/22/16). As described by Lareau, this parenting style of “natural growth” may not necessary by choice, but likely results from

working class and working poor parents' lack of time, access, or knowledge of opportunities for their children. From this perspective, whereas the kids at MFL are constantly moving in between different activities beyond CreateSpace, for most of the kids at Maker Jawn, this is their primary after-school pursuit.

In this section, one can therefore see how the different factors or “actors” within sites – whether the organizational dynamics, staffing structure, physical location, and demographics of participants – interact in order to create two very different types of maker programs. CreateSpace is a small educational maker program located within the Middletown Free Library, staffed by a part-time facilitator and a skeleton (often volunteer) staff with limited technical experience. Because of these factors, the program functions primarily as a series of discrete, short, introductory maker workshops that focus a range maker technologies and tools, scheduled a few times a month. The participants of these workshops are elementary and middle-school students with suburban, middle class backgrounds, for whom CreateSpace is just one of many organized activities in their lives. Maker Jawn, on the other hand, is larger than CreateSpace, but it is situated within the even more sizeable system of the Free Library of Philadelphia. Because of the nature of city branches and their ever-present audience, Maker Jawn functions as a series of recurring, open-ended, afterschool sessions, where participants are free to pursue creative projects of their own choosing. Since staff members are hired specifically for their experience with arts and technology, they are able to support kids in developing different skills and competencies over time. Unlike CreateSpace, participants of Maker Jawn are

drawn from the working class and working poor audience of its branches, who often do not have access to the same range of opportunities. From this perspective, the program often serves as the primary extracurricular activity of this group. Therefore, while these programs seem similar from the outside, it has been shown here how they fundamentally differ because of the distinct factors that intersect through the implementation of their educational maker programs.

How Making Can Shift the Library as a Public Space

Within this half of the chapter, I move onto answer the question of how the implementation of educational maker programs such as CreateSpace and Maker Jawn might shift the nature of the libraries in which they are situated (respectively, Middletown Free Library and the Free Library of Philadelphia). In particular, I examine whether or not these programs influence the way that these organizations may be understood as institutions of public education. Before moving onto this discussion, however, it is important to first consider how the library has generally been understood as a public institution, and second, the actual ways through which it accomplishes this service.

Throughout their history – from antiquity to the present-day, libraries have served as an information resource for some particular audience. While access to this information has occasionally aided in professional pursuits (as with corporate, specialty, or academic libraries), the history of the public library within the United States has primarily emphasized the pursuit of personal interests. Many of the earliest libraries in the country were “social libraries,” which focused particularly on the mission the self-improvement and search for knowledge (Shera, 1965; Rubin, 2010). The first social library in the

country, called the “Junto,” was founded by Benjamin Franklin, and emphasized the “mutual improvement” of its members through the collective discussion and debate of ideas (and thus working to fulfill the ideal of the bourgeois public sphere) (Habermas, 1991). The original mission of the Carnegie libraries (which formed the backbone of the US public library system that exists today) additionally promoted the idea of self-improvement by providing public access to “the precious treasures of knowledge and imagination through which youth may ascend” (Carnegie, as cited in Agresta, 2014).

Despite this continued emphasis on its audience, libraries have recently been undergoing a crisis of public engagement. With the rise of the Internet, there has been a declining interest in print, as well as a rising fear that the web is replacing libraries as people’s preferred information provider (Barnett, 2002). Perhaps in response to this ongoing shift, libraries have shown increased interest in incorporating makerspaces and maker programs in recent years (see, for example Britton, 2012; Lankes, 2011; Ghikas, 2014). On one hand, this is seen to continue the tradition within libraries of providing the general public with access to new technology. As a public repository, libraries have always provided access to resources (print or otherwise) that were too costly or too cumbersome for personal ownership. Access to digital technology has been positioned as a part of this mission; for most people, public libraries were the first places where they encountered personal computers and the World Wide Web (Barnett, 2002). Furthermore, according to the Pew Research Center’s Internet and American Life Project survey in 2013, free access to computers and the Internet in public libraries has become as important to library patrons as access to print resources (Kaufman, 2013). Thus, the propagation of makerspaces within libraries carries forward this tradition by providing

public access to high-tech fabrication tools that might otherwise be unavailable to individual users (Koerber, 2012).

On the other hand, adoption of making and makerspaces is also seen by many as a way to further the library's focus on community building. Before the advent of makerspaces, libraries had already been responding to shifts in society by stressing their ongoing role as a community space (Agresta, 2014; Jaeger et al., 2014). Libraries have long offered public programs for their patrons – from lectures and book clubs, to basic literacy classes and job search assistance. In this view, makerspaces are yet another service that allows the library to “enable community members to grow and share their own knowledge through creating things with others” (Breitkopf, 2011). Here, libraries are seen as spaces of engagement and participation, rather than just consumption and acquisition (Metropolitan New York Library Council, 2012). Additionally, support of makerspaces and maker activities are seen to build upon the libraries' capacity of “bringing people together and providing instruction” (Metropolitan New York Library Council, 2012), thus extending libraries' ongoing “trusted role as learning places” (Hildreth, as quoted in Britton, 2012).

For all these reasons, making is actively supported through numerous funding opportunities within libraries. In early 2014, IMLS (which is a federal organization) partnered with numerous groups including the Children's Museum of Pittsburg and MakerEd to fund capacity-building projects for making throughout the country (Bullard, 2014). Projects that have emerged from this range from fully equipped makerspaces in libraries, to smaller-scale projects such as ‘maker’ programs or the purchase of related equipment and tools. Following Shera (1965)'s seminal definition of librarianship then,

these initiatives are thought to facilitate the library's role in facilitating – and evolving with – society's ever-shifting knowledge building needs.

Despite this enthusiasm, however, there have been debates within the library community about the best ways to incorporate makerspaces into the mission of the institution. Considering the limited resources of libraries, there is the obvious question of how to best allocate both money and space. Librarians have always had to make difficult curatorial decisions regarding what books to buy and keep (Barnett, 2002); these decisions extend to technological equipment as well. For many, these questions can be framed within the long-existing debates regarding the general mission of libraries in general – is it to assist individuals or to assist society? As discussed by McCabe (2001), this tension became even greater throughout the 1980s within the wake of neoliberal state reforms, and public emphasis on individualism. In particular, McCabe highlights the recent rise of what he calls “libertarian public library,” or libraries that emphasize both the “expressive individualism of the Left and the utilitarian individualism of the Right” over and above collectivist pursuits (p. 32). This shift has been shown through the shifting policies of libraries, both with regard to their budgeting decisions and their content focus.

This tension can be seen as a continuation of conflicts within earlier decades of the American public library system. With the rise of popular fiction, newspapers, and magazines, many of the circulating libraries of the past were forced to make decisions regarding what kind of resources they would provide (Rubin, 2010). Librarians had to balance their interest in satisfying popular tastes, with their interest in serving the collective good by buying ‘appropriate’ and/or ‘high quality’ literature (Wiegand, 1989).

Within today's libraries, one might assert that there is a similar conflict with regard to makerspaces – primarily, this involves whether or not makerspaces are meant to serve the personal needs of individuals (e.g., to get work training, to make a prototype, for personal enjoyment) or the collective goals of society (e.g., to improve STEM proficiency, to promote democratic aims). Additionally, there is also the related question of who makerspaces are for – a self-motivated few or everybody possible? If so, then what is the role of the library in broadening participation in the movement? As the futures of makerspaces and libraries are increasingly intertwined, librarians have to address questions not only about these spaces in particular, but also regarding the purpose of public libraries in general, and their role in enriching public life.

The Tactical Implementation of CreateSpace and Maker Jawn

From this perspective, how does the implementation of CreateSpace and Maker Jawn fit with these debates? Here, it is useful to return to the earlier discussion on strategies and tactics, as derived from De Certeau (1984). On one hand, larger claims regarding the transformative potential of implementing maker programs within libraries might be considered the *strategies* of the wider community – that is, the officially accepted reasons why makerspaces are beneficial to the institution of public libraries. On the other hand, the particular ways in which CS and MJ are implemented within each library (Middletown Free Library and the Free Library of Philadelphia) may be considered the *tactics* – that is, the “everyday practice” – of these spaces, which may or may not support the above described strategies (De Certeau, 1984). In other words, while this implementation *may* fulfill or intersect with these larger justifications, they are

mainly put forth in order to fulfill each site's own particular, unique goals. In order to look at this process more closely, it is important to look at how MFL and FLP differ as public institutions. As described above, much of this has to do with where they are geographically situated and consequently, whom their intended patrons are.

Consequently, this determines how they adopt educational making into their spaces, and eventually what making comes to mean for the people who participate.

As a suburban library that serves a middle to upper-class audience, Middletown Free Library can be understood as just one of numerous services that exists to serve visitor's individual desire for personal enrichment. It exists alongside other public and private organizations to provide opportunities for learning and engagement, whether through yoga classes, summer camp or movie nights. As Glendening discussed with me, one of the issues facing the library included its decreasing visitation and book circulation numbers (fieldnotes, 5/5/14), something – as discussed above – which is a general trend among libraries ever since the rise of Internet. Thus, like other publically funded cultural organizations, one of the main goals of the library is to increase visitation and usage by proving its necessity and ongoing relevance to the community.

From this perspective, the library's adoption of maker programming can be understood as a *tactic* it uses to compete with other organizations. Mostly does this through promotion of what they can offer to individuals, including access to technology and opportunities for self-enrichment. In describing CreateSpace, for example, the library website and annual report highlights how the program allows patron access to “cutting edge technology and programming” (“About Middletown Free Library,” n.d.), and is “currently the only space of this kind that is open to the public in Delaware County (MFL

Annual Report, 2015). Additionally, the wide range of CreateSpace topics is specifically designed to provide diverse enrichment opportunities for youth. As mentioned earlier, CS workshops have focused on both high and low-tech projects, as well as many different tools and technologies – topics that are often solicited from patrons themselves (fieldnotes, 5/5/14). Furthermore, CreateSpace presents easy-to-consume class formats with low barriers to engagement; rarely are there any prerequisites for participation, nor need for subsequent attendance, therefore making them more compatible with middle-class kids’ busy schedules of planned activities.

In turn, this particular adoption of educational making also works to shape how the concept itself is positioned for its patrons. Here, making is primarily put forth as an individually focused activity, something that can be used augment one’s own experience in the world. This conceptualization generally resonates with the historical, techno-utopian (and more libertarian) roots of the Maker Movement – ways of using tools and technologies for the purpose of gaining self-sufficiency within a world that can ultimately be controlled, something which was discussed within the previous chapter.²⁸ CreateSpace thus becomes a channel for this individual cultivation. From this perspective, the adoption of making into this library arguably works to shift it from a primarily civic institution of public education to a site that actively competes within the neoliberal marketplace of self-enrichment experiences. Rather than considering this a kind of ‘moral failing’ on the part of the librarians however – as McCabe (2001) might posit, since it arguably moves it further into the realm of a ‘libertarian public library,’ I contend that this move is just an organic outcome resulting from the enactment of educational maker

²⁸ Specifically, see the sections entitled: *Entrepreneurialism and the “New Industrial Revolution and The Politics of Hacking and Making*.

programs within the specific middle-class context of this particular site, and how the library functions within these structural conditions. In other words, the entire composition of the actor-network that makes up Middletown Free Library is what leads to this conclusion.

The urban, 61-branch Free Library of Philadelphia, on the other hand, is a very different kind of institution. Clearly, there are a whole different set of people, places, ideas, and things that comprise its actor-network. Thus, the implementation of maker programs here is necessarily different, and this, in turn, shifts the library (or at least the branches where MJ is implemented) in different ways. As mentioned earlier, the branches where Maker Jawn is established are often entrenched within local communities, and thus, always have a healthy supply of visitors. Rather than having to establish new reasons for people to come then, the library works to provide a wide range of services to benefit its potentially ‘under-resourced’ population, such as GED certification, vocational assistance, college-readiness programs, that might not otherwise be available to them. From this perspective, the Free Library of Philadelphia functions as a civic organization, whose focus is on improving the collective fortunes of those within city at-large.

From this perspective, educational making programs are not used here to bring in or attract patrons; indeed many kids were not even aware of the program before initially encountered it in person. Instead, making within FLP maybe understood as a *tactic* to expand upon the library’s existing social services and publically-focused goals. Within Maker Jawn, opportunities for making are understood to promote a number of socially helpful outcomes, including the building of “21st century skills” (“About Maker Jawn,” 2016), community-building, and converting teens from consumers to producers

(fieldnotes, 2/18/15).²⁹ Within the library, these outcomes are often rhetorically connected to potential future opportunities for participants in terms of both their academic life and vocationally (fieldnotes, 2/18/15; Klevence, interview, 4/8/15). At this point, it should be noted that the demographics of Maker Jawn staff generally differ from the participants; while some of them do live in the areas where there are branches, they generally seem to come from middle-class backgrounds. Additionally, while there have been some MJ staff of color throughout its history (e.g., including Sean McCoy, whom I talk more about in Chapter Five, as well as Khaleef Aye and K-Fai Steele, both of whom were part of the founding of the program), most of the mentors who worked during my fieldwork were white³⁰. From this perspective, making thus becomes a part of the larger “social justice” goal of library staff in catching up the “underserved” and “under-resourced” MJ participants with their middle-class counterparts, affording them opportunities that they may not usually gain access to at school or in their everyday lives (Steele, interview, 3/7/16; Holby, interview, 4/9/15).

As with CreateSpace, the implementation of educational maker programs through Maker Jawn also positions making in a particular way with regard to its participants. While for CS, making becomes an individual pursuit – mostly defined through engagements with new and novel technologies, here, making is an activity that has a social or collective purpose. Thus, making within Maker Jawn tends to better match the

²⁹ These ideas are included within the mission of Maker Jawn. This, along with the mission of CreateSpace, will be further discussed in the following chapter.

³⁰ Clearly, a lot more could be said about the racial and demographic differences between Maker Jawn staff and participants – something which many of the MJ mentors themselves have mentioned. This is especially interesting compared to CreateSpace, where the staff seems to come from the same background as the participants themselves (i.e., they are middle-class and white). While this is unfortunately outside the scope of this dissertation, it is something that certainly merits future research and analysis.

larger goals of making as described by many of the library ‘spokespeople’ discussed above – to foster community and build a sense of collective agency. Making here therefore becomes less about individual subjectivity, and more about cultivating an entire population in particular ways. It should be noted here, however, that rather than being seen as the primary catalyst for these outcomes, these socially focused goals were *already* a part of FLP’s mission, something that was supported through its existing body of public services. Again, rather than being seen this as a result of the individual desires of staff within the FLP, this construction of the library as a space of public service through educational making should be understood as the result of the relationships and associations between the already existing actors of the network.

Conclusion

In this chapter, I have worked to describe the implementation of two distinct educational maker programs within two distinct library spaces – Middletown Free Library, a small library located in the suburbs of a major metropolitan area, and the Free Library of Philadelphia, a larger, sprawling urban library system located throughout the city. From the outside, their educational maker programs (CreateSpace and Maker Jawn) seem alike in that they promote similar activities and projects, and engage with kids that are generally fall within the same age group. However, as I have illustrated, the context through which these activities are realized – particularly the organizational structure of these programs and how this influences its staffing, as well as its geographic location and how this influences the demographics of its participants – profoundly influence what kinds of programs are created. CreateSpace is essentially a series of introductory hands-

on programs focused on a diverse compilation of different maker projects and technologies, taught by a small staff of librarians and volunteers, with limited training and/or prior experience with maker practices and tools. These programs are contained in an easy-to-consume format – discrete, short, early-evening workshops, designed to compete with other extra-curricular activities in attracting its predominantly middle-class youth audience. Maker Jawn, on the other hand, is staffed by a larger corps of part-time workers, who generally have backgrounds or experience in creative production and/or technology, thus allowing for more in-depth, complex engagements with maker practices. Within the multiple branches in which it is situated, Maker Jawn is just one among the many social services that the city library provides for their predominantly working class and working poor audience. In order to best serve this group, the program is structured as daily, afterschool sessions, whose loose structure creates opportunities for collaboration and community building.

While there are larger claims regarding the beneficial effects and impacts of bringing maker activities to libraries – for example, the transformation of library patrons from consumers to producers, both CreateSpace and Maker Jawn should be understood in terms of how they fulfill the particular needs of their particular sites. CreateSpace works to aid Middletown Free Library's specific goal of bumping up declining visitation and attracting patrons, through the more publicly espoused goal of providing public access to new and novel technologies. Maker Jawn contributes to the Free Library of Philadelphia by extending its already wide community service reach into its neighborhoods, by providing new opportunities for youth to acquire the necessary '21st century skills' to aid their future life chances. Therefore, whereas Maker Jawn seems to support FLP's already

existing role as a civic organization, focused on charitable services for ‘underserved’ populations, CreateSpace solidifies MFL’s new role in the community, as just one among many organizations that competes within the neoliberal marketplace of new experiences.

While this chapter focuses on the establishment of these new kinds of networks through the implementation of educational maker programs, in the next chapter I move onto the notion of maintenance. How do these program support themselves through time? As I will discuss, one important aspect of this activity involves seeking funding and other forms of assistance through the active process of moving actors within the network, something which I label the ‘hustle’ of educational making.

CHAPTER 4**Maintaining the Trend:****The ‘Hustle’ of Pursuing Ongoing Support****Vignette – The First Day of a New Initiative**

“Why don’t you get started making up a story?” says Lauren Pakradooni, a Maker Jawn mentor to a girl, who is about nine years old. They are sitting at a table together in the main floor of the Ramonita de Rodriguez Branch of FLP, one of the several sites of Maker Jawn.

“About what?” the girl says.

“Ice cream?” Pakradooni suggests, referencing something the girl said earlier. She continues, “You could even make a fake cookbook and a recipe for pizza or ice cream.”

Another girl, who is standing near the table, seems enthusiastic about the idea. She starts listing other foods for the possible cookbook, including jelly donuts.

The first girl responds quickly. “Yuck!” she states. She pauses, thinking aloud, “I like... sprinkles. Chocolate sprinkles, vanilla ice cream, with a cone on the bottom.”

“That’s a great– can you draw that out for me?” They both look down at the paper booklets laid out on the table, set out by Pakradooni and the other MJ mentor earlier in the day. As I find out later, the main activity for the day is creating ‘circuit books’ – interactive booklets that have interactive circuits made out of copper tape and small LEDs. While this activity had been done during the regular, more free form Maker Jawn

sessions during the school year, this day actually was the first day of entirely new MJ initiative called “Summer of Making” (fieldnotes, 7/6/15).

While MJ programming generally focuses self-directed, hands-on projects in order to promote the broad goals of promoting creative expression and “technological literacy” (fieldnotes, 2/18/15), this particular summer initiative differed since it had a very particular focus. Specifically, through the promotion of ‘storytelling’ based maker activities (such a copper tape book and stop motion animation) alongside directed use of reading iPad apps (such as PBS’s “Martha Speaks Story Maker”),³¹ this program would work to improve participants’ more ‘traditional’ literacy skills of reading and writing (fieldnotes, 7/17/15). Additionally, as had been discussed over the past few months within staff meetings, this program would actually work to complement yet another library initiative called “READ! by 4th.” Started in 2014 and led by the Free Library of Philadelphia (FLP), this larger, citywide program enlisted nearly 50 local partners sites in its goal of getting all fourth graders in Philadelphia to be proficient at reading by 2020. Rather than being officially affiliated however, Maker Jawn’s Summer of Making (hereafter called “Reading & Making” for clarity) was specifically designed as a way for the smaller program to gain attention from the larger, more well established initiative within the context of FLP at-large. According to Theresa Ramos, a major advisor of the program³², this move would help Maker Jawn gain more publicity and perhaps more

³¹ Several other iPad applications were suggested by the program’s outside consultant, Isamar Ramirez, including PBS’s “Martha Speaks Word Spinner,” “Felt Board,” “Goodnight Safari,” “Phonics Genius,” and “Phonics Tic-Tac-Toe.”

³² Ramos was once a full-time Grants Manager at the Free Library of Philadelphia, and helped to manage the founding of the program under its first director, K-Fai Steele. However, at the time of this staff meeting, Ramos had partially retired from the library, though still maintaining some control over the direction of the program (and oversight over director Winchowky). During the months that I observed Maker Jawn, she still

relevance in the eyes of those in the top levels of FLP administration. The eventual goal of the program was to illustrate the way that hands-on making could positively contribute to the development of traditional literacy skills, or, as Ramos states, reframing reading itself *as* a maker activity.

This is not to say, however, that the Summer of Making was designed to entirely replace the regular, less structured sessions of Maker Jawn. While the latter usually took place over three hours in the afternoon (i.e., 3-6pm) throughout the year, this new program would only take place for an hour a day for three weeks over the summer. Further, instead of being unstructured and self-driven, this hour would be organized into two parts: first, participants would be asked to use an iPad reading app for a specified amount of time, and then, participants would be led through a series of related maker activities (primarily focused on ‘storytelling’). While this decision was assumed to be clear from the administrator’s standpoint, the mentors expressed fear during the staff meetings that this overly planned structure might confuse the ‘regulars’ of the program, who might not be interested in participating in these more managed activities.³³

As the afternoon wore on, this prediction seemingly came true. As more and more kids kept entering the space, they acted as if this would be like any other day. For example, one girl (whom I had recognized from another visit) started talking with

was involved with many significant decisions regarding the future of the program – especially regarding its funding – in consultation with Winchowky and others.

³³ Incidentally, many of the regulars of Maker Jawn were not even eligible for participation in “Reading & Making,” which had a more specific target demographic than the school-year program. While Maker Jawn welcomed kids from elementary school up to high school, “Reading & Making” expressly targeted youth entering the fourth grade (8 or 9 year olds). Additionally, kids participating in the new program were required to attend daily for three weeks with permission from their parents (for data collection purposes). This differed from the usual way that kids participated in MJ – as mentioned in the previous chapter, participants of the regular program were free to come and go as they pleased, as little or often as they wanted.

Pakradooni, expecting to receive assistance for a sewing project that she had started during a previous session. Pakradooni, however, was engaged with the “Reading & Making” participants on their prescribed activities. She asked if the girl would be all right working on her own (she was).

While this incident by itself was not very substantial, the mentors continued to deal with a series of other responsibilities and changes throughout the rest of the afternoon. For instance, one new responsibility that arose as a result of this launch was the need to manage the newly purchased collection of mini iPads, bought expressly for the program (this included 10 per branch that hosted “Reading & Making,” for a total of 40). As I had seen in a previous staff meeting, the purchase of this technology was contentious – mentors thought the money (which was left over from their IMLS grant, to be discussed later) could be better used through the purchase of more useful equipment.³⁴ Additionally, many mentors expressed concerns about having to manage the large collection of iPads at each branch; because all the sites were open to the general public, there was a possibility that some could easily be taken or stolen without constant vigilance (fieldnotes, 7/6/15). Along with managing the iPads, mentors were also required to keep track of a number of other things throughout the initiative. First, as part of the effort to prove the ‘effectiveness’ of the program, mentors were asked by Isamar Ramirez (the outside consultant hired to create and manage the program) to collect ‘data’

³⁴ For instance, some mentors argued that purchasing more laptops would be more practical, whereas mini iPads were seen as trendy and less powerful. In addition to better supporting the range of projects they wanted to pursue (e.g., film editing, music production), the laptops were seen as more impactful in the context of kids’ lives, since many of them did not have access to computers at home. As some argued, the ability to use computers would not only help participants with regard to their academic life, but also within the context of their future careers (fieldnotes, 4/29/15).

on each program participant for the purposes of assessment.³⁵ Second, because “Reading & Making” had been hurriedly launched, mentors were still in the process of publicizing and signing up participants during the first week of the program. Thus, even on this first day of the program, I witnessed these multiple demands at work: at the same time as Pakradooni was working with program participants, she was also dealing with MJ regulars, keeping an eye on the brand new collection of iPads, and actively trying to bring new participants on board. While administrators Ramos and Ramirez had assured mentors that the program would cause a minimal amount of daily disturbance (fieldnotes, 6/17/15), in person, it became clear that the implementation of this program would require more active juggling of responsibilities and on-the-ground negotiations than had been anticipated. Despite this, the program continued since the administrators continually stressed the benefits of the initiative – namely, acquiring outside financial and material support for Maker Jawn.

Introduction

Whereas the last chapter looked at the particular ways that maker programs can be instituted within libraries, here and in the following chapter I focus more explicitly on the problem of ongoing maintenance. I ask: once these programs are initiated, what kind of work is involved in maintaining them, and how might this activity continue to shift what the programs are? Clearly, one of the main issues that these educational maker programs face is a continual need for support, financial or otherwise. While the ‘core’ functions of

³⁵ This included, for example, having conversations with each participant (either recording or taking notes), and noting their ‘improvements’ with regard to their storytelling skills, such as understanding character, setting, or plot (fieldnotes, 6/24/15).

libraries such as book acquisition and circulation are likely maintained through the organizations' main sources of funding (i.e., town, city, or state resources), additional programs often need to be supported separately through independent grants or donations. Both CreateSpace (CS) and Maker Jawn (MJ) have received monetary and material assistance through a variety of sources, including government funders, nonprofit and commercial maker organizations, and private donations from individuals. This chapter therefore examines the particular decisions and day-to-day activities involved in seeking and acquiring this support.

In order to describe these processes, I rely in this chapter on the term “hustle,” a concept that has an array of formal and colloquial connotations, both positive and negative. Keeping in mind these conflicting associations, I use this term to describe managerial attempts within CS and MJ to move around actors – whether people, objects, or spaces – with the aim of capitalizing on external sources for funding and support. For instance, within the opening vignette, the attempts to rearrange the MJ mentors, the participants, and even the iPads and other supplies, might be understood as a kind of ‘hustle’ pursued in order to acquire the support of the “READ! by 4th” program, and the attendant FLP administrators. Beyond looking at the particulars of these individual ‘hustles’ for support, however, in this chapter, I situate these activities within the larger context of the history of both programs, from the conditions of their founding to their current iterations. Furthermore, I consider both the existing and potential support sources

of these programs (whether financial, material or promotional), as well as what decisions and activities were made by staff in their attempts to attain these.³⁶

As I will illustrate, while these hustles are initially designed to prolong and maintain existing activities, these activities often end up destabilizing the already established relationships between the actors in the network. As a result, much within these programs (people, spaces, objects) ends up being engulfed within these unpredictable pursuits, sometimes to detrimental effects. Whether or not this happens, however, strongly depends on the *organizational structure* of the programs – that is, how close the decision makers (or those administrators who decide upon hustles) are to the on-the-ground work of the program, and how closely this new work adheres to the original *mission* of these programs. Thus, while many scholars studying educational making have generally considered the *participants'* experiences of the program, this chapter asks us to consider the *facilitators* of these experiences. Only through this expanded look, I argue, can we fully understand the issues surrounding the sustainability and maintenance of these educational maker programs.

This chapter is organized as follows. First, I start with a brief discussion of the concept of 'hustling' in terms of how it is defined within business and everyday settings. I also examine the way that hustling has become a sort of 'buzz word' within the world of

³⁶ As noted within the introduction, most of the data from this chapter comes from my field observations of the administrative meetings of both programs (weekly staff meetings at MJ, and planning meetings for special initiatives such as "TechniGals" at CS), as well as conversations and formal interviews with administrators and staff of both programs, where the funding and support history of the programs was discussed, as well as related (and ongoing) activities. Additionally, this data is supplemented by information found online regarding both programs' funding and support sources – not only are many of these grants government-based (and therefore public), but also often publicized by the support organizations and the programs themselves through press releases and other media.

entrepreneurship, in order to describe the numerous ‘pivots’ and shifts required to compete in an intense economic environment. Second, I move onto a more empirical discussion of different hustling activities that have occurred at both CreateSpace and Maker Jawn. Here, I detail two different *types* of hustling, which include 1) *tangibly* shifting programs by modifying their tools/materials, structure or audience, and 2) *discursively* shifting programs through modifying descriptions of its meaning and purpose.

Following this, I move onto the actual *outcomes* of hustling. While the pivoting and shifting of resources may make sense within the context of commercial enterprises, I discuss how this becomes more problematic in the face of mission-driven organization. In order to illustrate this, I compare the particular effects of hustling within CS and MJ. As I detail, hustling is generally more innocuous within the context of CreateSpace. This is due to both its smaller size – that is, the fact that the main decision-maker of the hustles is also the main facilitator of the program, as well as its overall focus on acquiring technology and providing the public with access to these (a goal that is relatively easy to accomplish). This contrasts with Maker Jawn, on the other hand, whose hustles have proven to be more destabilizing and more potentially problematic. Mostly, this is a result of its larger ‘managerial distance,’ that is, the space between the administration (who make decisions about hustles) and staff (who have to implement these hustles) and the subsequent negotiations and frustrations that occur as a result, as well as its emphasis on building relationships between community members vis-à-vis creative pursuits, rather than the tools or technologies themselves. When considering the implementation of these educational maker programs, then, it becomes essential to consider not only the particular

mechanism of the hustling for support, but also how stable and resilient the existing network of actors that comprise that sites are.

‘Hustling’ and its Contexts

The origin of the word “hustle” come from the 17th century Middle Dutch “hutselen,” or “husseln,” which meant “to shake, to toss.” While the connotation of this original term was about shaking objects, it eventually was connected more explicitly to human activity, first in terms of pushing and shoving people (18th century), then in terms of working or moving quickly (1821), and finally in connection to more illicit or illegal activity (mid to late 19th century). As it currently stands, hustling usually refers to energetic or forceful activity (in a wide variety of contexts, from sports to ‘street’ activities, to corporate settings) in pursuit of some kind of gain (often monetary).

In this chapter, I keep in mind these numerous connotations of hustling, but also look particularly at its use within *entrepreneurial* contexts – a world that has also been generally associated with the Maker Movement at-large (for a longer discussion on this connection, see the section *Entrepreneurialism and the “New Industrial Revolution”* located in Chapter 2). In order to understand this specific use of the term within this setting, here it becomes useful to look back at Amar Bhide’s (1986) seminal *Harvard Business Review* article, “Hustle as Strategy.” There, Bhide – a business professor who focuses on innovation and entrepreneurship – outlined the ways that “hustle,” which he defines as the use of a flexible work force in order to efficiently fill gaps in the market, can actually be used as a business strategy within the context of fast-moving, highly competitive market environments.

While Bhide originally analyzed this concept within the milieu of the financial service industry, this general idea surrounding hustle as strategy has subsequently been adopted within a wide range of entrepreneurial contexts, where much has been written about the necessity of developing a ‘hustling’ attitude when building one’s business within a competitive market. Oftentimes, this includes being persistent in the face of multiple rejections and setbacks, and constantly working to self-promote in an environment of intense competition (see, for example, Curtis, 2013; Patel, 2015; Garland, n.d.). Primarily, however, hustling involves being ‘opportunity alert’ and responding to these changes (e.g., Bhide, 1994; Abrahami, 2014; Stengel, 2016). Historically, entrepreneurs have been defined as individuals who take considerable risks in bringing “new combinations” including goods, production methods, materials, or organizational structures into the market (Schumpeter, 1934). In this respect, hustling is an extension of this original activity since it involves a willingness to rearrange or recompose these combinations in order to shift toward new directions if necessary – or, in common Silicon Valley parlance, to “pivot” (Quinn, 2014). While this is occasionally due to personal interest or desire, this pivoting is often a matter of survival within a competitive environment.

From this perspective, it is also important to keep in mind the other common uses of ‘hustling’ – particularly, how it colloquially references to the notion of economic endurance within a diversity of contexts. As described by Venkatesh (2000), hustling became a “much-used term” in the 1970s within poor, urban communities in the United States. Describing the act of making a living within these scarce financial environments, this term has come to encompass a diverse array of “intricate, sometimes unstable and

secretive” activities, from informal exchanges of legitimate goods and services, to narcotics trafficking and prostitution. More than describing a set of activities however, the term was also affiliated with a particular outlook, including both “the willingness to take advantage of whatever economic opportunities are available in [one’s] environment” even if not entirely legal or acceptable (Whitehead, Peterson, Kalijee, 1994), and the desire to express self-efficacy and determination within a seemingly uncontrollable world (Venkatesh, 2000). Thus, while the stakes of these different kinds of hustling activity (i.e., on the ‘street’, in entrepreneurial settings, within these library maker programs) are clearly different, it becomes important to note here how it involves both activity *and* a mindset – something which can be seen within the efforts of CreateSpace and Maker Jawn described below.

Hustling in CreateSpace and Maker Jawn

In this section, I examine the actual mechanism of “hustle,” or the ways that staff at both CreateSpace and Maker Jawn work to shift their existing resources in order to take advantage of new support opportunities, whether financial, material or promotional. First, I discuss why hustling becomes necessary within the context of these nonprofit organizations, looking specifically at the ‘origin stories’ of both programs. Then, I outline the two main categories of hustling, which include 1) the *tangible* shifting of existing programs by modifying its tools/materials, structure or audience, and 2) the *discursive* shifting of programs through descriptions of its meaning and purpose.

Starting the 'Cycle of Hustling'

Maker programs within libraries are still considered new and experimental efforts – often explicitly “work[s] in progress” that are still subject to changes or modifications (Glendening, interview, 9/2/15). Because of this, they are often not funded by the institution’s regular, ongoing and stable, sources of support but instead through outside sources – usually single, time-limited grants. Initial reliance on these types of grants can be seen within the ‘origin stories’ of both programs. Glendening describes the birth of CreateSpace in this way:

Basically it started... when I was hired... I was here for like a month... I had just posted something on Facebook about, I think, a space in Indianapolis that had a maker trailer. I was just like "Oh, this would be so cool to have something like this at the library." Margie Stern at [Delaware County Libraries] headquarters saw it, and she's like "Oh, you know, LSTA [Library Services and Technology Act] – that's one of the areas we're funding are these creation grants. Why don't you look into it?" Our board president at the time...[was also] really interested in the Maker Movement and everything, and had a 3-D printer. They used Arduinos and stuff in their place. He's like "Yeah, let's do this. We should do it." (interview, 9/2/15)

Similarly, Steele at Maker Jawn describes how the founding of the program began when local collaborators alerted the staff about a funding opportunity:

It was the mix of a few things, and one of the very big chunks was having Yasmin [Kafai from the University of Pennsylvania] interested in what we were doing. And Yasmin pointing us toward different opportunities. So Ann Marie Thomas at the time was the president of Maker Ed; it was the year they had just started and her parents were originally from Philly and they wanted to fund a site that was in Philadelphia, and Yasmin kind of knew what I was doing at the library. We were interested in doing some e-textiles stuff, and she was like “Hey check out this thing, Maker Ed. Maybe you'd be interested in applying to be the site,” and we did, and we got a \$25,000 grant from them to really get started. (interview, 3/7/16)

In both of the above narratives, one can see how the founding of the programs did not come about through long-term planning of an idea and a subsequent search for funding.

Instead, the actual inception of these ideas came about *as a result* of being aware of potential support opportunities. In other words, these libraries enlisted themselves into the already existing networks put into place by existing funding organizations.

Additionally, it is important to note here that both the above-mentioned grants for CreateSpace and Maker Jawn were explicit designed to assist organizations in starting *new* maker initiatives, rather than supporting existing ones. This is generally the case with grants of this type; once established, these programs supposed to find other ways of keeping these efforts going on their own, whether by generating revenue for self-maintenance, or finding a way to fold these programs into the main services offered by the institution (and thus being funded through its core budget). If this cannot occur, grant-funded programs are often doomed to a limited “shelf life” (Steele, interview, 3/7/16), unless they can prolong their temporary funding indefinitely through a series of new grants proposals and initiatives. Thus, instead of working to maintain and existing program, nonprofits are often forced into the constant struggle for survival. Mostly, this involves be constantly on the lookout for potential opportunities. Glendening states: “You've just got to keep up with what's going on. Just read and see what other places are doing and talk with people and stuff. Just join things” (interview, 9/2/15). Glendening further adds this is a matter of what “vision” you have for your program (interview, 9/2/15). Not only can this vision involve the future of one’s own library, but also the Maker Movement at-large. Steele, for instance, describes the multi-generational grant proposal as “us kind of trying to think of what the future of maker could look like” (interview, 3/7/16). It is only through this continual vigilance and work to find “something new, something different, something up-and-coming” (Winchowky,

interview, 8/20/15) that allows organizations to “reignite the passions of the funder” for the purposes of acquiring ongoing support (fieldnotes, 6/24/2015). Ramirez (the outside consultant for “Reading & Making”) further describes this effort:

If you keep doing same programming over and over again, they’re not going to keep funding for you. So *you have to keep continue innovating and getting results*. This will allow library to leverage other funders for you.... [and likely] to see more results (emphasis added) (as quoted in fieldnotes, 6/24/2015).

This ongoing activity – or efforts to continually shift programs in order to secure new forms of support – is what I will call the ‘cycle of hustle’. As I argue, this activity persists throughout the history of an organization. The characteristics of this cycle are described below.

Tangible Shifts in Existing Activities

One way that hustling occurs within CreateSpace and Maker Jawn is by tangibly modifying existing activities in order to fit existing definitions of – or new calls for – making. Throughout my fieldwork, I observed three methods of accomplishing this, either by shifting: a) the *tools or materials* used in a program; b) the *structure* of a program; or c) the *audience* of a program.

In terms of *tools and materials*, program staff can easily convert existing programs into ‘maker’ ready programs with the explicit addition of recognizable tools and technologies. CS’s Glendening describes a simple example of this process:

Here's one step. First, you maybe learn how to make this little book. But then we can add this other part in where now you have a book that you can create art in, or you can add the circuit stickers and LEDs, and learn a little bit about how a circuit works and take it to another level. (interview, 9/2/15)

This process is essentially what occurred through the original CreateSpace LSTA “Creation Grant” mentioned above, which was intended for the initial purchase of new ‘maker’ technologies, including 3-D printers, iPads, scanners, and audio/visual recorders, for the purposes of starting up a new makerspace/digital media lab. The use of these tools, alongside the library’s existing programs, essentially became the basis of CreateSpace. Following this initial purchase, Glendening has continued to hustle for more tools and materials through different initiatives, including becoming a “Global Chapter” of littleBits³⁷, and acting as a host for Instructables.com’s “Build Nights.”³⁸ The free or discounted tools and materials that have resulted from these partnership hustles have formed the basis of new programs, and subsequently been incorporated into other programs within CreateSpace. Maker Jawn has likewise depended on building up its particular collection of technologies, tools, and materials, ranging from laptops to hot glue guns. Within each branch that hosts their program, there is a special storage space (either a closet or open shelves) that contains all these materials, which can only be used by Maker Jawn participants and mentors to support their projects. Additionally, they also have a collective stock of materials kept at their headquarters that can be shared out to different branches (for example, their newly acquired A/V kit including a camera, tripod,

³⁷ LittleBits is a company that produces modular electronic components for youth. As a global chapter for the company, CreateSpace receives discounts for littleBits materials, as well as free “swag” and teaching/project resources (“littleBits Chapters,” 2016). As a result of this partnership, the library runs an ongoing series of littleBits-based events.

³⁸ Instructables.com is an online repository of maker projects that is owned by the design software company Autodesk. Build Nights are all-ages evening events where participants are tasked with coming up with new projects using donated tools and technologies from different companies, sponsored through Instructables.com. Within CreateSpace, featured materials have included Dremels (a handheld rotary tool), Sugru (a moldable glue that turns into rubber), Brown Dog Gadget Solar Panels, and Lumi Inkodye (a photosensitive fabric dye).

and audio recorders). In this way, their programming is distinguished from other youth-focused initiatives at the library.

Another way that reframing or reshifting programs can occur is by explicitly targeting new *audiences*. Oftentimes, this shift can result directly from a call from funders. This can be seen, for example, through the establishment of CreateSpace's summer initiative "TechniGals." As described by Glendening, CreateSpace's normal audience includes "kids ages 7 and 8 and up," something which she describes as their "'sweet' spot for interest and enthusiasm" (as quoted by Slavin, 2015). However, in summer 2015, CreateSpace launched "TechniGals," a summer camp specifically focused on engaging middle-school girls (ages 11-13) in STEAM (Science, Technology, Engineering, Arts and Mathematics) topics. The program was supported by ILEAD, a Pennsylvania-sponsored grant backed by IMLS, which focuses on developing "the knowledge, skills and abilities of library staff to understand and respond to user needs through the application of participatory technology tools" ("ILEAD USA," 2016). The demographic shift of the "TechniGals" program was explicitly made in response to the ILEAD's call to "identify a problem in [the] community and then utilize [the library's] resources to help solve it" (Fialkovich, interview, 8/31/15). According to Glendening, she had initially been unsure about what problem to choose for the proposal. However, after identifying an absence of girls within CreateSpace programming *and* sensing popular interest in promoting girls' participation in STEM within the wider maker and funding community, she and the rest of staff decided to concentrate on that issue through the new initiative (fieldnotes, 11/17/14).

Maker Jawn has also worked to target new audiences as part of their hustling activity. Most notably, they won a widely publicized, half-million dollar “National Leadership Grant” from IMLS in 2014 focused on the development of “multi-generational” maker programs. This award expanded MJ’s initial focus on teens and children, to include adults and families – something which staff member Brandon Klevence describes as the seemingly natural “next step” in the growth of the program (interview, 4/8/15). Steele, one of the main writers of the proposal, more explicitly describes this decision:

We were trying to go for this IMLS grant, so we knew that it had to be slightly different from just teenagers, cause... that's what we had been focusing on through this [previous] MacArthur grant... *So it was the money that drove the shift in focus.* (emphasis added) (interview, 3/7/16)

As with “TechniGals” then, we can see how the hustle for new audiences for the multi-generational grant at Maker Jawn was driven more here by a desire to fulfill a funder’s calls, rather than originally arising from the needs of the program or sites themselves.

The third and perhaps most dramatic way that staff works reframe programs in the search for support opportunities is by modifying their *structure*. The “TechniGals” summer camp described above is exemplary of this kind of shift. As discussed in the previous chapter, the basic structure of CreateSpace are stand-alone, evening workshops for a small group of youth (usually around 6-8 kids) that are led either by Glendening or other interested staff/volunteers, which are run 3-5 times a month. However, Glendening modified the basic model of CS for “TechniGals,” which is basically a one week intensive summer camp for around 30 participants, which includes two workshops per day (which are basically more concentrated versions of CS’s usual workshops), as well as

a daily live chat (online and in-person) with women who work professionally in STEM fields.

Correspondingly, Maker Jawn has also launched differently structured programs in response to new sources of support. These do not always include money or supplies, but sometimes new relationships or affiliations. For example, in 2014 Maker Jawn ran a summer program in partnership with the Philadelphia Youth Network (PYN)³⁹, which differed from their usual program, since it enlisted local teens throughout the summer to aid in developing a new “badging” system based on maker activities for patrons of the library, within structured sessions.⁴⁰ Here, the support gained was not financial or material, but instead the shared publicity for the program, as well as access to a team of teen participants, who were recruited and paid as summer workers through PYN. The “Reading & Making” initiative described at the start of this chapter is another prime example of this kind of structural shift. As described earlier, this project had a more strict schedule, more defined activities, and more limited audience than the usual MJ sessions. By emphasizing the acquisition of traditional literacy skills, it was designed to attract the attention (and potential funding) for the “READ! by 4th” program. It should be mentioned here that this strategy was at least partially successful; as of early 2016, there has been an official collaboration between both groups as implemented through special

³⁹ PYN is a local organization focused on academic and vocational programming for the city’s “underserved youth” (“About PYN,” 2016).

⁴⁰ Badging has recently gained popularity as another ‘trend’ within informal learning that seeks to promote an alternate means of credentialing learning beyond degrees or test scores. Within Maker Jawn, for instance, this involved different badges that connected to different types of skills including “teamwork and collaboration” and “creativity and tinkering,” which are generally drawn from the popular conversations around the “21st century skills” that are required to “succeed in the workforce in the 21st century” (Klevence, interview, 4/8/15).

events and programs. In addition to tangibly shifting programs in these ways, hustling also actively occurs through discursive activity, something further described below.

Discursive Reframing of Existing Activities

The discursive shifting of existing activities, or how people *describe* what are doing, is another way in which hustling occurs within CreateSpace and Maker Jawn. This tactic can be seen within the inception of both “TechniGals” and “Reading & Making.” While these programs rely on activities that are very similar to their previous initiatives, they are also made distinct because how these activities are positioned – that is, not only what they are, but also their eventual goals.

While making has been connected to a wide range of different objectives (e.g., becoming producers instead of consumers, community-building, equity in education, etc.⁴¹), “TechniGals” capitalizes on the Maker Movement’s particular focus on STEM education. The online description of “TechniGals” reads as follows: “Join the Middletown Free Library in working to inspire young girls to engage in STE(A)M activities and careers” (“TechniGals” website, n.d.). Additionally, the program is affiliated with Penn State Brandywine⁴² and its long-running “STEM Options” public outreach program. This focus, however, differs slightly from other CreateSpace programs. The library’s popular “Minecraft in Real Life” program, for instance, centers on trying to engage kids ‘off the screen’ by participating in tangible, hand-on activities inspired by the popular video game (Glendening, interview, 9/2/15). In this way, it

⁴¹ These different objectives have been described throughout this dissertation, see the introduction, the literature review, and the previous chapter for some examples.

⁴² Penn State Brandywine is MFL’s partner in the ILEAD grant. The campus is located less than two miles away from the library.

stresses both experiential learning and creative expression rather than STEM learning. Despite these differently stated goals however, “TechniGals” and “Minecraft in Real Life” have incorporated similar projects and technologies, including 3-D printing, littleBits, MaKey MaKey⁴³, and sewable electronics. While both programs have essentially the same foundation then, they are conceptualized and *described* differently in pursuit of different support opportunities.

The “Reading & Making” program similarly relies on discursive shifts in order to justify its relevance and importance. During a staff meeting shortly before the official start date of the program, Ramos worked to explain this linkage between the two activities using several rhetorical moves. Rather than thinking of it as an “academic skill,” she described how she conceived of *reading as a form of making*, alongside other skills such as filmmaking or coding. According to Ramos, all of these activities involve “producing, and not consuming ... meaning from experience” (as quoted in fieldnotes, 6/17/2015). Thus, even though the structure of “Reading & Making” differed from the regular school year program (e.g., three weeks of required participation, directed use of iPad reading apps), it also incorporated many of the same basic maker activities, including producing stop-motion animation films, using MaKey MaKey, or creating dioramas. However, as hypothesized by Ramos (fieldnotes, 6/17/15), these activities could actually have a *different meaning* for participants within the program since they would be linked with the activity of reading, storytelling, and ultimately meaning-

⁴³ MaKey MaKey is a MIT Media Lab-founded “invention kit that encourages people to find creative ways to interact with their computers, by using every day objects” such as fruits, play-doh, water, and other human beings “as a replacement for keyboards and mice” (“MaKey MaKey Quickstart Guide,” n.d.).

making. Whether or not this truly occurred cannot be answered here⁴⁴, however, it is important to note again how the affiliation between making and reading was made in order to seek support from the “READ! by 4th” program, and thus, working to strengthen its status as a legitimate program within the larger system of the library.

In attempting to connect seemingly different goals and/or activities then, both Ramos and Glendening were actively implementing a particular technique of hustling which Steele has called the act of ‘massaging’ grants (interview, 3/7/16). Steele (who was mentored by Ramos) describes it this way:

Theresa ... understood how the system worked... She could figure out how to use grant money from one grant to support another grant and figure out the thread that could combine everything... *the term she uses is, she finds the “golden thread” between all of the grants, like what are the things that make these all go together. One could be positive asset based community development, or like you know, social justice for youth or something like that. And [once you] define that thread... all of the work that you do... feeds all of those grants cause they're all kind of inspired by the same thing.* (emphasis added) (interview, 3/7/16)

In essence, what Steele describes – the act of identifying, defining, and acting upon the ‘golden thread’ – is a complex discursive hustling move. It requires reframing activities and goals conceptually rather than materially, and then using this framing in order to gain further support.

Regarding these discursive moves, I argue that it is the flexibility of making as a term that actually makes this kind of hustle easier. Much of this has to do with the (brief) history of how making has been defined within the movement at-large. While making was initially defined by the use of particular technologies and tools, many within the

⁴⁴ While Ramos and Ramirez were interested in producing evidence of this connection through this pilot, this became challenging. Ramirez made an attempt to collect ‘data’ on all participations of “Reading & Making” but this was derailed by the sporadic attendance of participants (who, as suggested earlier, were perhaps more used to the drop-in format of library programs, including Maker Jawn). In the end, only one of the four sites of this pilot ended up completing the program as planned (fieldnotes, 8/18/15).

movement have become invested in including a wide range of activities under the same banner (see, for example, the section entitled *Crafting and the Nostalgic Dynamics of Making* in Chapter 2). At Maker Faire, for example, more ‘low-tech’ and ‘traditional’ activities such as arts and crafts, farming, and cooking now regularly appear alongside the more expected activities of 3-D printing, microcontroller robotics, and digital media production. This expanded understanding of making as activity can certainly also be seen within the wider world of educational making. While the first *Makerspace Playbook: School Edition* (2014) published by Maker Education Initiative (described in the previous chapter) reflected the initial impulse of emphasizing maker-specific materials and tools, the subsequent revisions of this handbook were deliberately more inclusive about tools, activities, and spaces. For example, the most recent version of the handbook has included scissors and glue guns alongside laptops and 3-D printers legitimate ‘maker’ tools, as well as playgrounds and theaters as legitimate ‘maker’ spaces (Maker Education Initiative, 2015), a move that was actually pointed out to me by a MJ mentor (Trakumaite, interview, 3/25/15).

Within CreateSpace and Maker Jawn, many staff members have also adopted this very expanded and inclusive definition of making. Laura Kuchmay, the adult services librarian at MFL, states: “The definition of making can be anything... it's not designated to one room or one activity” (interview, 9/2/15). Kuchmay therefore includes explicitly ‘high tech’ activities, such as coding and robotics, alongside more ‘traditional’ practices such as quilting and drawing⁴⁵ as maker programs. Hannah Holby of Maker Jawn similarly defines making broadly, stating that it is “any realization of a creative idea”

⁴⁵ One such activity included “Zentangle,” a meditative drawing method introduced in 2004 that has extremely popular over the last decade.

whether its “writing or pictures or movies or organizing something or whatever it is”

(interview, 4/9/15). Furthermore, as Glendening states:

I think people get bogged down [with the idea that making is] all about 3-D printing and technology, and it's not, because *I think a lot of libraries are already doing maker programs. They just don't call it that*, because there was never an effort before to bring this all under one tent and explore it. (emphasis added)
(interview, 9/2/15)

In this sense, it becomes clear that use of particular tools and materials is not as important as developing a particular “maker mindset” (Dougherty, 2013) when participating in these activities. MakerEd’s previously mentioned *Youth Makerspace Playbook* states (2015), for example, that: “Makerspaces, like making, are all about ways of thinking.” (p.6). Ramos further adds that it is a “philosophy,” as well as a different way of looking at things” (interview, 6/19/15). However, it could be argued this is as much a discursive formulation as a cognitive one. Staff at both sites regularly use similar language to talk about the maker mindset, whether this included ideas about open-ended, youth-driven learning, fostering a sense of belief and self-confidence in one’s creative ideas, and not being daunted by failure or frustration (Fialkovich, 8/31/15; Trakumaite, interview, 3/25/15; Widman, interview, 3/4/15). In some sense, much of this talk is drawn from the ‘ether’ of the educational maker network; as described in the introduction, many educators, scholars and activists have linked ideas from the Maker Movement to a wide range of already existing learning approaches and theories.⁴⁶ Rather than positioning this primarily as a way describing some fundamental truth, however, it is important to note how staff members’ active use of the term ‘making’ and related rhetoric also functions as

⁴⁶ These, for example, include inquiry-based learning, project-based learning, tinkering and play, design thinking, discovery learning, and constructionism (Maker Education Initiative, 2015). See also the section in Chapter 2, *Researching Learning within Educational Making*.

its own kind of hustle – something that makes it easier to align one’s organization with the larger networks of the Maker Movement and educational making, and thus aiding in the pursuit of new support opportunities (more about this process will be discussed in the next chapter on producing ‘spin’).

The Problem of Hustling within Mission-Driven Organizations

In this section, I begin to examine the potential difficulties of adopting a hustling attitude within the setting of the public library. As I described earlier, hustling as entrepreneurial activity involves ‘pivoting’ or vastly changing direction. However, as I argue, there are difficulties of doing this within the context of socially focused, mission-driven organizations. In order to understand this, it is important to first describe the relationship between ‘social entrepreneurship’ and mission-driven organizations.

In addition to purely commercial enterprises, the Maker Movement has also been linked to the efforts of socially focused entrepreneurs, or those who hope to push their efforts towards solving societal problems. This emphasis might be said to reflect the historical roots of the movement; as discussed in the literature review chapter⁴⁷, the foundation of the Maker Movement in the counterculture-turned-cyberculture movements of the 1960s and 70s help explain its current focus on both the “communitarian ethos” and dedication to new technologies and tools (Turner, 2006; Morozov, 2014). This dual emphasis remains evident within present-day Silicon Valley, with its ongoing emphasis

⁴⁷ Please refer to the sections entitled *Entrepreneurialism and the “New Industrial Revolution”* and *The Politics of Hacking and Making* in Chapter 2 for a longer discussion on this.

on what Eugene Morozov (2013) calls “technological solutionism,” or the idea that technology is the best way to both identify and solve societal problems.

In the Maker Movement, this impulse can be seen among the many socially focused initiatives that have publicly emerged as a result of this activity. These include ‘social good’-focused products such as incubating blankets for babies in the developing world, or apps that allow citizens to report city infrastructure problems such as streetlight outages and road irregularities (“The Rise of TechShop,” n.d.). Additionally, making itself has been positioned as a tool of social change. Within the MIT-founded Fab Lab, for example, access to and training with prototyping technologies is seen as something that can increase individual agency and “technological empowerment” for under-resourced people from “inner-city Boston to rural India” (“Fab Lab FAQ,” n.d.). Similarly, the emphasis of the Maker Movement on “transform[ing] education” (Dougherty, 2013) is part of this same urge to promote making for positive social ends (Watters, 2013; Morozov, 2013).

While the idea of social entrepreneurship depends upon ideas first outlined within the world of business however, there are certainly ways in which this becomes more complicated within the world of nonprofit institutions. Clearly, a major source of this tension involves the ultimate goals of entrepreneurial activity. While commercial entrepreneurs direct this effort toward personal profit or gain, social entrepreneurs direct their activities toward “the ultimate goal of creating social value” (Abu-Saifan, 2012, p. 22). Oftentimes, these goals are explicitly stated within their particular “mission” statement, or their outline of both *what* and *how* to contribute to the public good (Minkoff & Powell, 2006). Rather than using profit as an ultimate measure of success then, socially

focused nonprofits often use adherence to mission as an evaluative measure of success (Ireland & Hitt, 1992). Additionally, scholars have also described how mission statements have “expressive dimensions” (Frumkin, 2002) in that they allow both staff and benefactors to “express their beliefs through work and donations” (Minkoff & Powell, 2006).

While hustling and pivoting direction might ultimately be beneficial for a commercial entrepreneur seeking profits then, for non-profit socially focused organizations, this activity has the potential to become more problematic. Not only are these organizations more strongly bound to their missions as measures of success, but they also are subject to the desires and commitment of a wide range of stakeholders, including staff, donors and the potential beneficiaries of the social service in question. Thus, if entrepreneurialism emphasizes a quick ability to shift in order to follow funding, and nonprofits emphasize a long-standing adherence to organizational ideology and mission, then how can the work of hustling work in the context of both worlds? In the following two sections, I seek to answer this question by looking more closely the outcomes of hustling within CreateSpace and Maker Jawn, and how this influence their ability to adhere to their original missions.

Looking at the Stakes Behind the Hustle

Drawing from the earlier discussion of the colloquial definition of hustling, it is important to remember that while hustling is acknowledged to be necessary for survival, it is an activity that is often known to be precarious and therefore unsustainable over time (Venkatesh, 2000). The case “Reading & Making,” for example, is exemplary of the

highly speculative and improvisational nature of these hustle activities, something which can be seen through Ramos and Ramirez's reference to the program as a "pilot" (fieldnotes, 6/17/15; 6/24/15). While oftentimes hustles are proposed with at least some promise of getting funding through a grant, sometimes these hustles are implemented even before any possible funding is visible. Hustles are therefore inherently uncertain and potentially destabilizing. While sometimes these impacts are minimal, there is also a strong possibility that these movements can be detrimental. However, as I illustrate below, the degree to which this occurs depends both on their mission (what their stated goals are), and their organizational structure (or more specifically, who makes hustling decisions versus who implements them). The way that all of these factors are related is further discussed below.

The Stable Foundation of CreateSpace's Hustles

At CreateSpace, the shifting and reallocations of resources that arise from hustling generally have minimal impact on the existing foundation of the program because of its particular organizational structure and mission. As mentioned in the previous chapter, the general organization of CreateSpace includes a few maker-focused workshops each month, which are primarily run by Glendening, who is both the head of CreateSpace and the Library Director of MFL. These events are often divided into different 'streams', such as "Minecraft in Real Life," or "Maker Camp." In general, the hustling efforts described earlier yield to new program streams, which are usually easy to implement. The reason for this is because of overall looseness and flexibility built into CreateSpace. First, while sometimes programs adhere to a semi-regular schedule (e.g., every other Thurs), the

schedule often changes based on other events within the library, or even Glendening's own obligations (e.g., when she has to attend a library board meeting, family vacations). Second, different CS program streams do not generally run continuously or indefinitely; in order to accommodate new hustles, she often replaces existing series (which have low attendance, for example) with new workshops with different formats and themes. For example, since my observation of the program from 2014-2015, Glendening has replaced older formats ("DIY.org club," "Curiosity Hacked" events) with an ongoing series of littleBits-themed workshops in order to accommodate their previously mentioned status as a 'global chapter' of the company. In this way, hustling does cause *some* reorganization of resources such as staff time and space, but these are easily adapted into the existing structure of the program.

One major exception to this rule was the "TechniGals" STEAM camp, which was a huge undertaking within the context the entire library. The program required an extensive amount of reorganization regarding space, staffing and time. The camp took place over five consecutive mornings in August 2015. It ran from 9am to 12:30pm, thus interfering with the regular opening hours of the library from 10am to 8pm. Additionally, the program accommodated many more participants regular CreateSpace workshops. Rather than accommodating 6-8 participants and 1-2 facilitators per program, "TechniGals" included around 30 middle school girl participants, and about 8-10 staff. In order to accommodate both the increased size and overlapping schedule, Glendening had negotiated with the library board for a delayed opening time at noon. Glendening had also enlisted much of MFL's staff to assist with the camp. Instead of assuming their regular library duties, they assisted throughout the week during the mornings.

Regarding staff and space reorganizations then, it could be argued that “TechniGals” did potentially take away from regular CreateSpace programming, as well as the library’s main function as a public space. Some library programs were suspended for the week, and there was at least one boy who stated that he was sad he was not allowed to attend the all-girls camp. Additionally, some of the library’s regular patrons were inconvenienced by the delayed opening; many showed up throughout the week and were turned away before noon. One might argue, however, that these hindrances were minor⁴⁸ and that the implementation of “TechniGals” actually benefitted CreateSpace as a whole. The program allowed for them to reach different types of audiences – not only girls from within Middletown Township but also from other nearby towns and suburbs. It also helped them to raise the profile of CreateSpace within the community (as provider of educational and entertainment experiences), and to form a connection to Penn State Brandywine, something Glendening had been interested in doing for a while. Finally, it boosted training for its staff on maker technologies and practices, since Glendening, Fialkovich, and Kuchmay were all able to attend a professional development workshop in Harrisburg, PA, as part of winning the ILEAD grant. In other words, while there were some minor disruptions caused by “TechniGals,” in the eyes of Glendening, these were far outweighed by the benefits of running the program.

Glendening’s decision-making process here helps demonstrate one major factor that influences the impact of hustling on CreateSpace – its organizational structure. As mentioned earlier, the ‘managerial distance’ between administrators (who decide about hustles) and workers (who actually have to implement these changes) is very important in

⁴⁸ For example, the boy who complained about not being able to participate in “TechniGals” was actually Glendening’s own son, who is a regular at all CreateSpace workshops.

determining the ultimate impact of hustles upon the ground-level workings of the program. At CreateSpace, there is no space between the top-down hustle and the bottom-up implementation because it is only one person who responsible for both activities; the program follows the vision of one individual (Glendening), who is also primarily responsible for running the program. This idea was, ironically, made clear to me one day while I was at Maker Jawn. I had been having a conversation with a MJ mentor, Gregory App. He had asked about the organizational structure of CreateSpace, and I explained that it was mostly planned and executed by one person. In response, App had commented that Glendening was lucky in this respect – she had control not only of the future of the program, but also her own role (i.e., employment) in that trajectory (fieldnotes, 2/2/515). Obviously, this was something he did not personally feel within the context of Maker Jawn, something that results from its different employment structure (more on this later).

In addition to organizational structure, another reason why the hustles did not significantly derail CreateSpace is because of the nature of its mission. As elaborated by Glendening, the goal of CreateSpace is accommodate public’s rising interest in new ‘maker’ tools and technologies such as 3-D printers and microcontrollers. This goal is illustrated through the description of CreateSpace on MFL’s webste:

We offer a variety of equipment of tools that you can use in the library as part of a program or make an appointment to use on your own. We are working to offer some of our tools, equipments [sic] and kits to check out with a Delaware County Library card. Educators and Librarians working in Delaware County will soon have the opportunity to check out a 3D Printing Kit to use at their school or library thanks to a partnership with 3D Systems through their MakerLab Club program. (“CreateSpace@MFL,” n.d.)

Thus, in an attempt to “stay relevant” and respond to “what’s going on in the larger world,” the library works provides its patrons access to new and novel technologies and

tools, which might otherwise be out of reach or cost-prohibitive (interview, 9/2/15). In this way, Glendening positions its maker program as just one of many tangible resources that the library can provide, whether it is books, internet access, or public events. From this perspective, the many hustles perpetuated by Glendening almost always support CreateSpace's mission of increasing patron access to new tools and materials, since they almost always include provisions for new purchases, and/or new training of its staff. As will be discussed below, this significantly contrasts the situation at Maker Jawn, which is both a larger program with more staff, and one whose mission depends more heavily on the interactions between this staff and its participants.

The Shifting Foundation of Maker Jawn's Hustles

Compared to CreateSpace, hustling at Maker Jawn is generally more unstable, due to a greater number of factors such as its size (more staff, more sites), its employee structure (one advisor, one coordinator, and a large team of part-time maker mentors), and how it is situated within the larger system of FLP (that is, how it has to compete with numerous other initiatives for resources). By far, the greatest impact of this hustling resulted from the redirection of staff time and efforts. Originally, MJ mentors were free to divert all their hours toward the execution of their free form, afterschool maker sessions for youth. Not only did this include time on the floor working directly with participants, but also time dedicated to project preparation and professional development. Through weekly "tinkering sessions," mentors worked to expand their skills and develop new creative projects for the program.

As MJ expanded and more initiatives were initiated however, staff time was increasingly directed toward these hustles. For “Reading & Making,” I have already described how mentors’ attention was diverted into several new tasks (e.g., learning assessment, publicizing and signing up participants, managing new equipment).⁴⁹ This was also true for other hustles. For the multi-generational initiative, for example, some mentors were transitioned away from working with youth afterschool, toward working with adults during the day. As described by several MJ mentors, this reshuffling (which also occurred because the staff funding changes further described below) certainly influenced the quality of the afterschool sessions. With only one mentor on the floor (rather than two), it became more difficult for young participants to get the individual attention or assistance required for their unique pursuits or projects (fieldnotes, 6/24/15). Arguably, this diversion of attention also hindered the daytime sessions for adults. While some mentors would have liked extra time to figure out how to best implement a new strategy for engaging a multi-generational audience, there was no space for this within the context of the rapidly diversifying MJ program to do this. As a result, mentors had to rely on their existing activities, rather than working to develop new strategies.⁵⁰ This general lack of time and space to plan was further intensified by the reduction, and eventual elimination, of the previously mentioned “tinkering sessions,” which had formerly been used as a time for sharing experiences and working to develop a set of best practices for the program (Steele, interview, 3/7/16). Overall then, because mentors’ time

⁴⁹ Here, it should be noted that some mentors mentioned feeling woefully unprepared for these responsibilities. Many feared they lacked adequate training to teach children how to read, or to assess student learning – something that made sense, since many of them primarily had art or technology, rather than teaching or education, backgrounds (fieldnotes, 6/24/15).

⁵⁰ One exception included the work of former MJ mentor Sean McCoy. His work and the entire multi-generational initiative is something that will be further explored within the next chapter.

was already “spread thin” (Guglielmino, interview, 4/1/14)⁵¹, the addition of these responsibilities and diversions of time and attention were perceived by many as to weakening, rather than strengthening, the existing basis of the program.

Here, it is important to mention yet another factor that significantly influenced the stability of Maker Jawn during my fieldwork – the shifting employment situation of the mentors themselves. When I first started observing Maker Jawn, Ramos and Steele had established the enviable goal of stabilizing staff funding through the acquisition of several city-funded, renewable, 10-month library positions. At the same time, they had also won the IMLS grant for multi-generational programming. Shortly after the announcement of the award however, the city had a hiring freeze. The library positions – which had seemingly staved off the necessity of hustling, at least in the short term – were now on the brink of being eliminated. From the outside, it seemed as if the half-million dollar grant should have been able to make up for this loss. However, MJ project coordinator Sarah Winchowky described to me her powerlessness to do this, since the original proposal had only allocated funds for purchasing equipment and materials, and only four (instead of 15) part time staff. While there *was* a possibility of submitting a budget revision to IMLS, Winchowky told me how she had been discouraged away from this by both MJ advisor Ramos and the FLP grants office, since it might reflect poorly on future grant proposals (fieldnotes, 6/3/15). Thus, in order to deal with this situation, Winchowky worked to reshuffle the funding structure of the program in order to maintain as many staff members as possible, albeit on an unstable, temporary basis.⁵² Thus, just as

⁵¹ It should be noted here that MJ mentors work part-time from 15-20 hours per week.

⁵² This involved a creative accounting solution of splitting the money originally intended for the four three-year long positions amongst the many more MJ mentors, thus temporarily extending their rapidly expiring

Maker Jawn was dealing with an abundance of funds for equipment and supplies on one hand, they were also dealing with the imminent loss of their staff on the other.

This crisis, in tandem with all the other responsibilities and staffing reallocations described above, generally put substantial strain on the staff, something that was further magnified by the organizational structure of the program. Earlier, I described how CS primarily depends on the vision and work of one person. At MJ, however, there is a noticeable distance between the administrators, who make decisions about the hustling activity (i.e., primarily advisor Ramos, and to some extent, coordinator Winchowky, and the outside consultant Ramirez), and the large corps of MJ mentors, who are responsible for implementing these hustles.⁵³ As mentioned earlier, the hustles of Maker Jawn are often made to align with the existing program, either through rhetorical or material justifications – for example, positioning iPad use as a form of technological literacy, or reading as a form of making. While these moves seemed logical for those more distantly connected to the day-to-day workings of the program (as demonstrated by both Ramirez and Ramos’ interviews), they did not seem to make sense those on the ‘front lines’ of Maker Jawn (i.e., the mentors working in the branches). In other words, since staff of MJ did not have any control over the direction or focus of these activities, they were constantly at the mercy of the administrators’ ongoing hustles.

10-month long city positions. While this solution was helpful in the short-term, it was always acknowledged by Winchowky (and the mentors) to be untenable moving into the future.

⁵³ To some extent, this is very much *literally* true; by the time I had started my fieldwork, Ramos was “semi-retired” and living, for the most part, in Peru. However, throughout my time there, she was still actively advising and working with Winchowky and the FLP administration. As a result of this, she visited FLP several times during the Spring and Summer for meetings, though rarely actually visiting the branches to observe MJ in action (though she had prior to her retirement).

In this respect, the process of hustling certainly had an effect on staff morale and commitment at MJ, something I witnessed throughout my fieldwork there. By the time I started observe the program, the staff was already aware of the imminent loss of their city-funded positions. While many were still dedicated to the program and the communities where they worked, they were skeptical about their future prospects within the program (something which was further intensified by the lack of transparency of who was going to be rehired and who was not). Many felt actively limited by their material needs; for example, some mentors spoke to me about the stress of not having health insurance or ability to pay their rent in advance.⁵⁴ As a result, throughout the spring and summer months of 2015, many of them actively sought other employment opportunities (something that actually was encouraged by Winchowky). Ironically, the library did end up renewing the city positions in Fall 2015. However, by then, most of the mentors that lived through the months of uncertainty ended up leaving the program; out of the 15 maker mentors that worked there when I first started my field work, only two remain in the program today.

Beyond this feeling of personal insecurity, Maker Jawn mentors also described the emotional toll of dealing with the uncertainty of the program as a whole. In between staff meetings and their work in the library branches, I had dozens of conversations with mentors (and Winchowky) about their shifting, growing feelings of frustration. This included anger directed at the individuals who were seemingly responsible for these ‘hustles’ (i.e., Ramos and occasionally Winchowky), at the library administration (who

⁵⁴ It should be noted, however, that despite this, most of the Maker Jawn staff come from middle class backgrounds and only live this paycheck-to-paycheck existence because they are working artists, rather than in salaried, full-time professional jobs. In other words, this lifestyle is a result of choice rather than structural circumstance.

were perceived by some as hypocritical, since they lauded the program publicly, while simultaneously withholding support behind the scenes), and at the overall structure of the system (i.e., the city budget problems, library bureaucracy, the cycle of nonprofit funding generally). The biggest frustration that mentors seemed to voice, however, was that these ongoing ‘pivots’ would end up destroying the program that they had worked so hard to build. This is something that several mentors voiced to me throughout several informal conversations I had with them throughout the spring (e.g., fieldnotes, 4/15/15; 5/20/15; 6/3/15; 6/12/15; email, 5/27/15). Mentor Klevence perhaps best described this feeling during his interview:

At the end of the day, my heart hasn't fully been in the game, because it's like you don't- You're telling me one thing; you're doing another. I have no idea how you're manipulating this thing that I helped make a year-and-a-half ago to actually continue on in a reasonable way- or like a healthy way, really. (emphasis added) (interview, 4/8/15)

In this way, the kind of hustling that occurs within the context of Maker Jawn harkens back to the colloquial definition of the term as kind of illicit or ‘inappropriate’ activity. While acknowledged to be necessary for economic survival, oftentimes, this might be accompanied by an idea that the actions involved might not feel good, or even ‘right’.

Connecting back to the earlier discussion then, one big issue to consider when looking at the impact of hustling is how it has the potential to alienate employees by derailing an organization’s mission. While CreateSpace focuses primarily on providing access to new technologies (perhaps an easier goal to fulfill), Maker Jawn’s mission is more focused on the nature of people’s interactions with technology – namely, how people use these technologies and what potential impact this has on their lives. As explicated on their website:

Maker Jawn aims to provide a unique space for community members in North Philadelphia Free Libraries, where self-directed experimental and experiential learning is promoted through a focus on creativity, critical thinking and skill-building. (“Maker Jawn – About,” 2016)

As described by Sellers, this mission generally followed conversations between MJ staff members in the early days of the program, where they had talked about their desire of “breaking out” of the ‘traditional’ “conventions of education” (interview, 4/15/15). Namely, this involved challenging teacher-driven pedagogy and heavily prescribed content, and moving toward youth-driven creative activity, with an emphasis on process and design. In general then, much of this mission depended on the *relationships* formed between participants and mentors, people that Steele described as individuals who would “be willing to listen...understand...and meet [kids] where they are at” rather than dictating what they should learn (Steele, interview, 3/7/15). Rather than emphasizing technology then, the mission of MJ depends on the engagement, and thus commitment, of the facilitators of the programs themselves. As a result, the hustles of Maker Jawn have a greater potential to disrupt the balance of the existing program, since it involves not only more people, but also their actual feelings toward the program. Here, however, it is important to note the difference between the individual impacts of hustling versus the organization impacts. In the year following my fieldwork, MJ is still actively running, staffed by entirely new mentors (except two) and seemingly going strong. While I did not observe this period of ‘recovery’ (since it was outside the scope of my research schedule), it does point to the potential resiliency of the network. In other words, while

hustling may have detrimental effects on particular individual in the moment, these same movements may still yield long-term organization success or sustainability.⁵⁵

Thus, when considering the entire process of hustling then, it therefore becomes essential to consider not only the particular moments through which this translation occurs (i.e., how the libraries shift into place), but also how susceptible and/or resilient the entire actor-network is to these hustles, something which can only be ascertained by considering both the material and affective basis of its existing connections.

Conclusion

In this chapter, I have worked to describe the ways that nonprofits are engaged in the constant reshuffling of resources for the purposes of seeking funding (the cycle of hustle). As I have illustrated, there are ways that this very act (which is initially designed to support the existing program) can end up having potentially disruptive effects on the ongoing maintenance of the program, essentially by engulfing the rest of its staff, space and materials in its pursuit. However, whether or not this occurs depends on the actual composition of the organizations themselves – namely, this is related to how staff are incorporated (or not) into the main mission of the program, and also how close decision-makers and on-the-ground workers are. Only by considering these factors, can one answer the question of whether or not this ongoing process is sustainable and, ultimately, productive. In next chapter, I deal with yet another factor in program maintenance – acts

⁵⁵ Of course, one might argue against the success of these hustles since all but two mentors that I interacted with have left, and many people still seem disillusioned by their experience working there. Additionally, it is unclear how much these hustles and staffing changes influenced the participants of Maker Jawn, many of whom formed personal connections with individual mentors. This, however, is outside the scope of this dissertation unfortunately.

of recording and reporting on activities, or what I call “spin.” As I will discuss, spin is intimately connected to the process of hustling; however, because it produces the lasting representations of this activity for the future, it also brings up essential questions surrounding the eventual meaning of the practice.

CHAPTER 5**Documenting the Trend:****The Inscription and Translation Practices of Producing ‘Spin’****Vignette – Live Streaming with CreateSpace**

When I walked down into the basement recreation room at Middletown Free Library, I was surprised to see the new arrangement of the space (fieldnotes, 8/11/15). I had been assisting with their ‘Maker Camp’ programming for a few weeks, and had been used to a more loose organization of the room. Normally, kids would be huddled together at different tables spread across the space, tinkering with some new tool or device. However, this August afternoon all the white plastic tables were pushed to one end of the room and neatly arranged in row. Several kids were already sitting at the tables, all facing toward the south-side wall of the room. There, someone had placed the rolling desk with the huge iMac desktop monitor and computer. I walked toward Glendening, and she leaned over and explained that they needed to all be in view of the online camera perched on the desk, in prep for the afternoon’s Maker Camp live streaming broadcast.

I had learned about this opportunity from Glendening several days earlier. After seeing a call online, she had applied for CreateSpace to act as the “local affiliate” participant for that afternoon’s live stream. While the main focus of the online Maker Camp program was their curated set of DIY projects for kids posted on their website, they also supplemented these with daily videos featuring interviews with a wide range of

‘makers’ – from electronic musicians to robotics engineers to astronauts⁵⁶. The video for this afternoon would feature Aardman Animation, the British studio behind several well-known claymation films and television shows, including *Chicken Run*, *Wallace and Gromit* and most recently, *Shaun the Sheep*.

“There’s a lot of people here that I don’t recognize,” I comment. Glendening nods and tells me about her last minute publicity push: wanting to make sure they would have enough people, she send out an announcement over the library email lists earlier in the week. “It filled up right away,” she tells me with excitement. I look over and silently note that all the tables are full, with over a dozen kids – more than handful I usually saw in workshops in the previous weeks. They all seem to be looking at the monitor in front. On the screen, a twenty-something man and woman are seated in wooden shed that opens out to some greenery in the background. Both are facing toward the camera and wearing Maker Camp t-shirts. They introduce themselves to all of us as “Camp Directors” Paloma and Burke and throughout the last few weeks, we have watched as they have hosted the daily videos.

I look at the clock and note that we have a few minutes until the live broadcast. While the kids seem ready, Glendening takes the time to make some last minute changes, asking several participants to switch places. After she finishes, she explains: while Maker Camp mainly focuses on targeting teens, the CreateSpace participants are mostly elementary to middle school-age children.⁵⁷ Because of this, she moved the older kids

⁵⁶ On the first day of Maker Camp that year, famed American astronaut Buzz Aldrin was a guest on the live stream.

⁵⁷ Glendening later informs me that all Maker Camp local affiliates had generally engaged younger kids that year. As a result, the larger organization shifted the subsequent year’s program to focus on this particular group: 8-12 year olds (interview, 9/2/15).

(who were still only 12-14 years old) toward the front, along with some younger regular participants as a sort of ‘reward’ for consistent attendance. She relegates other younger participants and several pre-teen girls I had never seen before further back. I walked toward the rear tables – one girl seemed to be sulking, while her shyer friend seemed satisfied. As she rolled the ball of clay we had provided for the day’s activity, she told me that she didn’t mind, as long as she could see what was happening.

Finally, it seemed as if the people at Maker Camp were ready to go. After welcoming the viewers to the live stream and introducing the guests, Paloma speaks directly to the kids at CreateSpace, asking them to introduce themselves and to answer the question: “What do you make?” Earlier, Glendening had already determined who was going to speak – regular CS attendees who seemed old enough to fit the target demographic. A brown-haired boy sitting in the front row speaks first: “Well, my name is Jeremy and I like programming, so pretty much like making websites or mods or something like that.” The hosts respond with smiles and high praise – “Programming is awesome!” Paloma exclaims. The next speaker, Jeremy’s sister, is sitting in the second row. She tentatively answers: “I like cooking?” She almost seems afraid her answer might not be acceptable. However, both camp directors burst with approval – “Cooking is a great way to make things!” “What better than to eat the experiment?”

The final speaker is Ava – a 13-year old regular attendee of Maker Camp, whom I had been working with on-and-off throughout the summer. I have come to learn that she is a bit of a rebel, so I wonder what she will say. Both hosts look expectantly at her. She looks at them and declares: “I’m Ava and I like rescuing pets.” There is a brief pause. It almost seems as if Paloma and Burke do not know what to say at first – while computer

programming and cooking clearly fall under their rubric of maker activities, they seem a bit more puzzled about how to spin this. Both speak cautiously: “Nice.” “Wow.” Paloma continues haltingly: “That’s a- just- a great, great way to spend your time.” Burke nods in agreement and Paloma seems to hit her stride: “That’s very noble. Thank you for doing that.”

Back on track, the hosts both quickly move onto the business of the rest of the video. They welcome the guests from Aardman Animation, and continue onto the day’s activity: making claymation models based on the character, Shaun the Sheep.

Introduction

The brief vignette above illustrates the main focus of this chapter, namely the ways that educational maker programs work to both record and represent their activities for an outside audience, or what I call producing “spin.” While the term has been used colloquially for many years in reference to storytelling (to ‘spin a tale’), “spin” has arisen as a popular term to describe professional practices of deliberately shaping public perceptions ever since 1984 U.S. Presidential Campaign, with the rise of “spin doctors” (“Etymonline,” n.d.; Sumpter and Tankard, 1994). At the time, the work of these individuals was often cast in negative light – working to support particular clients or organizations rather than the general public, and generally providing less than accurate, “reactive” responses to oftentimes negative events (Sumpter and Tankard, 1994). While this negative connotation has clearly remained for some – especially within the world of politics (Beard & Cerf, 2015; Greenberg, 2016), the term has also come describe more general practices of strategic storytelling for the purposes of gaining support for some

cause or group.⁵⁸ Within the world of entrepreneurship, for example, the ability to self-promote and positively present one's ideas is often conceptualized as positive attribute that advances one's future chances (Garland, n.d.). As I will argue, this particular practice of spin – or the purposeful creation and dissemination of particular narratives surrounding one's activities – is actually essential to the practice of 'hustle' (as described in the previous chapter). In other words, the task of gaining ongoing support and promoting self-sustainability (hustle) is actually maintained through the creation of spin, whether within grant proposals, conference presentations, or postings to social media.

This connection, for example, can be clearly seen within the above vignette, where CreateSpace's participation within the Maker Camp video served to support the ongoing hustle of MFL as an educational making organization. While the library did not receive monetary or material assistance for their participation (except the modeling clay for the activity), they did receive other kinds of support. By participating and providing a tangible record of their engagement, they gained some amount of visibility within the network of the Maker Camp and the larger network of the Maker Movement. On one hand, this was the outside consequence of the activity – to further support CreateSpace's claims of membership within the educational making community. On the other hand, there were numerous internal consequences of this activity as well – namely, how the on-the-ground experience of everyone involved in the activity was shaped through the acts of planning and producing the video. Glendening's email about this event not only publicized it, but also made it into a kind of 'media event' for the library – one that

⁵⁸ In this way, the positive, more strategic, connotation of term also borrows from its uses within sports contexts – that is, skillful manipulation of a ball in order to advance winning, such as in baseball, pool, or bowling.

clearly galvanized more participants than would have normally attended. Additionally, for the participants, the goals of the workshop shifted. Rather than only working to please themselves with their creations, the young participants focused their efforts on producing unique artifacts to show-off to the video hosts and guests from Aardman Animation, as well as the entire live audience of the streaming video.⁵⁹ Put another way, the act of spinning that day had both intended and unintended outcomes, which radically shifted the experience of making for both the participants and the facilitators.

Instead of thinking of spin as a subset of hustling then, in this chapter I consider the production of spin an activity that deserves its own analysis. Specifically, I look at how the practices of recording, translation and representation actively work to shape and influence not only what a program is, but also what it becomes throughout time. In order to do this, I focus on two primary aspects of spin throughout the rest of the chapter. First, I examine the actual *process* of how spin is created: how things are recorded about particular activities and how these are translated into the ‘appropriate’ narratives. My main purpose here is to identify the wide range of *recording practices* (e.g., taking photos at events, creating sign-in sheets, video recording kids’ responses to activities), as well as *translation practices* (i.e., converting the collected ‘raw’ information into final ‘products’ or forms including blog posts, online articles, etc.) within these sites. Here I ask: what is the “substance” that is people want to capture or “inscribe” about these activities (Latour and Woolgar, 1979), and what is the process through which this is converted into durable and mobile forms for particular audiences? After this discussion, I then move onto the

⁵⁹ For instance, at one point, the hosts asked to see some models, and kids held up their unique creations to the camera. This included one female sheep with a bow on her head, and “punk rock” sheep with a Mohawk ‘haircut’. The hosts later on asked for campers to post these up onto the Maker Camp Google+ Page for the rest of the online community to see.

outcomes of this process of spin. If these forms are intended to transmit information to others for the purpose of gaining more resources, how successful are they at this goal? Why or why not? Additionally, how might these actual processes shape the actual organizations themselves, both in terms of the management or administration of the programs, as well as the personal experience of the staff and participants?

As I will demonstrate, within the context of these educational maker programs, spin can be understood as the act of creating effective narratives out of the collected ‘bits’ of information for the purposes of ‘fitting’ into the larger network of the Maker Movement. As will be seen throughout the rest of the chapter, activities that ‘translate well’ will continue to be supported and maintained, while ones that do not are often pushed aside or eliminated. I argue, however, that there is a way that the very act of ‘fitting’ – or reshaping activities for the purposes of creating desirable narratives – can itself become a new productive activity for these sites moving into the future. That is, while spin is originally intended to support the ongoing maintenance of the existing program, it is an activity that becomes generative, since it comes to shape not only *what*, but *how* these programs acquire meaning for the people involved. Before moving onto this empirical discussion however, I begin this chapter below by describing how the entire Maker Movement conceptualizes the idea of spin, or the practices of documenting and sharing about maker activities. Conceptually, I situate this phenomenon within the larger theoretical frameworks of both “inscription” (Latour and Woolgar, 1979), and ‘legibility’ (Scott, 1998).

Documentation, Inscription and Legibility within the Maker Movement

One of the major differences between the current day Maker Movement, and the related phenomenon of the past (e.g., the DIY movement, the Arts and Crafts movement) is how the former defines itself through the possibilities of recording and circulating material made available through the Internet. Numerous ‘spokespeople’ within the movement (Latour, 2005) have described the importance of both documenting and recording what one makes, alongside the actual processes of producing tangible objects. For instance, Mark Hatch (2013), the CEO and co-founder of the well-known commercial makerspace TechShop, describes ‘sharing’ as the second of the nine foundational tenets of his “Maker Movement Manifesto”⁶⁰. He states: “You cannot make and not share” (p.1). Similarly, Chris Anderson (2012) describes the ability to record and share project ideas, designs, and specifications as an essential aspect of the “new industrial revolution” that has been spurred on by the Maker Movement.

Within the world of educational making, numerous groups and advocates have also described the importance of documenting and sharing. For example, both iterations of Maker Education Initiative’s how-to ‘Playbooks’ highlight these practices as good for both pedagogical practice and organizational self-maintenance. The first edition of the playbook has an entire chapter dedicated to “Documentation,” which they define as “sharing projects ... and the stories behind their making” (Hlubinka et al. 2014). In general, this practice is positioned as an effective way to get participants to reflect upon their individual processes of making, and to maintain records of their ongoing progress

⁶⁰ The other tenets Hatch (2013) includes in his manifesto are to: make, give, learn, tool up, play, participate, support, and change (p. 1-2).

(something which is further supported by MakerEd’s Open Portfolio Project)⁶¹. The revised edition of the playbook additionally promotes the practice of documentation by connecting it directly with the issue of hustling for support. Rather than standing as its own section, “Documentation” is actually included under the section labeled “Sustainability.” The authors state:

One of the most useful, powerful, and important actions to encourage in your makerspace is also oftentimes one of the most overlooked: documentation. Without it, what goes on in your space stays there, new audiences are harder to attract, lessons from experiences are not captured, and reflection is not as supported... *capturing the work of your makerspace is incredibly vital to sustaining the space* (emphasis added). (Maker Education Initiative, 2015, p. 60)

Thus, as popularly defined, makerspaces and maker programs are highly dependent on the processes of spin – not only for the purposes of supporting its participants, but also promoting self-sustainability.

From the perspective of Actor-Network Theory, these recording and sharing practices also become essential for sustainability since the form the basis of connections between different actors. As Latour (2005) describes, these activities work to ‘articulate’ and ‘localize’ interactions that occur in different spaces and times within a network, often through particular forms: for example, architects are connected to university students through classroom blueprints and construction specifications, citizens are connected through paper voting ballots to the state. Actors are thus bound together in networks through these practices of inscription and circulation. Perhaps one of most notable examples of this within Actor-Network Theory can be seen in Latour and Woolgar’s

⁶¹ The MakerEd Open Portfolio project focuses on supporting young makers in creating “portfolios” of their maker projects and efforts as a form of credentialing and/or assessment. The project’s main goals, according to their website, are to develop “a common set of practices” and standards for both creating and evaluated these objects (“About the Open Portfolio Project,” 2016).

(1979) anthropological study of the laboratories of Roger Guillemin at the Salk Institute. Through their account, Latour and Woolgar re-frame the entire laboratory through the perspective of producing scientific papers for publication – that is, positioning this entity as a giant apparatus designed for the singular purpose of “literary inscription” (p. 45). As they describe, all activities within the lab are essentially in support of this particular goal, whether it is extracting biological samples from dead rats, printing out a data sheet from a computer, or discussing the slope of a graphed curve. All of these practices are therefore part of a “prolonged series of transformations,” wherein “matter” is transformed into “written documents (p. 50-53). “Considerable energy” is thus devoted to “devising ways of attaining some readable trace” of their work (p. 53), which is subsequently translated into scientific papers and disseminated through the regular process of academic information sharing. In this way, the eventual worth of the laboratory is primarily defined through the content of these papers and their circulation, rather than actual “material” occurrences in the space (that is, what occurs ‘on the bench’). From this perspective, this idea about inscription can also be seen at work within educational makerspaces. In the *Youth Makerspace Playbook* (2015), for example, the authors describe a similar sentiment with regard to documentation, stating:

Without it, what goes on in your space stays there ... the kinds of opportunities that come from having well-documented and publicly available work cannot be overemphasized. (p. 60)

Thus, within both spaces (laboratories and educational makerspaces), analysis of final documents becomes a form of value determination. The media documents that emerge from this work (e.g., scientific papers, a blog of a maker program) not only document the material work of these sites, but also serve to constitute its worth in the wider world.

From this perspective, it additionally becomes important consider the actual content of these documents – how well does this content reflect (or not reflect) the intentions of their creators? In other words, do these documents communicate the desired messages to the appropriate audiences? In trying to understand this issue, I draw here from James Scott’s (1998) work on “legibility,” or the practices of governments trying to understand, manage, and ultimately shift social experience. Scott focuses his analysis on “large-scale schemes” of the state to ‘improve’ society, whether the Soviet collectivization of farming or villagization in Tanzania, which have usually sprung from “a state’s attempt to make a society legible” (p. 2). As he describes: “certain forms of knowledge and control require a narrowing of vision” (p. 11), which typically includes reductivist impulses that require abstracting and summarizing complex realities that surround spaces and people. However, rather than merely describing, oftentimes these standardized organizational categories (whether land acreage, crop yield, or universal surnames) can actually work to the “shape a people and landscape” so that they actually “fit” these particular “techniques of observation” (p. 82). In other words, because the systems are given “the force of law” through affiliation with a governing body, they end up actively shaping human experience (p. 3). For example, Scott describes how the development of standards in describing land value (the yield of a particular crop, for example) explicitly influences how farmers use the land – in order to raise the monetary value of the land, farmers might increase growth of this more valuable crop in place of more naturally occurring plants (which might actually been essential in the maintenance of a local ecosystem). In this way, the everyday world of the farmer has been shifted through the active enactment of legibility.

In this way, acts of documentation and recording might also work to reshape other practices and spaces. For instance, if a laboratory's value is determined by the impact ratio of its papers (number of citations) (Latour and Woolgar, p. 74) then presumably the pursuit of this standard could influence what happens in the space. Similarly, if an educational maker program's value is determined by either the number of attendees or blogs posts written, then it is plausible that this might actually end up forming the basis of the work, in place of more organic ways of measuring success. Put in another way, attempts to make a social experience more legible are always at risk of shifting the experience itself – legibility becomes a managerial strategy.

The idea that legibility is influential is certainly not new within educational practice. The development of content and testing standards could clearly be considered strategies through which educational work in schools is made more legible for an outside audience: students' test scores are thought to reveal something fundamental about the quality and effectiveness of teachers and schools. Thus, while the original goal of tests (or "assessments") was to keep track of an individual student's progress and to aid individual teachers in the classroom, the passing of the "No Child Left Behind" Act (NCLB) and similar policies has made it such that these tests in aggregate are now seen as the best way to evaluate the effectiveness of a school or district at-large. As discussed by numerous scholars and practitioners in the field, the development of this 'high-stakes testing regime' has certainly had pernicious effects on the U.S. public education system. Numerous well-documented issues have arisen from the government's increasing reliance on these tests. At the classroom level, this includes negative pedagogical effects, including a move away from more holistic teaching practices toward a greater focus on

‘teaching to the test’ and ‘drill and kill’ methods (Jerald, 2006). On a school wide level, this includes more publicly visible impacts including: the elimination of subjects that are not measured through high-stakes testing (social studies, the arts) (Whitehorne, 2006), school closings that many have thought unjust (Hudson, 2012), as well as the more damaging incidences of administrators and teachers who try to combat this by knowingly altering test scores in order to save their jobs and schools (Strauss, 2015). Perhaps in a more invisible way, such emphasis on testing can also occasionally work to perpetuate structural inequality, through supporting such questionable practices of favoring some populations over others in terms of school admissions and expulsions, based on (often faulty) assumptions regarding their academic potential (Kamenetz, 2015).

When looking at these educational makerspace then, it is important to consider how their practices of legibility and spin may similarly have negative effects on the actual on-the-ground practices of the sites. On one hand, it is not a direct comparison since school test scores measure different things than the spin documents of these educational makerspaces – the former foregrounds the progress (or not) of the learners, whereas the latter foregrounds on the experience of the educators. On the other hand, these media documents (whether blog posts, videos or lesson plans) are used for the purposes of evaluation and measurement; that is, just as authorities measure the effectiveness of schools through test scores, the success of these programs is evaluated based on the quality of these forms of spin. In other words, these documents can have the same productive and/or destructive potential as high-stakes testing. In the rest of the chapter then, it remains important to consider how these forms may yield particular effects. Before describing this, however, I move onto describing the actual spinning practices of

both Maker Jawn and CreateSpace.

The Processes of Recording and Translating Maker Activity

In this section, I examine the actual inscription and spin practices of staff members at Maker Jawn and CreateSpace. As MJ mentor Holby stated to me during her interview, “everybody is always saying document, document, document” (interview, 4/9/15). For both sites however, the process of documenting involves two major steps – first, actually capturing information about particular activities, events, or situations through a specific method (its *recording* practices), and second, processing and/or compiling these bits of evidence into some desirable narrative about the same phenomenon (its *translation* practices).

A simple illustration of this two-step process can be seen through Maker Jawn’s method of keeping track of who participates in its programs. In order to keep track of their attendance, the program has instituted the use of the sign-in sheets for their regular afternoon maker sessions. Basically, these are blank lists where youth are asked write their names down as a marker of their involvement. Use of these lists may therefore be understood as a recording practice, however, the information captured by this process is then translated into a number of different forms. For instance, in their final grant report for the LSTA Creation Grant received in 2013, Maker Jawn included the following statement regarding numbers of attendees:

At Lillian Marrero and Kensington [branches], 310 unique participants have taken part in Maker programs, with 55 returning participants. Accounting for all six sites, 588 unique participants have participated in Maker programs, with 103 regular attendees. There has been an average of 7 participants per program. (“LSTA Creation Grant – Final Report,” 2014)

In this instance, the ‘raw’ data regarding MJ attendees was captured through numerous sign-in sheets, and subsequently ‘processed’ by staff members, who compiled and cross checked the numbers in order to create the above statement for the purposes of the final grant report.

In addition to these sign-in/sign-up sheets⁶², staff at Maker Jawn and CreateSpace utilize a range of different recording and inscribing practices, including photographing and/or video recording, creating schedules and calendars (to keep track of dates and quantities of events), and keeping a record of “written observations” from particular programs (“LSTA Creation Grant – Final Report,” 2014). Occasionally, this ‘raw’ data is directly presented to particular audiences – for example, when event photos are posted online without much explanation or contextualization, as is often seen in CreateSpace’s Facebook page. This occurs most often, however, with regard to the actual projects of the youth participants themselves (e.g., stop motion animation films, 3-D printed figures), which are often directly put on display for the public at-large. At CreateSpace, this is usually accomplished by turning the main floor of the library into a makeshift exhibit space, whereas at Maker Jawn, kids’ projects are additionally posted online either to social media sites (YouTube, Soundcloud, Flickr) or their blog. As products of spin, these photos and artifacts are often assumed to ‘speak’ for themselves, especially when aimed toward a general audience for the purposes of publicity (and attracting new participants).

⁶² CreateSpace also keeps track of their numbers served through attendance lists; however, while Maker Jawn uses sign-in sheets to keep track of attendance *while* the program is taking place, at CreateSpace, people are often required to sign up for an event *before* it actually occurs, usually through email or Event Brite (an online event management system). This is mostly a matter of logistics; since MFL is smaller library that does not get much foot traffic, Glendening wants to check if people will actually attend before setting up an event.

Occasionally, these same pieces of ‘raw’ data are also often directly presented to funding organizations as forms of evidence. For instance, within Maker Jawn’s final report for their 2013 LSTA grant, photos of staff trainings and kids working on different projects, as well as observational notes from the program, are both presented as supporting documents or ‘proof’ of the actual work of the program (“LSTA Creation Grant – Final Report,” 2014).

Beyond these more material forms of data, however, staff at CreateSpace and Maker Jawn are also invested in capturing more *intangible evidence* of program ‘effects’ – namely, the “stories” behind the making of a project or a particular making ‘process’ (Hlubinka et al., 2014). As stated within the *Youth Makerspace Playbook* (2015): “The stories of how anything is made, attempted, discovered, and explored are among the greatest things that will ever be made in a makerspace” (p. 60). While this practice is considered important for the people who participate in making (giving them a chance to process and reflect), the authors of the Playbooks also stress its role in organizational sustainability. As described there, storytelling itself is a practice that has real currency within the nonprofit world, something that is reinforced through their reference to the guidebook: “Stories Worth Telling: A Guide to Strategic and Sustainable Nonprofit Storytelling” (2014). This guide, released by Center for Social Impact Communication at Georgetown University and the Meyer Foundation, outlines how developing compelling narratives is key to generating philanthropic support. This is reinforced by Glendening of CreateSpace, who stated in her interview:

When you're talking to people that are going to give you money, they don't necessarily care that much about the numbers. They want to know, how did this change somebody's life? Or how was the impact on people? I think there's more

moving towards having both [numbers and stories]. (interview, 9/2/15)

In general, funding organizations support this need for both quantitative and qualitative data. For example, the final reporting survey for the LSTA Creation Grant (which both Maker Jawn and CreateSpace have won) requires both program *outputs* and *outcomes*. Whereas outputs reference quantities (“What was created for the project and how much?”), outcomes describe more abstract incidents, which include “the extent and kinds of impact the project has on its participants,” whether “the target audience’s skills, knowledge, behavior, attitude, status, or life conditions” (“LSTA Creation Grant – Final Report,” 2014). Thus, while outputs may be conceptualized as more ‘raw,’ outcomes are clearly more processed.

In terms of its mechanics, this process of generating stories generally involves collecting raw bits of information about the program – photos, notes, and memories from an event – and interpreting within some kind of legible framework. Here, that involves invoking the popular discourses of making, whether the terminology (“tinkering,” “play,” etc.), or the numerous claims that have been made regarding maker activity (potential of increasing interest in STEM topics, acquiring a sense of agency over one’s surroundings, etc.). In the Maker Jawn blog, for instance, mentors have provided descriptions of youth activities that are actively contextualized within this rhetoric; these include looking at origami pyramid folding as a STEM activity (Shin, blog post, 1/9/15), and playing with alligator clips and LEDs as forms of “tinkering” and “improvisation” (App, blog post, 4/7/14). Additionally, this also includes support of both sites’ own definitions and measurements of success – whether developing productive ways of dealing with failure and frustration (Widman, blog post, 3/25/15), or moving beyond the screen for “in Real

Life” engagement (“CreateSpace@MFL Facebook Page,” 2016). To quote Fialkovich of Middletown Free Library, it thus becomes “the library's job to take that mentality for a Maker program and utilize it and adapt it to other programs” (interview, 8/31/15). From this perspective, the production of these translations and stories actively works to provide evidence not only for popularly agreed upon assumptions surrounding making, but also individual organizations’ own goals and purposes.

Beyond evidence, however, sometimes the process of creating spin involves actively reaching out to the wider ‘maker community’, whether other similar organizations (e.g., libraries or museums with youth maker programs), or larger maker-specific organizations (e.g., Instructables.com, Maker Camp). For the most part, this usually encompasses more active forms of translation, producing what I call “best practices” products – easy-to-consume forms of spin that provide advice or ‘lesson learned’ for other organizations looking to start or grow maker programs. For example, these include articles for online publications (e.g., *Library Journal*; *Library as Incubator Project*; *Kids, Code and Computer Science*)⁶³, presentations at public events such as “Maker Faires,” and academic and professional conferences (e.g., American Library Association Annual Conference, International Society for Technology in Education, Digital Media and Learning) or other media (online presentations, webinars, books)⁶⁴. Sometimes this practice of translation is pushed even further through the production of more ‘actionable’ (and readily applicable) forms of spin, including lesson plans or project instructions, where activities are broken down into explicit sets of directions for

⁶³ See, for example, Enis, 2015; Tait and Steele, 2014; Slavin, 2015.

⁶⁴ For example, Maker Jawn produced a three-part webinar series called “Maker Programming on the Library Floor” (2013; 2014; 2014), whereas Glendening of CreateSpace also wrote a book based off her experience with the “Minecraft in Real Life” series (Glendening, 2016).

educators or facilitators. Within Maker Jawn, this mostly involves the wide range of curriculum and “tool user guides” that they post on their website (“Maker Jawn Curriculum,” 2016)⁶⁵, while CreateSpace has accomplished this through the project instruction posts that they have created as a result of their participation with Instructables.com “Build Nights” (“Instructables Member – micreatespace,” 2015).⁶⁶ By producing these documents and sharing them, CS and MJ are thus able to participate within the wider network of maker organization, through contributions to the public store of knowledge surrounding maker practices.

While staff at both sites are involved with the practice of collecting and translating data, it should be noted here that CreateSpace generally tends to present more raw forms of data (numbers, photographs) than Maker Jawn. Mostly, this is a result of its smaller size and capacity: it is only one site with one main facilitator. However, Glendening has expressed to me an interest in compiling more stories (i.e., more ‘processed’ data) moving into the future (interview, 9/2/15). This is likely a result of her participation with the ILEAD program (the TechniGals summer camp funder described in the previous chapter); through that grant, Glendening and two of her staff (Fialkovich and Kuchmay, the Youth and Adult Services Librarians) received training in ‘maker’

⁶⁵ Since Fall 2014, Project Coordinator Winchowky has made an active push for mentors to create more curriculum. While some of these were initially created for the internal use (for example, “tool user guides” for technology such as a Zoom H4next Handy Recorder and the Brother XL2600 sewing machine), others were explicitly produced for public distribution (and include topics such as “Guidelines for Making Movies in Libraries,” a “Wind Powered Cars” challenge, or creating a “Magic LED Lantern”) (“Maker Jawn Curriculum,” 2016).

⁶⁶ As part of their agreement for participating in the company’s “Build Nights” (for which they received free materials and tools), Glendening and Fialkovich have posted several “Instructable” project directions on the website. For example, Glendening created an Instructable called “Make Your Toys LEGO Compatible,” which described a project that she implemented during the *Sugru* Build Night at Middletown Free Library, which included both notes and photos from the event.

documentation practices, including creating surveys and gathering video testimonials from participants. It remains to be seen, however, how thoroughly these new information gathering and translation processes will be adopted; it is entirely dependent on the (limited) staff time of Glendening and other librarians.

Maker Jawn, on the other hand, dedicates much more employee effort and hours into the processes of generating spin. This is primarily because of its size (more sites, more staff), as well as its placement within the larger hierarchy of the Free Library of Philadelphia. Here, there is a more formal process of recording, transporting and converting data: all mentors are required to keep track of Maker Jawn projects and general occurrences within particular branches. These notes and photographs are then converted to other forms, including lesson plans, blog posts and monthly reports. While the lesson plans and blog posts are meant for public consumption, the monthly reports are designed for internal distribution, for other MJ staff or FLP administrators (e.g., executive and grants staff, branch managers). While these reports are meant to keep administrators in the loop, information from these is also sometimes excerpted for other more public documents, including grant proposals and reports, public presentations, and publicity materials. In general, this process can end up taking a significant amount of hours per week – something which some MJ mentors described as potentially problematic, since it takes away time from actually running the maker workshops and sessions. In general, the differences in scope between these two sites in terms of their spinning practice is something that will influence its eventual impact – both in terms of how external and internal parties respond these products. This will be discussed in the remaining sections of this chapter.

The Productive Power of Spin, or Does it Translate Well?

Considering the processes and forms of spin, the question now becomes how well these products actually fulfill the desires of the administrators of these programs – are they legible, and to what degree? While there is no doubt that these products of spin may accomplish something (even if a small amount of publicity), whether or not they actually accomplished their intended goals depends on how well they ‘fit’ within the larger maker narrative (and actor-network) that the administrators of these programs are interested in pursuing. As I argue, products of spin that fit well are often kept (along with their attendant activities), while ones that do not are often eliminated, whether representationally or in actuality.

One useful illustration of this practice of ‘fitting’ a product of spin to a desired narrative (and its related organizational goals) can be seen through the purposeful crafting of CreateSpace’s public website. As mentioned in the previous chapters, the mission of CS is to promote use of new technologies and materials within the library. This message is made very clear within the website, which generally highlights the technological aspects of the program above other elements. For example, most of the space and text of CreateSpace’s pages are dedicated to 3-D printing. This is accomplished by providing: 3-D printing FAQs for interested patrons, ways to contact staff about submitting a design for printing, or additional resources to learn about the practice. Additionally, the other text and visuals of the website highlight CreateSpace’s technology-heavy ‘branded’ programs, including “Maker Camp,” “littleBits” workshops (based on the modular electronics kit manufacturer, for whom they are Global Chapter), “Minecraft in Real Life” (a program based off the popular kids’ videogame), and “TechniGals” (the ILEAD-

funded girls' STEAM summer camp). The result of promoting all these technology-based and/or branded programs is that it "hides" (Latour and Woolgar, 1979) the more 'mixed' reality of their programs, which also includes many 'low-tech', arts and crafts elements. This includes activities such as making paper-based flipbooks, decorating desserts, or crafting musical instruments out of everyday objects (all projects that I witnessed in action at CreateSpace). In this way, the website highlights the particular elements that allow the program 'fit' better within larger narrative of the Maker Movement – promoting CreateSpace as technological-based, tool-heavy makerspace.

While the example of CreateSpace's website illustrates how certain actions may be *hidden* from the public, occasionally, there are times when the 'mismatch' between the products of spin and their intended narratives actually lead to the *elimination* of activities and/or individuals entirely. A very clear example of this can be seen through trajectory of Sean McCoy, a former Maker Jawn mentor hired specifically to support the program's cross-generational maker initiative. As mentioned in the last chapter, the goal of this initiative was to develop a new model of maker activities that could engage both youth and adults. Initially, staff had focused their energies on getting adults to participate in similar activities as youth – for example, stop motion animation, 3-D printing, or playing with electronics. However, these efforts were not particularly successful, mostly because of the specific demographics of adults that staff encountered. While the youth-based program took place after-school and attracted a wide range of kids, the adult-focused sessions took place during the day and attracted a more limited group – namely, the people who usually frequented these branches at this time, including: unemployed people (who were often primarily seeking internet access and/or vocational help),

homeless people (for whom the library has long served as a safe, climate controlled space) and recovering drug addicts (who often came from the rehabilitation clinics that were located near the branches where the adult maker sessions took place).

While mentors were interested in engaging this mixed, more ‘vulnerable’ population, they were generally unsure of how to do this; their usual tactic of attracting participants through use of maker tools and projects was not particularly successful within this context. McCoy, however, took an entirely different approach. Rather than starting with any particular projects, materials or tools, McCoy first focused on establishing a personal connection with patrons, and attempting to learn more about their lives. In an interview, he stated:

It initially starts with just gaining relationship with these folks and also building rapport with them. Once you build the rapport and start the relationship, then I'll see some of their skillsets and see what they would like to work on. (McCoy, interview, 3/24/15)

As a result of this approach, McCoy generally spent much of this time just sitting and talking with patrons. It would often be days before he would even introduce any particular projects or technologies; mostly, this would arise out of people’s own goals and desires. For instance, McCoy eventually ended up working on a wide range of personalized and varied activities, such as helping a local hair stylist start an Instagram account where she could post photos of her work, assisting a local drug recovery group in launching a weekly newsletter, and working a local (homeless) artist on creating pieces for the tabletop role-playing game “Warhammer 40,000” (interview, 3/24/15; fieldnotes, 3/19/15 and 3/24/15). In this respect, McCoy described his interest in helping people “create content *for* themselves,” thus giving them a vehicle to share their “voices” within

the community.⁶⁷ Mostly, this work was driven by McCoy's own previous experiences – as he explained to me, he shares a similar background with many of the patrons since he is both African-American and from a similar demographic (though, he grew up in New York rather than Philadelphia)⁶⁸ (fieldnotes, 3/19/15). Additionally, McCoy also drew from his previous experiences a “Digital Resources Specialist” in FLP⁶⁹ - a job that required him to assist patrons in branch computer labs, and thus gain more familiarity with their daily needs and material circumstances. As he explained, while it might have been easier for kids to jump in and play with new technologies as part of Maker Jawn, it would have been a tougher sell for adults in these communities. He states: “A guy that just lost his family and living in an abandoned house, you try to tell him to work on a project when he's trying to save his life. There's some difference.” (interview, 3/24/15). Thus, rather than trying to push projects or technologies onto this population, McCoy described the necessity of bringing in digital technologies in ways that made sense people in their everyday lives.

Despite the fact that he had success enlisting adults into MJ programming with his particular approach however, McCoy eventually left his position at Maker Jawn during the tumultuous period of staff cuts discussed in the previous chapter⁷⁰. When I asked

⁶⁷ In fact, McCoy expressed to me his interest in creating a documentary out of the Cecil B Moore branch called “The Voices,” which highlighted the different patrons within the library and what that community space meant to them.

⁶⁸ As mentioned earlier, this is in contrast with most of the other mentors that I interacted with during my fieldwork, who were predominantly white and middle-class. Prior to and following this time, however, there were mentors and administrators of color, including K-Fai Steele and Khaleef Aye, who both helped to found the program. These were still the minority among the larger group though.

⁶⁹ Along with McCoy, there were several other MJ staff who also worked as Digital Resource Specialists (DRS). These included Winchowky, Steele, and App.

⁷⁰ As described in the chapter on ‘hustle’, this was because of the loss of the numerous “city funded” positions within Maker Jawn, which supported most of the mentors within the program (all but 3). Interestingly, many other mentors assumed that McCoy would be able to stay on with “foundation funding”

Winchowky about this, she explained that he had left on his own accord but that it was mostly due to the fact that McCoy had not been engaged with fulfilling the expected quota of lesson plans and blog posts (fieldnotes, 8/20/15). Specifically, I inquired about the particular projects that he had been working on; this included a short documentary on homelessness and foster care that he posted MJ's YouTube page called "Safe Haven" (2015), on which he worked as a consultant. While Winchowky agreed that this was 'good work', she also expressed how 'no one' really even knew about it since he had not written a blog post about it or publicized it through the other channels of spin within the program (fieldnotes, 8/20/15).

On the one hand, this illustrates the importance of products of spin in the process of evaluating, judging, or even acknowledging work – in the words of MJ mentor Holby, the "mentality" of "we have to share everything we do or else it didn't happen" (interview, 4/9/15). On the other hand, one could see the difficulties of actually encompassing all of McCoy's work into these standardized products. Because all the projects were so highly individualized, they could not be easily 'fit' within the seemingly universal, contained form of the Maker Jawn lesson plan. In other words, the complexity of the situations was limited by the standards of the form. Thus, even though Winchowky acknowledged the potential usefulness of his mode of interaction, Sean's work was not only 'hidden,' but eventually eliminated as a result of its illegibility. Here then, it can be seen that the productive value of spin is only as good as the message that it carries – something that depends entirely on the match between the form and the intention.

However, while this anecdote illustrates the potentially destructive nature of spin, in the

because he had been hired specifically for the IMLS Intergenerational Grant. As discussed here, however, this was not the case.

next section, I look at how these same practices may yield unexpected results, and may even become a constructive force moving into the future.

Dealing with the ‘Messy’ Work of Educational Making

In the previous section, I addressed the question about how acts of recording and translation can end up shaping the management or administration of educational maker programs – because forms of spin are the standards through which individual activities and people are valued, it very much matters what kind of products one creates and if they are legible within this system. However, while that process involves the intended outcomes of spin, in this section, I focus more on outcomes that arise *unexpectedly* as a result of this production. More specifically, I discuss how the act of producing spin and ‘fitting’ within particular narratives can itself become a productive, generative process. As I will argue, the process of inscription and translation takes up a significant amount of effort and time, and thus can actively shape staff’s in-the-moment experiences, as well as their understanding of these activities moving into the future. Mostly, this occurs because these practices give people channels through which to develop a rationale and sense of coherence behind the often messy and chaotic work of educational making.

By definition, the work of facilitating an educational makerspace is inherently messy. While traditional ‘instructionist’, ‘teacher focused’ educational methods emphasize prescribed structures, activities and content, educational maker approaches privilege following the interests of learners themselves, and thus, moments of improvisation and discovery. Scholars studying making as a pedagogical method have relied on an array of concepts and terminology – including ‘tinkering’, ‘play’, and

‘experimentation’ – to describe this more loose assemblage of factors and in-the-moment learning. A more thorough discussion of these terms and their relationship to established pedagogical principles and methods (e.g., constructivism, constructionism, experiential learning, project-based learning) can be found in the earlier literature review chapter (see the section entitled “Researching Learning within Educational Making”).

Despite the fact that these methods are thought to benefit students, the actual management of these types of learning arrangements has become an issue for many practitioners and scholars in the field. Rather than depending on the traditional role of a ‘teacher’ or ‘instructor’, different educational maker organizations have relied on different types of roles, including “shop coordinators” and “mentors,” who gently guide and suggest, rather than direct and lead (Hlubinka et al., 2014). Additionally, the work in these loosely arranged spaces often requires varied kinds of assistance and expertise, since it accommodates different people are doing different things at different times. Within a typical MJ afterschool session, for example, there may be multiple stream of activity happening at once, each requiring different kind of knowledge and/or skills. The first day I observed a MJ session, for example, I saw some kids working on Styrofoam plate screenprinting with mentor Sari Widman, while others were working on *Garage Band*⁷¹ with mentor Gavin Riley, and still others were working on independent projects such as making a purse with the sewing machine, and constructing and decorating a cardboard box (fieldnotes, 2/25/15). As described by Riley, the “most challenging thing” about working at Maker Jawn is learning to “adjust... to a situation that's like never really consistent... it's different kids everyday, ... [engaged in] something different, new

⁷¹ *Garage Band* is an electronic music program for Mac computers – something that Riley is familiar with because of his personal background as a musician.

projects” (interview, 3/4/15). Compare this, for example, with the work of a ‘traditional’ classroom, where the ideal involves everyone moving at the same pace, with the same content and/or activity.

This kind of messiness is something that I certainly experienced on a personal level through my work as a volunteer facilitator within CreateSpace. While there is generally a singular focus on skill or project within CS workshops (as described in Chapter 3), I also experienced these moments of seeming chaos – juggling in between multiple people with differing goals. Oftentimes this was due the fact that kids were all encouraged to go at their own pace, and free to explore other related topics at their will. For example, one day during a Maker Camp session, the proposed project was to build a perpetual motion fountain with empty water bottles and play-doh as a sealant. However, after finding out that the play-doh was actually water soluble (i.e., it dissolves in water), some kids more were interested in experimenting with that rather than finishing the fountains. Thus, the work of facilitating the workshop that day not only involved understanding how to complete the project, but also how to support kids’ other interests and goals (fieldnotes, 7/7/14).

Within Maker Jawn and CreateSpace, facilitators have different strategies for dealing with this kind of inherent messiness. For instance, both Glendening at CS and MJ mentor Sari Widman have used the physical arrangement of the space (e.g., the placement of the tables and seats) to help shift or control the social interactions and participant experiences of the activities. Widman even wrote a blog post about these attempts, describing how moving a single table into her line of sight can help shift the energy of a particularly “hectic” maker session (blog post, 3/25/15). Other strategies have

included adding material constraints (limiting time spent playing on iPads, only bringing out particular materials on particular days), and shifting schedules to accommodate structured activities alongside self-driven projects (e.g., at Widener and Kensington, certain days per week are designated as more structured, where as others are more free-form). Beyond these in-the-moment changes, however, I argue that the production of spin also becomes an active way through which to deal with the seeming disorder of the educational maker experience.

‘Fitting’ in as a Productive Practice

As I discussed earlier, staff at these educational maker programs are responsible for inscribing and translating information about maker activities as a part of the process of generating spin. While this practice is initially designated for outside audiences, I argue that it also can help staff to deal with the seeming chaos of the activities by giving them a tool to help organize and make sense their experience. This is especially true at Maker Jawn, where numerous mentors described their experiences of being overwhelmed and feeling frustrated. After one particularly hectic day at the Lillian Marrero Branch, for example, Widman apologized to me for the “chaos” I witnessed (fieldnotes, 2/25/15) – a sentiment that she reiterated several other times throughout my fieldwork. During another conversation with MJ mentor Holby, she also expressed her anxieties about the inherent messiness of the program, stating: “Sometimes, I’m wondering what are we *actually* doing?” (fieldnotes, 4/1/15). Similarly, mentor Gregory App stated: “It’s fun, but ... it’s almost like treading water at times. You’re just like... I guess I wasn’t prepared for the amount of babysitting work. Or controlling chaos.” (interview, 3/21/15).

From this perspective, the process of recording and translating information can work as a kind of salve against these persistent feelings of frustration. For instance, when asked about the process of blogging, MJ mentor Riley stated: “It’s a really good way to organize your thoughts, and to kind of, quantify a lot of nebulous stuff.” (interview, 3/4/15). He described one example of this process:

You know, yesterday I was like, oh we got a blog post coming up. [I thought] ‘Oh we’ve been doing vinyl cutter stuff for three weeks now [at Cecil B Moore branch], and like, a lot of stuff has happened, so I can talk about that now’, you know? But while I was doing it... I wasn’t really thinking like this would make a really great blog entry... [However now] it’s kind of like- *I’m sort of excited to write that entry because I can track our process, think about where we started, where we came, what issues we had, just like anything else about just that one project and kind of sum it all up, so it’s good for me.* (emphasis added) (interview, 3/4/15).

In this instance, inscribing and processing the information allowed Riley to step back and take the long view of an activity, thus providing him with a greater sense of control and accomplishment. App similarly describes his process writing blogs, stating that the process mostly involves “pleasing myself at first... writ[ing] something I’m proud of or I can stand behind.” (interview, 3/21/15).

As described by former MJ administrator Steele, the reason why this kind of translation, and reflection, becomes important within this setting is because of the unusual pace of libraries. She states:

Basically libraries move at a combination of a really slow pace and a really fast pace. And I think the slow pace is that it’s an institution, and I think that the fast pace is that like ‘oh my god, summer reading is a month away, and... we got this grant... [and] found out we got 60 teens we have to work with starting in two weeks’... And it ends and you’re just exhausted, and you’re like, well that was crazy, onto the next thing. (interview, 3/7/16)

As a result of this pace then, there is little time to actually process what occurs before moving onto a new program. In this respect, the act of spinning – whether through

writing, talking, or even thinking – helps with “getting people out of their frenzied day to day activity and giving them a chance to reflect on the process” (interview, 3/7/16).

In this way, the act of ‘processing’ the ‘raw data’ of the experience is not just for outside audiences, but also for the reflector him or herself. Often, this involves recasting it within more personally meaningful or familiar terms. For instance, both MJ mentors Widman and App have written blog posts where they have interpreted the experience of Maker Jawn through their individual educational and professional backgrounds. Whereas Widman has drawn from her personal experience in art and design – for example, posting on the design thinking involved with creating “copper tape notebooks” (blog post, 8/5/14), App has similar pulled from his training in urban studies – in several posts, he has used GIS (Geographic Information System) mapping software in order to explore the spatial impact of Maker Jawn programming in the city (blog posts, 9/29/14; 2/12/15). Following through with this interest, Widman has also written and implemented a lesson plan that specifically encouraged design-based thinking and problem solving, alongside an everyday practical building challenge with Legos (blog post, 2/26/15). Likewise, App has initiated several geography-focused activities for youth including a light-up map of one’s own neighborhood and a board game exploring public transportation routes throughout the city (interview, 3/21/15). Thus, in addition to increasing facilitators’ own understanding of the activities, these translations can also become explicitly productive in that it inspires new on-the-ground activities of experiences.

Beyond on-the-ground workings of the program, however, here it is important to discuss how this process of producing spin ends up shaping the affective experience of those involved in these program – specifically how belief in these narratives enables the

creation of a productive *culture* of making. While some staff have generally described the ways in which these processes of reflection and translation have been helpful, some have still expressed skepticism about the practice of adopting the maker rhetoric. Mostly, this involves the acknowledgement of the instrumental purpose of the term – the ways in which it is leveraged for monetary purposes. For example, MJ mentor Guglielmino once described making as “a kind of nothing term” that only “exists for funding” (fieldnotes, 2/18/15). Likewise, Riley concedes that he thinks of making as “a little bit of a fad” that “people have kind of like branded in a certain way to make it economically viable” (interview, 3/4/15).

However, both have acknowledged that engagement with this brand not “necessarily a bad thing” (Riley, interview, 3/4/15), since it allows them to acquire ongoing support for their activities. In this respect, it is acknowledged to be a kind of ‘necessary evil’, something that Steele describes this way:

I think it's just like a matter of having whatever that language is, that rhetoric behind what the kids are doing that you can just deliver ... [however] it's hard because you feel like you have to justify... why a program is legitimate or not, which is a bummer about these kinds of programs. But at the same time, it's just a necessary thing, you just have to deal – *you have to have that kind of language in your back pocket, and you have to believe in it too.* (emphasis added) (interview, 3/7/16)

As Steele describes then, belief in the rhetoric is one way through which products of spin can acquire productive power. For instance, Guglielmino described how engagement with the maker brand can be “just a nice way to label like-minded people,” who are interested in finding each other and sharing ideas (interview, 4/1/15). Glendening has additionally described how this practice of spinning can additionally lead to feelings of solidarity and commitment:

I feel like by calling it arts and crafts, people think it's frivolous and it's not very important, but when you make it part of a bigger movement... it elevates it to the level it should be. (interview, 9/2/15)

In this fashion, then, the practice of producing spin – that is, constructing desired narratives for the purposes of fitting into the maker community – might be thought help facilitators not only in developing internal, motivating rationales for their work, but also building feelings of commitment to the wider ‘cause’ of making. In other words, rather than thinking of making as some kind of essentialized activity that brings people together, the process of embracing the maker ethos, discourse and rhetoric (through the practices of spin) can itself become the basis for connection. From this perspective, making becomes a kind of produced *culture*, a shared system of meaning and beliefs, under which people unite themselves in order to accomplished shared goals and purposes. In order words, these practices of spin help to create the personal and collective basis under which making can ultimately become a tangible, productive force in the world.

Conclusion

Within this chapter, I worked to describe the activity of ‘spin,’ or the acts of creating and sharing desirable narratives out of the ‘bits’ of information collected through the activities of both CreateSpace and Maker Jawn. Drawing from the concept of “inscription” (Latour and Woolgar, 1979), I first focused on the actual mechanics or processes of producing spin. This included both *recording practices* – or how staff worked to capture ‘data’ regarding the on-the-ground activities of the program, and *translation practices* – or how staff converted this ‘raw’ information into more polished narratives of making and learning, which were then disseminated to different audiences.

As I described, CreateSpace generally presents more ‘unprocessed’ forms of data (e.g., photos, attendance numbers) as forms of evidence to outsiders because of its smaller staff and scope. However, Maker Jawn, as a larger program ensconced within the even-larger organization of the Free Library of Philadelphia, had more formal channels through which information was recorded, translated, and circulated (e.g., monthly reports, blog posts, lesson plans). Regardless of these different processes, however, both sites generally followed the rules of ‘legibility’ (Scott, 1989), that is, activities (as represented through these forms of spin) that seemed to ‘fit’ better in the larger, more accepted, narratives of making were kept, while others that did not were either hidden or even eliminated. Despite this potentially negative outcome however, there were ways in which the active processes of ‘fitting’ – or trying to reshape activities (or at least one’s understanding of these activities) within these grand narratives – can actually become productive in and of itself. In other words, the active production of spin can sometimes aid in helping to generate a personal sense of meaning and commitment to the larger ‘cause’ of making. In this way, I argue, a kind of ‘culture of making’ is formed – a system of shared beliefs and understandings that provide the foundation upon which future work can lie.

CHAPTER 6**Evaluating the Trend:****The Stakes Behind the Maker Movement as a Media Brand**

Throughout this dissertation, I have worked to illustrate the ways that educational making, as a practice and an idea, gets taken up and implemented within individual educational sites. As I have described, local sites work to establish educational programs by translating ideas about making within their individual actor-networks, therefore yielding their own particular version of what making is. These programs continue to shift and change through the processes of maintenance, which includes the ways that they relate to the outside educational maker organizations by *hustling for support* and *producing spin* – that is, shifting their own resources and ways of representing activities to ‘fit’ outside definitions of educational making in an effort to continue receiving monetary, material and social support. While these processes are designed to support an organization’s existing program, I have argued in this dissertation how these activities may end up engulfing staff within its pursuit, sometimes to the detriment of the organization’s original goal or mission. That is, rather than allowing for the ongoing maintenance of the original educational maker program, sometimes staff is forced to pursue more trendy and/or legible ideas such that they can acquire support from outside organizations or programs.

Within this conclusion, I step back and consider what is at stake with regard to these moves. While hustling and spinning may move a single organization away from their mission and/or goals, how may we conceptualize the effect of this larger trend on

educational institutions generally, as well as society at-large? In order to answer this question, I first start by describing how the Maker Movement itself works as kind of media phenomenon that is supported and spread through particular communicative narratives, texts, and practices. Second, I discuss why this commercialized branding leads to problematic outcomes with regard to the use of educational making as a publicly-aimed phenomenon – that is, it becomes something that is more subject to market demands than guarantees of the public good. Finally, I discuss how we may counteract these moves, both in terms changing the actual practices of financially supporting maker programs, and of studying, analyzing, and understanding these processes.

The Maker Movement as a Media Phenomenon

Despite the fact that the Maker Movement primarily emphasizes in-person, hands-on activity, I argue that it is essentially a media phenomenon, since most of its power derives from the dissemination of particular narratives and concepts about making through the media. That is, even while people are physically producing tangible objects, this only becomes a ‘Movement’ through public declarations of this type of activity through the media. One of the main drivers of the movement, as discussed throughout this dissertation, has been the company Maker Media – the founders of the Maker Faire public events, as well as the publishers of *MAKE Magazine*, alongside other informational resources including their website, multiple handbooks, and guides. In addition to Maker Media, there have also been a host of other media organizations that work in support of the Maker Movement – as seen through the numerous books and

articles discussing the benefits of educational making, or the proliferation of online resources for makers such as Instructables.com, DIYorg, or Thingiverse (an online 3-D design database). Furthermore, as discussed in the previous chapter, one of the main tenets that distinguishes the Maker Movement from previous movements that emphasize hands-on productive work is the sharing and circulation of ideas – something which only becomes possible through the proliferation of digital media in the current era. Groups and individuals who self-affiliate with the Maker Movement are able to do such because of their multiple activities online – whether it is reporting on their activities through blogs or videos, or creating new relationships and connections through social media with others involved in maker activity. Beyond the mere existence of these maker-focused forms, however, I argue that these media actually form the foundation upon which the Maker Movement resides – something that becomes clear when viewed through James Carey’s (2008/1989) seminal framework for understanding the media.

As described by Carey, communication as a process can primarily be understood through two analytic perspectives - as transmission or as ritual. As Carey describe, mhe more commonly held view of communication is as a form of transmission – the way iwhich media forms can literally transmit information from one place to another, usually from some centralized source to a wider audience. From this perspective, the Maker Movement has certainly functioned as vehicle of content transmission; information about maker activities – regarding different technologies and projects, as well as empirical justifications about the usefulness of making – has been transmitted both to and from a wide array of educators, students, and organizations through multiple media forms and narratives.

I argue, however, that the Maker Movement can also be viewed through the lens of the ritual view of communication. From this perspective, communication becomes the basis of activities and practices through which shared ideas and beliefs are built, expressed, and reinforced within society. So, just as the act of reading the newspaper every morning during breakfast can become a ritual that reinforces a particular adherence and belief in national belonging and culture, the many acts of recording and sharing within the Maker Movement can become similarly significant in terms of creating a shared subjectivity. One obvious way in which this has occurred is through the earlier discussed proliferation ‘Maker Faires,’ initially founded and sponsored by Maker Media, which are now held across the United States and the internationally.⁷² These public events act as collective gathering spaces where people not only discuss maker activities, but display, perform, and show allegiance to the entire maker ‘ethos’ – that is, the idea that human beings have an inherent impulse to create things, and that this inclination should be cultivated because it provides positive benefits to individuals and society at-large. Beyond these events however, I additionally posit that the actual acts of recording and sharing (as discussed within the previous chapter) are additionally also a part of this ritual behavior. While these blog posts and videos do record particular kinds of messages and content, it is the process of creating these and the subsequent sense of belonging to a larger movement (described by Glendening in the previous chapter), which forms the basis of the Maker Movement as a kind of collective ritual. This was very clearly seen,

⁷² As described in the introduction, the ‘official’ Maker Faires are held in New York City and the San Francisco Bay Area every year. However, there are numerous other ‘Maker Faire’ events which have sprung up across the nation from the “White House Maker Faire” to smaller-scale “Mini Maker Faire” events in libraries, schools, and amuseums. Additionally, there have been international Maker Faires including “Maker Faire Africa” (a pan-African event, which has been held within Ghana, Kenya and Egypt), “Maker Faire Hong Kong,” and “European MakerFaire” (in Rome).

for instance, in the discussion of the Maker Camp live streaming experience at the start of the previous chapter. The youth that participated in the video were not only doing this to get information on how to construct a maker project, but also as an active and publicly visible form of participation within the movement. Additionally, even the acts of showing off one's creative work through a photo or a video and posting it online become a visceral experience – a staff member asking a shy kid to show off their project for the blog becomes a way of validating the experience of the youth as a legitimate maker within the community through its linkage to the wider network. From this perspective, the communicative acts related to the Maker Movement act as rituals through which the shared world of meaning around making is constructed.

The Maker Movement as a Commercialized Brand

In addition to its status as a media phenomenon, many have additionally argued how the Maker Movement functions as a kind of brand, which is supported by its many iterations within the media. As outlined by Ghodeswar (2008), a brand is a “distinguishing name and/or symbol” which is used to differentiate goods, services, or experiences from others for the purpose of sale in the marketplace (p. 4). Thus, as described by Bean and Rosner (2014) rather than thinking of it as an actual social movement, they position the Maker Movement as a commercialized brand that is used to support the growing maker ‘marketplace.’ Whereas social movements are a bottom-up phenomenon, which are often used in opposition to some kind of higher authority or power, they argue that the Maker Movement is literally used support capitalistic aims. They state: “while it is theoretically possible that DIY may lead to creative

empowerment, the certain result is economic expansion: a new, broad market for routers, drills, and jigs, not to mention magazines and 3D printers” (p. 28).

Beyond these particular objects for sale however, it is also important to keep in mind how the maker name or label itself also functions as a kind of commodity for educational organizations. As described in the first two chapters of this dissertation, the term making has been appropriated by many individuals and organizations to describe a wide range of disparate activities, from 3-D printing and robotics to knitting and canning tomatoes. From this perspective, the label brings a particular benefit to organizations because of how it allows staff to re-categorize already existing activities (e.g., computer classes, arts and crafts) under a larger, more recognizable and appealing brand. Not only does this aid in potentially attracting new visitors and participants, but also in bringing in new resources in terms of material and financial support.

During the early days of Maker Movement, this connection between branding and resource accessibility was both obvious and readily available. Inclusivity was always touted as a key hallmark of the movement, as best encompassed by Maker Education Initiative’s catchphrase “Every Child a Maker.” Initially, there was an abundance of support opportunities from the public and private sector in supporting new makerspaces and maker programs – something clearly evidenced by the trajectories of both CreateSpace and Maker Jawn. Over time, however, organizations that have self-enrolled into this environment have had to work harder and harder to stay relevant and acquire funding within the wider Maker Movement network. This has occurred, I argue, for several reasons. As described within the previous two chapters, only groups or

organizations with the appropriate resources to keep ‘hustling’ and ‘spinning’ remain successful in this arena, whether this includes actual manpower (numbers of employees) or their social or cultural capital (already existing connections to others within the network). Additionally, this model of maker funding does not easily allow for real change or growth because of how definitions of ‘successful’ making has often been delimited through existing standards of evaluation or assessment. In other words, as discussed in the previous chapter on spin, program staff are often made to ‘fit’ their activities within already vetted understandings of what making can look like (e.g., use of 3-D printers, support of STEM learning). While different organizations have used making as a starting point for new programs, these often shift and change over time based on their particular contexts, participants and staff (see, for example, my discussion of this process in Chapter 3). However, the consistency with which people can fit into these popularly accepted definitions of making continues shapes their access (or lack thereof) to existing resources and opportunities.

From this angle, the importance of understanding how making functions as a commercialized brand is understanding how it shapes the existence of those organizations or groups that step into the network of the Maker Movement. On one hand, buying into the rhetoric or belief system behind this movement does provides benefits for those involved – to reiterate staff comments from the previous chapter, use of the maker label can connect ‘like-minded people’ or provide individuals with a sense of larger purpose or meaning when engaging with these activities. On the other hand, entry into this world of educational making can end up covertly enlisting organizations into even larger cycles of hustling and spin, and the attendant states of enduring precariousness. In other words,

because educational making functions as a kind of brand, those that buy into the label are inculcated into the same neoliberal, market logics that control other commercial brands in the world.

It could be argued, of course, that these kinds of market dynamics are not dissimilar from what other nonprofits face. However, it *is* important to note here the specific structural reasons why the kind of marketization within the Maker Movement differs from those other shifts. While many have lamented the privatization of the public sector, what is so interesting about making, as discussed in Chapter Two, is how it originated from the business world (in particular, Silicon Valley). Only after it caught traction as a popular phenomenon did players within the movement start to enlist willing and interested public affiliates. As mentioned earlier, Maker Media has partnered with numerous government programs on particular initiatives, including their high school makerspace program (controversially) funded by the DARPA Mentor Award, the Maker VISTA national service initiative, sponsored by AmeriCorps VISTA, and the White House Maker Faire. From this perspective, rather than private interests encroaching upon previously public domains, the public sector seemed to gravitate toward this private phenomenon as a way to bolster their own efforts in STEM education. Furthermore, as discussed throughout this dissertation, the ethos of making is highly intertwined with the ethos of entrepreneurialism. Rather than being unwilling participants then, it seems clear that the embrace of the Maker Movement by public organizations such as libraries seems to automatically point to the embrace of these capitalist dynamics. In light of these particular mechanics then, what might be done to counteract the negative influence of

forces, while still maintaining the benefits of educational making as both a label and source of shared meaning?

Shifting the Mechanics and Perceptions of Educational Making

Practically, there seem to be several options for combatting the effects of making as an educational brand. One notable area of potential change is the way that funding organizations themselves structure and manage their financial support systems for maker programs. In light of this ‘second wave’ of maker programs, granting organizations might consider focusing more on sustenance of existing programs or long-term maintenance, rather than on novelty and implementation of new programs or spaces. For instance, these organizations might consider more proactively focusing on the issues of maintenance through specific programs or resources. As discussed in the previous chapter, Maker Education Initiative (the nonprofit spin-off of Maker Media, discussed throughout this dissertation) has already started doing this through their chapter on “Sustainability” within their *Youth Makerspace Playbook* (2015). It could be argued, however, that this text (and other related resources) tends to put the onus of sustainability on the local organizations themselves, instead of asking for wider shifts of focus within the educational maker network at large. From this viewpoint, one could imagine how maker-focused organizations could start hosting public workshops and professional development events that not only speak about pedagogies of making, but also directly addresses sustainability and maintenance as key determinants of success.⁷³

⁷³ A model of this kind of program can be seen, for instance, with the organization Beespace, a business incubator based in New York City specifically focused on nonprofit or socially focused organizations. In addition to providing grants and space for startups in this area, this organization provides tangible support

Another potential area of change could be to challenge existing, already accepted, definition of ‘successful’ making in and of itself. As discussed within the literature review chapter (Chapter 2), many scholars have already described how popular understandings of maker activity are often circumscribed by those who have the most visibility within the movement – namely, middle-class, white males working on ‘high tech’ activities such as robotics and 3-D printing. As I have already discussed within my literature review, many critics decried how related practices – including homemade tailoring, car repair, or home electrical work – have often been left to the margins of the Maker Movement, despite their arguable relevance, something I previous described within the second chapter of this dissertation. From this perspective, one proactive change would be to promote alternate definitions of what ‘counts’ as successful making. Only by doing this, I argue, can we transform notions about what and who deserve recognition within the Maker Movement, and likewise, who has access to material support and assistance.

Beyond these practical solutions, however, it should be noted that one of the main goals of this dissertation is shift the actual scholarship and public understanding of the Maker Movement as both a brand and a practice. As described within the introduction to this dissertation, most scholarship on educational making tends to focus on the actual ‘moments of making’ occurring within these spaces, emphasizing what and how *individuals* make. Within this dissertation, however, I have attempted to ‘pull back the curtain’ of maker programs to show how essential it is to consider the *entire surrounding*

network of educational making when trying to understand its actual impact upon people.

As I contend, this includes not only the administrative experiences of those who run these programs, but also how these individuals have to work within the larger nonprofit environment of funding and support. This become essential, I argue, in light of how these competitive dynamics are often hidden in plain sight within these programs since they are cloaked within the auspices of education, which is universally deemed a ‘social good’. In other words, the label of ‘education’ can often quell popular critique, and makes it such that people are reluctant to talk about these behind-the-scenes, perhaps unsavory ways of interacting or administering these activities. From this view, one essential way of challenging the ‘branding’ impulse of the Maker Movement (in terms of how it keeps organizations and people in flux) is to actually recognize our *own* role as researchers in continuing these dynamics. As long as scholars keep trying to pinpoint the ‘essence’ of what good making is, or highlighting ‘best practices’ within the field, we keep the competitive undercurrents of the educational maker network afloat and hidden. Only by working to strip away these blindfolds, however, can we actually start to use the ideas behind the Maker Movement to help to enact real change. This is something that I hope I have started to accomplish through this work.

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