Making Publics: Mobilizing Audiences in High School Makerspaces

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Background/Context: *Researchers, policy makers, and practitioners are paying increasing attention to the educational opportunities afforded by the maker movement—a growing public interested in do-it-yourself designing, remixing, and tinkering using physical and digital tools. While education research on "making" has often focused on informal learning contexts, this article examines the possibilities and tensions that surface as a new urban public high school brings making to the center of its teaching and learning.*

Focus of Study: *This research examines the learning opportunities that emerged as students engaged in their school's Media Production Makerspace. Focusing on the ways students created, remixed, and shared individual and collaborative media texts in the classroom, the study asks: What are the resources and constraints of the Media Production Makerspace's learning ecology for students from nondominant communities, and what practices, tools, and knowledge do students draw on and develop as they engage in school-based making activities and extend those to other audiences?*

Setting: *The study is situated in the Collaborative Design School, a non-selective urban public high school organized around principles of making and the maker movement.*

Research Design: *This study was a social design experiment that followed 45 high school freshmen in the Collaborative Design School's media makerspace over three design cycles during the 2014–2015 school year.*

Conclusions/Recommendations: *The study revealed that the work of cultivating and mobilizing audiences was central to young people's making activities. However, the ways these audiences were cultivated and mobilized depended on a number of historical, cultural, social, and political factors and involved significant labor by multiple stakeholders. To mobilize audiences into meaningful publics oriented toward collective action, young people needed to see themselves as civic actors who could contribute to broader public conversations and whose opinions, perspectives, and experiences mattered. In tracing the tensions that arose in this process of making publics, the authors suggest that integrating makerspaces in schools can lead to powerful learning opportunities and serve as generative routes to civic action for some students but also that makerspaces should not be positioned as panaceas that can be inserted into schools as an autonomous fix.*

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In September 2014, the Collaborative Design School was one of three alternative public schools to open in a large northeastern city district (all names are pseudonyms unless noted). The school was to be organized around principles of design thinking and making—and in addition to regular core classes, the students would participate in three different makerspaces centered on media production, community organizing, and industrial arts. While the project-based curriculum and asynchronous learning model were forward-thinking, especially in light of the national impulse toward urban school reform focused on skill-driven, no-excuse approaches (Darling-Hammond, 2010; Milner, 2013), perhaps the most surprising thing about the school was that it was being opened at all. In the two years prior, the district—facing a $300 million budget gap and having many schools identified as "failing"—had focused its energies on closing neighborhood schools and creating privatized alternatives. The decision to open the Collaborative Design School was not an insignificant investment: amid financial instability and a volatile blend of public and private interests, the district saw the school and its maker-based pedagogy as a promising model that might serve as an exemplar for other schools endeavoring to build iteration, self-direction, and innovation into district structures long-labeled "failures."

This district was not alone. Across the United States, making and its attendant maker movement—a growing public interested in do-it-yourself designing, remixing, and building using physical and digital tools—have found resonance with teachers, researchers, and policy makers dedicated to reforming and re-energizing "failing" schools. In June 2014, for example, when the White House hosted its first Maker Faire, President Barack Obama renewed his commitment to building "a nation of makers" and introduced a series of new educational initiatives that would provide funding and support to transform struggling urban and rural schools into makerspaces, brimming with cutting-edge technologies and bustling with innovation, design-thinking, and entrepreneurship (Kalil & Miller, 2014). In the 2015 *Strategy for American Innovation* report, the White House articulated the value of this educational approach as its foregrounding of "curiosity, tinkering, collaborative problem-solving, and self-efficacy" (p. 69). In other words, in keeping with the larger ethos of the maker movement, such modes of schooling downplay the scripted curricula and circumscribed outcomes often associated with struggling schools, and instead provide supports that allow students to take creative risks, engage in authentic learning, and see failure as an opportunity for growth (Lang, 2013; A. Thomas, 2014).

We have been interested in learning how these maker pedagogies, which have flourished in out-of-school and community contexts, are being

incorporated into more formal educational spaces, especially in light of broader national conversations about educational accountability, reform, and innovation. To that end, we report findings from the first year of a design-based research study investigating the learning opportunities and tensions that arose as the Collaborative Design School implemented a design-oriented maker framework in its initial year. In this article, we focus on the school's Media Production Makerspace (MPM) as a site in which youth participated in making, remixing, and sharing individual and collaborative media texts to represent their ideas. Recognizing that young people are surrounded by a media-saturated landscape, the MPM sought to harness the broader culture of participation associated with digital media distribution (Jenkins, 2006) in order to expand students' opportunities to express themselves and participate in the public domain.

In this article, we frame the learning opportunities and tensions that emerged in the MPM as part of a process of *making publics*, a phrase that signals the mutually constitutive nature of making and its audiences. One of the most motivating dimensions of the school makerspace for youth was its focus on cultivating and mobilizing audiences around students' work. We found that as young people engaged in the process of developing and expanding audiences using new tools and networks, a number of the students began to mobilize audiences and resources toward collective action. In the process of mobilizing audiences into meaningful publics, young people began to see themselves as civic actors who could contribute to broader public conversations and whose opinions, perspectives, and experiences mattered. We also learned that while school makerspaces can offer potential pathways to civic action, educators must remain responsive to the tensions that emerge when students' making activities are made legible to different audiences. Given the legacies and histories of racism, sexism, and other systemic injustices that are intertwined with the institution of school (Warren, Douglas, & Howard, 2016), making practices in schools always operate in relation to sedimented cultural and social histories and resources. In this way, even as participatory, material learning opportunities afforded by the school's makerspaces offered generative routes to collective, public action for some students, they could serve to further disenfranchise or constrain possibilities for others.

MAKING/PUBLICS

This study is premised on the idea that to fully participate as active citizens in their communities and the world, young people must become producers and makers of their own content who understand how to leverage different communication technologies for diverse purposes across various

networks (Ito et al., 2013; Jenkins, 2006; Papert, 1980; Soep, 2014). Such a sociocultural understanding of how young people participate in the world through "new literacies" (Lankshear & Knobel, 2011) recognizes literacy not simply as a bundle of discrete skills related to text decoding, but rather as a social process that positions composition, production, interpretation, and making as central practices situated in larger cultural and ideological contexts. These socially recognized ways of making meaning highlight the collaborative, distributed, and creative ethos of new literacy practices (Lankshear & Knobel, 2011) that expand youth's opportunities to participate in the world around them in consequential ways (Jenkins, 2006). From this perspective, we theorize the literacy practices in the Collaborative Design School's Media Production Makerspace (MPM) through the literature of *making* and *publics* in order to understand how school-based making circulates within and beyond the walls of the classroom, as well as the work necessary to support the generative interplay of makers and their audiences as active participants in the world.

MAKING AND MAKERSPACES

While *making* has emerged as a significant subject in educational discourse across a variety of contexts—presidential addresses (The White House, 2015), professional development workshops (National Writing Project, 2013), symposia in the *Harvard Educational Review* (Halverson & Sheridan, 2014)—its meaning can be slippery. The term itself is nebulous, which not only leaves it open to a plurality of uses by different stakeholders but also allows it to be associated with multiple real and imagined ancestries. The most visible of these lineages is that of Maker Media, the for-profit corporation whose *Make* magazine and network of Maker Faires helped marshal distributed DIY enthusiasts into an organized, branded Maker Movement (C. Anderson, 2012; Bean & Rosner, 2013). However, some observers invoke different historiographies—arguing that making should be seen as the upshot of earlier grassroots efforts that predate Maker Media's founding in 2005. Gauntlett (2011), for example, traced it through the tangled legacies of 19th-century arts and crafts, 1960s DIY culture, and 1980s computer clubs. In education research, some note its parallels with vocational training (Rose, 2014), while others position it in the genealogy of progressive pedagogy—often starting with Rousseau or Dewey and ending with Seymour Papert, who is sometimes styled as the father of the maker movement (Martinez & Stager, 2013). Such disparate lineages braid together a loose tapestry of diverse and, at times, competing values, practices, and assumptions under the rubric of making. For the purposes of this study, we embrace an inclusive definition of making that coheres around the

"creative production of artifacts" (Halverson & Sheridan, 2014, p. 496) within learning environments oriented to problem solving—a framing that aligns with our partners' working definitions of the concept as well as perspectives on new literacies that understand the production of artifacts to be an important means of actively engaging in broader participatory cultures (Jenkins, 2006).

In educational research on making, the variation in these produced artifacts is expansive. With recent pushes to integrate engineering into K–12 education (National Research Council, 2011) and the emphasis on making in the learning sciences (Martin, 2015)—a field with roots in computer programming, robotics, and experiential learning (Kafai, 2006)—most studies tend to emphasize projects with electronic components. While some of these use single-board computer kits like Arduino and Raspberry Pi (Buechley & Mako-Hill, 2010), many expand the notion of programming to include a mixture of crafting techniques and electronic circuitry—for instance, linking microprocessors to other materials using conductive paint, Play-Doh, or thread (Buechley, Peppler, Eisenberg, & Kafai, 2013; Johnson & Thomas, 2010; Qi & Buechley, 2009). However, making is not limited to such technology-driven projects. Along with the production of artifacts, making is also interested in the production of *makers*—people with a disposition for creative tinkering, risk-taking, iterating, and problem solving (A. Thomas, 2014). Dale Dougherty, the founder of Maker Media, called this "the maker mindset," (2013) an orientation disembedded from specific technological practices, which allows it to find resonance outside traditional STEM contexts. For instance, the close association between this mindset and educational frameworks for "connected learning" (Ito et al., 2013) have helped integrate making into National Writing Project initiatives aligned with new literacies perspectives (Buchholz, Shively, Peppler, & Wohlwend, 2014), including discussions of "writing as making" (National Writing Project, 2013). While this open-endedness creates challenges for defining precisely what making is, it suggests that perhaps even more important than trying to define or police the boundaries of what counts or does not count as making is acknowledging that the term has become an available resource that educators and students increasingly use to describe themselves and their practices.

Even with this expansive definition, much of the research on making has been situated in out-of-school contexts like libraries (Bevan, Gutwill, Petrich, & Wilkinson, 2015), museums (Kafai, Fields, & Searle, 2014; Peppler & Glosson, 2013), community makerspaces (Vossoughi, Escudé, Kong, & Hooper, 2013), and summer workshops (Buchholz et al., 2014). This out-of-school emphasis partly reflects the significant investment such institutions have made in providing youth access to makerspaces (e.g.,

Tinkering Studio at the Exploratorium in San Francisco, Maker Space at the New York Hall of Science, MAKEShop at the Children's Museum in Pittsburgh). However, it also signals that the emphasis of making on iteration, risk-taking, and unstructured tinkering can sit in uneasy alignment with certain demands of formal school settings. Nevertheless, making and schooling are certainly not incommensurable. As A. Thomas (2014) noted, many of the qualities and values that making celebrates are those educators have long aimed to promote: lifelong learning, self-directed learning, communication, collaboration, creativity, and design. Following these parallels, some policy makers and school leaders have started imagining how makerspaces might augment formal school curricula. For instance, President Obama's "Nation of Makers" initiative (White House, 2015) provided support for the construction of makerspaces not only in communities and universities but also in K–12 schools. In this way, contexts like the Collaborative Design School represent early efforts to configure makerspaces for use in urban districts where austerity measures have limited resources and personnel. These new initiatives afford researchers an important opportunity not only to examine how participatory learning develops in relation to school-based maker practices but also to trace the tensions, discontinuities, and gaps that may emerge in light of current educational efforts toward increased standardization and accountability.

One important consideration as making is integrated into urban education reform is how the respective discourses of "failure" intersect. In emphasizing risk-taking and iterative problem solving, the making literature often invokes failure as a generative stage in the creative process (Blikstein, 2013; Kapur, 2008). Gabrielson (2013), for example, argued that elements of tinkering—e.g., building, tweaking, adjusting, reflecting, destroying, and reconstructing—are not only integral parts of producing artifacts but also of learning in general. From such a perspective, failure is not a label placed on a completed project but a form of feedback that is meant to inspire future iterations. When embedded in the context of urban schooling, however, it is necessary to note the disconnect between this framing of failure and that of the larger educational infrastructure which continues to be evaluated—and to evaluate—based on a binary scale on which failure is contrasted with success. In such a context—and in places like the Collaborative Design School—failure carries a double meaning that is, at once, generative and evaluative. This tension has led some scholars to question whether the conventional notion of failure is too deeply entrenched in deficit frames—particularly those experienced by students of color and working class youth—to be easily reclaimed for generative making activities (Vossoughi & Bevan, 2014). Such discontinuities demand

that research on making in urban schools attend not only to questions of access and opportunity but also see these as part of more broad mechanisms that have enabled and sustained educational inequities over time.

MAKING PUBLICS

In the context of schooling, curricula and institutional structures make it difficult to replicate the authentic engagement often ascribed to the open-ended process of making. Given these constraints, we find it helpful to theorize the literature of *making* alongside that of *publics*—as there is much to learn by examining the process by which iterative making is made legible to outside audiences, both as a stage in iteration and as the presentation of a finished product. Much has been written on the notion of audience in students' creative and academic compositions. Ong (1979), for example, described how a writer's audience is always a fiction, as writers use textual forms and strategies not only to imagine a potential audience but also to rhetorically bring it into being. Lunsford and Ede (2009) built on this notion of imagined audiences, distinguishing further between audiences that students directly address and those they invoke. In a digital culture, Marwick and boyd (2010) argued that authors still have to imagine, address, and invoke their audiences, but "networked audiences"—made up of real and potential viewers connected in communicative networks that are at once personal and public—require new strategies as audiences converge and coalesce in unpredictable fashion (p. 130). Finding and managing multiple audiences, Levine (2008) argued, is one of the central tasks facing young people now, as new forms of participation require youth to develop their public voice, expressing themselves publicly and taking action on shared issues. A number of researchers have suggested that schools can provide important social scaffolding in developing public voice through media projects, with teachers and peers operating as students' first public (e.g., Buckingham & Harvey, 2001; Rheingold, 2008).

While notions of audience—be it teachers, parents, peers, or strangers—have been helpful for thinking about how students direct their work, we find it useful to distinguish *audiences* and *publics* by foregrounding the collective dimensions of the latter. On this distinction, we follow Livingstone (2005), who wrote, "In a thoroughly mediated world, audiences and publics, along with communities, nations, markets, and crowds, are composed of the same people . . . yet a more satisfactory account maintains their analytic separation" (pp. 1–2). While the concept of publics has a long and contested history, often drawing on the political dimensions of engaging in a shared public sphere (Habermas, 1991) in which some are included and others excluded (Fraser, 1992; Warner, 2002), we focus on the ways

scholars in cultural and media studies have taken up the term to refer to shared culture, knowledge, or discourse that brings people together, often in collective action (e.g., Baym & boyd, 2010; boyd, 2010). Located between audiences and publics, suggested Livingstone (2005), is civic culture, "the locus of identities, values, and cultural understandings" (p. 30) that blends the cultural and political, tied to people's experiences and oriented to shared action. In other words, the tenuous thread that connects *audience* and *public* is forged as the former is mobilized to civic participation, as people are linked in new configurations motivated by ideals of collective action. Whereas audiences are those who hear or encounter student work, publics must be *made*.

To consider how publics are made in the process of mobilizing audiences toward collective action, we draw on Stuart Poyntz's (2009) work theorizing youth media. Building on Hannah Arendt's (1958) conception of publics, Poyntz argued that contrary to many people's ideas, institutions are not central to public life—people's public actions are. Public acts, Poyntz (2009) continued, are "a form of engagement that forces us to experience the undeniable presence of others" (p. 367). Youth media, in this sense, involves public engagement as young people situate themselves in relation to audiences. By centering others, becoming responsive to them, and understanding oneself in relation to them, young people can see themselves as belonging to a shared world. Seeing oneself in relationship to others is fundamentally democratic work, necessary for developing a common world and public culture. Engaging in public action in the presence of others is a way of living that resists homogenization and contests mass production by highlighting democratic plurality. Youth media can contribute to such resistance, foregrounding youth's perspectives and experiences to counternarrate or *restory* (E. E. Thomas & Stornaiuolo, 2016) mainstream or deficitizing representations. Such plurality of meaning making highlights the precariousness and contingency of all representational practices, as one's meanings are always rooted in social and cultural histories that are subject to change upon engagement with others in the world.

This understanding of publics as *made* through mobilization toward collective action brings the frameworks of making and publics together in a way that highlights the contingencies and instabilities of engaging in new literacy practices in schools. We found that the focus on making publics that emerged in the study emphasized the tensions that surface when iterative dimensions of making are mapped onto larger school infrastructures that value correctness, individual competency, and traditional notions of success. We see the translation of making into something legible for different audiences as a locus where these tensions are made visible: for instance, in how audiences for student work can both

motivate and inhibit iteration; in how students' perspectives, cultural backgrounds, and ways of representing themselves are translated, taken up, or silenced by different stakeholders for different purposes; and in how students navigate the demands of divergent forms of "failure" as they work to mobilize audiences into publics. We sought to trace the opportunities and tensions that emerged when new literacies were mapped onto schooling practices with long histories, particularly for students from nondominant communities who often have experienced forms of marginalization or oppression in schools.

METHODS

The present examination of young people's making practices was conducted as part of a longitudinal study investigating the development of students communication, representation, and problem solving practices across the Collaborative Design School's makerspaces. As a social design experiment (Gutiérrez, 2011; Gutiérrez & Vossoughi, 2010), the study was focused on working in partnership with youth and community stakeholders to develop historicized understandings of the school's makerspaces and to develop new tools and practices that produce new learning arrangements, especially for students from nondominant communities (Fishman, Penuel, Allen, & Sabelli, 2012, p. 141). Such a focus on equity extends design-based research methodologies that emphasize the importance of context, iteration, and evidence-based theory building (T. Anderson & Shattuck, 2012; Collins, Joseph, & Bielaczyc, 2003) to take into better account issues of race and power often missing in design-based research (see Vakil, McKinney de Royston, Nasir, & Kirshner, 2016). In emphasizing issues of race and power, this study takes up Gutiérrez s (2011) call for designing consequential educational interventions that radically shift views of learning, foreground perspectives of youth from nondominant communities, and aim to create local and institutional change.

We report findings from the first year of the study as we followed 45 high school freshmen in the Collaborative Design School's media makerspace over the initial 2014–2015 school year. As a methodology rooted in cultural and historical orientations to learning, social design research aligns neatly with the school's focus on design thinking and equity-oriented pedagogy, with the school engaging in three design cycles in its first year (which corresponded with the school's trimesters). As school community members sought to make systematic changes across the design cycles to improve learning in the makerspaces and across the school, we co-constructed the research agenda with key stakeholders (Gutiérrez & Vossoughi, 2010) and worked to make visible our social positionality and

relationships with participants (Vakil et al., 2016). In evolving the research agenda together over time, we attended to the six key design principles Gutiérrez (2011) outlined:

> (a) deep attention to history and historicity, including how they relate to resilience, sustainability, and equity; (b) a focus on re-mediating activity, that is, a focus on reorganizing the functional system rather than individuals; (c) employing a dynamic model of culture with an understanding that cultural and other forms of diversity are key resources for sustainability; (d) a persistent emphasis on equity across the design process in the theorization, design, and implementation; (e) an emphasis on resilience and change, where change implicates the individual, the collective, and the ecology; and (f) an end goal of transformation and sustainability. (p. 192)

Guided by these social design research principles (history, re-mediation, diversity, equity, change, and sustainability), the co-constructed research agenda involved re-mediating the system of learning in the MPM from the bottom up, with all stakeholders encouraging young people to engage in the redesign process as historical actors (Gutiérrez, 2011, p. 192). As a result, the research question guiding this paper was: What are the resources and constraints of the MPM s learning ecology for students from nondominant communities, and what practices, tools, and knowledge do students draw on and develop as they engage in school-based making activities and extend those to other audiences?

CONTEXT AND PARTICIPANTS

The Collaborative Design School (CDS) is a non-selective public high school in a large, urban school district in the northeast United States. The school model is structured to include core learning classes, as well as coursework in three interdisciplinary makerspaces focused on media production, community organizing, and industrial arts. With funding from both the district and a private foundation, the school uses competencies rather than traditional grades to allow students to earn credits for activities that work across disciplinary boundaries—i.e., students can earn research competencies just as easily in the makerspaces as in their humanities courses. According to district documentation, in the school's first year, students from across the city's neighborhoods attended, with 83% identifying as African American, 14% as Latino, and the remaining 3% as White, Asian, or other (all of whom qualified for free or reduced lunch).

We focus on how the Media Production Makerspace (MPM) emerged and developed during the school's first year. Students were encouraged to follow a process that positioned failure as a valuable part of creative iteration—from brainstorming and prototyping to soliciting feedback and delivering a finished project. The makerspace itself was a large, open area—the size of three classrooms whose dividing walls were removed—which was organized into zones for different types of activities: computer stations, clusters of comfortable chairs, wall-length whiteboards, tables for group work, a conference table for large group meetings. Importantly, the year-one instructor for the MPM, Sam (real name used with permission), was a veteran district teacher with experience not only in teaching media literacy but also in aligning student composition with real-world issues.

Our roles in the school community were constantly being negotiated. A key element of social design research involves collaborating with stakeholders and foregrounding participants' voices, perspectives, and practices to ensure they become integral parts of the research and learning arrangements. To that end, we worked to develop the partnership over an extended period of time, with one of our central goals being to develop sustained and mutually enriching relationships by participating as fully as possible in the school community. As White, middle-class, cisgendered university researchers, our positionality in a school whose students were primarily from nondominant communities was always salient. As the school opened amid national outcry over the police killing Michael Brown in August 2014 and the ensuing Ferguson protests and rise of the Black Lives Matter movement, issues of race and power became important topics of conversation throughout the year, and we tried to be explicit and open in naming issues of race and power in our interactions and dialogues with teachers, staff, and students. We recognize the politicized and racialized nature of our positions and relationships and acknowledge that our position as White researchers affiliated with the university afforded us particular forms of asymmetrical power and privilege. As we engaged in social design research, we endeavored to take issues of power, race, and racialization as central concerns in our inquiry and make visible our own positionalities and commitments (Vakil et al., 2016).

DATA COLLECTION

Data were collected in the MPM across three design cycles over the year (see Appendix A). Each design cycle lasted one trimester, during which time a new group of students rotated into the MPM. Each trimester-long lab cycle included 25–35 students, though the school, like others in the district, experienced attrition and absenteeism that resulted in fewer

students in the lab at any given time. We report findings for the 45 students who persisted through the school year and consented to participate in the university- and district-approved study. At the beginning and end of each design cycle we met with Sam, the principal, students, and staff to talk about the learning goals of the trimester, the changes being made to the school and MPM structure, and the students' work.

Four kinds of data were collected in each design cycle. Members of the research team visited the MPM at least three days each week, acting as participant-observers and collecting observational and artifactual data. During these visits, team members worked closely with Sam and students—circulating around the room, talking to students about their work, and assisting Sam as needed. Observational data included 90 field notes, reflections, and analytic memos and 44 audio and 45 video recordings of MPM activities and informal conversations with students (an average of 5–10 minutes in length). Artifactual data included photos of students and their work (288) as well as all student projects, including in-process iterations (191 files that included scripts, brainstorming documents, prototypes, feedback forms, and finished products). Survey data asking students to describe their learning in the MPM were collected at the end of the first and last cycles (see Appendix B). We collected informal student interviews through individual and small group conversations with students during each design cycle (recorded as observational audio data) as well as one semi-structured interview with the teacher, Sam (90 minutes). Additionally, we conducted in-depth, semi-structured interviews (see Appendix C) with each student once (43 interviews of 30–60 minutes), all individual interviews except for two that were conducted with student pairs. We conducted follow-up interviews with eight students who participated with other audiences outside of the school—field trips, presentations—in order to better understand the role of publics in shaping the way students talked about their process of making.

DATA ANALYSIS

All data were analyzed iteratively using qualitative data analysis software (ATLAS.ti). We engaged in grounded theory building (Strauss & Corbin, 1990) to understand students' new literacy practices in the MPM, particularly how they participated in and beyond the space and represented their learning. To interpret the data from multiple perspectives, we engaged in collaborative analysis with multiple stakeholders. During and after each design cycle, we worked in teams (with different configurations of teachers and researchers) to read through the data and make sense of the whole cycle. Through this iterative analytic process, we

sought to understand how youth's making practices were linked to their learning and literacy development in order to inform decision-making for the next cycle.

In each cycle we engaged in two rounds of coding, first cycle descriptive coding followed by second cycle pattern coding (Miles, Huberman, & Saldaña, 2014). In the first cycle descriptive coding of observational, survey, and interview data, we collaboratively generated 31 descriptive codes over the three cycles, including codes that described *space* (how students felt in the MPM, how they used the different elements in the room, etc.), *audience* (who they imagined when composing, who they showed their work to and why, etc.), *artifacts* (what students created or made, their purposes and motivations for doing so, and their relevance to students), and *teaching* and *learning* (how they conceptualized learning, what constituted good teaching in the MPM, etc.). In analyzing the artifactual data students generated, we generated three additional descriptive codes that characterized the content of this work, including a focus on *personal* (e.g., poems about where they were from, stories about growing up), *local* (e.g., opinion pieces on the dress code, podcasts about the school model), and *community* issues (e.g., police brutality, gentrification).

We then engaged in a second round of pattern coding (Saldaña, 2009), in which we looked for patterns in our inductive codes as we reread them against framing literature on making, publics, and digital literacies. The resulting list of three code categories reflected the key themes that emerged from that iterative inductive and deductive analysis and addressed our central research question: *motivations, resources,* and *tensions.* We identified sub-codes that characterized the most salient patterns in each of the three categories. For example, we generated four codes to capture the main motivating elements of the MPM, all of which involved audiences in some way: the *relationships* students built with peers, teachers, staff, and visiting adults; the *recognition* students received for their work by others (such as grades or publication); the *impact* of their work on others (such as audiences at conferences or assemblies); and the *connection* of the MPM activities to students' personal lives, interests, and other contexts. We offer an overview of these pattern codes (with examples from the data) in Table 1 (see Appendix D for extended example of the pattern coding).

Table 1. Coding List

Codes	Examples
Motivations (M) *Relationships (M-REL)* - Students were motivated by *relationships* with teachers and peers	"I made [a poetry podcast recording] for my friend while she was going through bad problems with boys. I made her one telling her to keep her head up, and she didn't need nobody, cuz she's strong, independent." [M-REL] (*Dante, 11/11/15)*
Recognition (M-REC) - Students were motivated by *recognition* of their work by others	"I'd describe [the MPM] as a place where you can show things you've been learning outside of school—like on Instagram and Twitter." [M-REC] (*Dante, 6/11/15)*
Impact (M-I) - Students were motivated by the *impact* of their work locally and beyond	"[The MPM] has a lot to do with media—making YouTube videos, music, putting your voice out there in order to solve something or make a difference." [M-I] (*Kareem, 6/11/15)*
Connection (M-C) - Students were motivated by a *connection* of the work to their personal lives or other contexts	"With Innovation Labs, it's the fact that we have a choice. We have to do the work, but we have a choice to either expand it or keep it in a safe zone. If we actually want to do it, we'll expand it to something more, and we'll actually get interested in looking at some more sources, or try to get partnerships with somebody." [M-C] (*Crystal, 6/11/15)*
Resources (R) *Materials (R-M)* - Resources included the physical *materials* they used	"It was cool to use technology for my schoolwork and stuff like that . . . and I liked that cuz it was easier than just sitting there—piece of paper, piece of paper, piece of paper." [R-M] (*Jahmir 6/15/15)*
Spaces (R-S) - Resources included the *spaces* available for making	"[The MPM] is a comfortable working space. In classrooms, I feel like I'm just sittin' behind a desk. In here, I feel like I'm working; like I'm at a job and I'm working." [R-S] (*Steve, 6/15/15)*
People (R-P) - Resources included the *people* they drew upon in the process	"Like a lot of other stuff in [CDS], we are all working together. Even though we're all independent learners, we still work together. We give feedback, we give a lot of insight about what our tasks are and how we can better ourselves." [R-P] (*Chris, 6/28/15)*
Individual (R-I) - Youth drew upon their *individual* resources (e.g., knowledge, experiences)	"A lot was going on—Ray Rice just hit his girl at that time, so that's why I chose ['domestic violence' as a wicked problem to research] . . . It was sort of—that's what I know about . . . so let me choose 'domestic violence.'" (R-I) (*Dante, 6/15/15)*

Codes	Examples
Tensions (T) *Risk (T-R)* - A tension included the *riskiness* of participating in the MPM	"Since [the school] was so new and it was so innovative, it was so different—I don't think [those students who left mid-year] understood it enough to want to stay and figure it out. I guess they felt as though since it's not a school that's been open so long—they wanted stuff like that." [T-R] (*Kalif, 6/11/15*)
Uncertainty (T-U) - A tension included the *uncertainty* around what students were being asked to do	"This year we had to take in so much change. It was too many different things all at once. We didn't get a chance to see the creativity that—in other schools, they're structured in a certain way, so [the MPM] would be kind of like an elective. [Students] would see it as time to escape from regular classes." [T-U] (*Anna, 6/11/15*)
Histories (T-H) - A tension included the ways different *histories* of people and practices intersected	"I think some kids don't get . . . they're so institutionalized in thinking that it's all up to the teachers and it's all up to the grownups in the school to make things for them, that when it's time for them to make their own things, it's kinda shocked them." [T-H] (*Kalif, 6/11/15)*
Iteration (T-I) - A tension included the MPM's focus on *iteration* of projects and materials	"That's when design thinking comes into play. Basically what I did is research links, type something out on paper, made a document, got it done, and went over it, went over it, went over it, so I can know what to say and do . . . Basically, did a little bit; went back did some research; did all that again . . . No lazy stuff." [T-I] (*Jahmir*, 6/11/15)

After generating these three themes, we returned to collaborative analysis to create data displays (Miles, Huberman, & Saldaña, 2014) as we theorized how students participated in the MPM. Because one of the primary areas of emphasis in social design experiments involves highlighting issues of equity and diversity, we were particularly attentive to the ways race, power, and remediation were intertwined in the MPM. In analyzing how students developed and mobilized meaningful and relevant audiences in and beyond school, we considered how these tensions were historically tied to issues of race, class, and age.

FINDINGS

As we analyzed data from the MPM's first year, we found that the media lab served as a centrally motivating space within the school for youth. One of the most motivating dimensions of this school makerspace was its focus on finding and cultivating audiences for what students made, which allowed students not only to participate in the lab itself but also to engage in new literacy practices oriented to other people and institutions beyond the local. We examined how students' making practices circulated within and beyond the walls of the MPM—a process that involved youth mobilizing

audiences and resources to take action across broader spheres while navigating the tensions that arose along the way. We highlight in this section three findings about how youth engaged in that process we called *making publics*. First, we analyze the ways audience served as a central motivation for participating in the MPM, as participants found and cultivated meaningful and relevant audiences for student work. In the second section, we trace how some students used different resources to mobilize audiences into meaningful publics, as they came to see themselves as civic actors who could contribute to broader conversations and take social action through their media artifacts. Finally, we consider the central tensions that emerged in this process of finding and mobilizing audiences, particularly the riskiness of engaging in public work in and beyond the classroom. In each section we examine one case study student's experiences in the MPM to illuminate how this process of making publics involved significant work that both offered generative pathways toward civic action for some students and served to disenfranchise others by creating new barriers to learning and participation.

AUDIENCE AS MOTIVATION: FINDING AND CULTIVATING MEANINGFUL, RELEVANT AUDIENCES

Youth described the most motivating aspect of the MPM as producing work to share with audiences, whether those audiences were immediate (teachers, classmates) or more distant (families, friends, community members). The key was that students were producing media artifacts that could be shared again and again, by pulling up the file on a mobile phone or watching their work on mass media outlets (both local and national PBS affiliates featured CDS student work that year). While the idea of having an audience was motivating for students, not all audiences were equally significant for them. We found that students had to consider the audience meaningful and relevant in order to be motivating. Though concrete audiences—identifiable people they could see, hear, and receive recognition from immediately—were often significant in driving the making activities in the MPM, we could not always predict what audiences students might find meaningful and relevant.

A central part of the teacher's work in the lab involved learning what audiences were consequential to different students at different times. Sam exerted considerable effort creating opportunities for students to share their work—asking his friends and colleagues to comment, posting student work online in educational forums, entering their projects into contests, and encouraging them to participate in workshops and internships. A committed teacher activist in the community throughout his

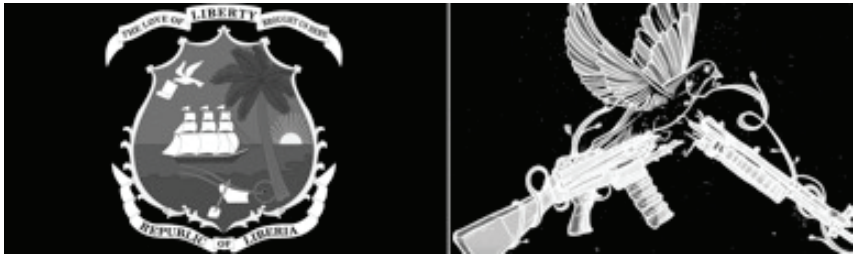
decades-long teaching career, and a Black man who grew up and raised his family in the city, Sam saw these opportunities for sharing student work as part of his broader efforts to connect schools with other networks, institutions, and collective civic efforts he cared about, both locally and nationally. We too helped find venues for students to share their projects, from conferences to websites to educational networks, and members of the research team served as external audiences by being in the room. Students also sought out their own audiences, not just among family, friends, and schoolmates but also in online communities like Wattpad or youth organizations, churches, and internships. The first step in making publics, we discovered, involved participants identifying, finding, and cultivating meaningful and relevant audiences for their work.

While many students took pleasure in creating media artifacts to share with classmates in the MPM, not all students found the immediate classroom audience meaningful or relevant. Devi, for example, was a student unengaged in the MPM, coming to the space most days but rarely participating. When a group had a task, he would sit with his earbuds in his ears (sometimes attached to a device and sometimes just dangling) and make no pretense he was working. An enthusiastic storyteller, music lover, and ball player, he just did not care to participate in the MPM (like some other school spaces) or to do more than the minimum assigned. During one project in which students could record a personal story about a societal problem, Devi chose a topic (gun violence, the example Sam used when introducing the project) but never wrote more than the first sentence of his script. For Devi, making a personal film to share with his classmates was not particularly motivating, and he described it as a boring way to do the same kinds of literacy activities common in his English class.

As Devi watched his classmates making films for audiences beyond the classroom, however, he began to take new interest in the story project. When he was pressed into service as a director for another student's movie (filmed as a talk show), he became more invested in the ways these films could connect to audiences beyond the teacher. He talked to members of the research team about his own story of growing up as a young child in Liberia, imagining how he could create a digital story that his family could watch. With this new possible audience in mind, Devi began to visualize how he could connect the topic of gun violence both to his homeland and his current city. To draw out those connections between his family history and his current experiences as a teen in a neighborhood known for gun violence, he sketched a digital story that knitted together a spoken word performance, music, and found images to tell about the fear that gun violence brings, not only to his native country but also to his current city.

To address familiar and extended audiences who might see his film, Devi wrote an introduction of himself and his school followed by an introduction to the topic of his story: "Gun violence is a wicked problem not just in the U.S. but in Liberia." After writing and practicing his script a number of times, he filmed himself performing a 2-minute spoken word-style story. He began the film with a song about gun violence, one that sampled a local news report about a violent night of killing in his city; this musical opening was layered with images of the world, city monuments, and the Liberian flag before flashing to images that represented an end to gun violence (see Figure 1). He also included an extended closing sequence that thanked a number of people who helped him make the film, with selfies and candid photos of classmates and members of the research team.

Figure 1. Images From Devi's Story



The process of finding and cultivating audiences that were meaningful and relevant to Devi was not a smooth one, and despite Sam's best efforts to help Devi see the possibilities of telling his story using new media, it was the work of his classmates that motivated Devi to imagine new audiences beyond the school context. In fact, after seeing some of his classmates' videos that they planned to show in an exhibition, Devi asked the teacher if he could join the MPM group presenting at a local university conference. While in many ways his family remained his primary audience (he brought his mother's iPad to the conference to film it for her), he expressed the desire to show new audiences his work on the transnational reach of gun violence.

Even though Devi may have been motivated by the possibility of expanding the audiences for his story, he was less certain how to prepare for unfamiliar audiences. Despite Sam's efforts to help him practice, Devi did not engage in the preparations some of the other students did. When he arrived at the university venue and saw about 50 people gathered to watch his film, he was struck by the unfamiliarity of the audience (teachers, university students, and professors) and realized the additional work required

to cultivate new audiences. Before presenting, he used his iPad to type a new introduction to contextualize his work to those in attendance: "Hi my name is [Devi]. I am a student for the [CDS] where we love, we dream, we do [a school motto]. A lil something about myself is that I am Liberian and Asian. I was born in Liberia and came to America when I was 3 or 4. I am here to introduce a video that is very important not just to me but people around the world."

This reframing of his story for the new audience reveals the significant work that goes into identifying, finding, and cultivating audiences. Devi, in this moment of rewriting, recognized that he would be accountable to the people in the room, to articulate his positions and share his experiences with people he did not know—essentially, to help them understand him (certainly facilitated by his deft handling of the many questions they asked at the end). Later, he sent the following email to the presenting group of teachers, fellow students, staff, and research team: "Thank you I'm so proud of us all dream work make the team work god bless y'all for what y'all are doing for us that the best experience of my life ever thanks." Whether or not it really was the best experience of his life, clearly it was motivating and impactful for Devi, particularly his sense that he could contribute his ideas to broader conversations and that his ideas and voice mattered to others. We point to Devi's story to illustrate that the process of imagining and finding audiences to motivate and inspire students' making practices was not a smooth, linear one—despite Sam's best efforts, he could not predict in advance what Devi might find motivating or relevant.

A second point we want to illustrate here in including Devi's story is that the process of making publics—of mobilizing audiences toward collective action—was not always fully realized. Often, students would see the literacy activities they participated in as singular events, something that might be meaningful in the moment but that did not carry across to the ways students saw themselves as writers, makers, or change agents more broadly. After making this story, Devi did not complete much work in the MPM that term and often continued to wear headphones and eschew group work or other project assignments. While full of ideas for his future, he was not very invested in school on a day-to-day basis and struggled to see its relevance in his future plans to be a sports star or entrepreneur. The one activity sequence that Devi participated in fully, making his story and finding meaningful and relevant audiences, might have been powerful for him but was ultimately limited in its impact on his literacy practices in school.

Yet while there may not have been an immediately visible shift in Devi's approach to learning and making, we cannot assume it had no impact on his future trajectory or thinking. He continued to talk about the import of that project and the experience of presenting it publicly, and perhaps

longer timescales would allow us to see ripples of impact years later. None of us could have predicted what audiences might be motivating or relevant to Devi in advance, nor could we have foreseen his project's short arc. While the process of finding and cultivating meaningful and relevant audiences for student work might be an uncertain one, providing those opportunities to make connections with familiar and new audiences remains important for all of the students, like Devi, who might take them up to particular effect, even when we cannot necessarily trace the longevity or impact of those experiences. We begin with Devi's story to emphasize the importance and salience of finding and cultivating meaningful and relevant audiences in the process of making publics, not only because students might find the experiences motivating and impactful in the moment but also because they represent the first step to connect to broader publics and a shared world. As teachers and researchers, we found that we could not anticipate which experiences would be leveraged into broader and more impactful civic activities and for whom.

MAKING PUBLICS: USING RESOURCES TO MOBILIZE AUDIENCES FOR COLLECTIVE ACTION

While the process of finding, identifying, and cultivating audiences represented a principal—and motivational—dimension of students' engagement in the MPM, it often served as the first step in making publics. For some students, the next step involved connecting and mobilizing those audiences, as they used the resources at their disposal to do so. Sam worked diligently to create connections between the work students did and broader networks and conversations, bringing in local speakers (poets, playwrights, filmmakers), taking students on field trips, showing media that featured youth of color taking action in the world, and inviting local and national media outlets into his classroom. He modeled and scaffolded different ways for students to connect with and participate in broader conversations, communities, and collective action. Such a process of seeing those connections and links to a shared world proved challenging for students, not least because it required them to imagine the myriad ways school was potentially connected to broader contexts, including neighborhoods, universities, the city, the district, the state, the United States, other nation-states, online communities, youth organizations, churches, families, or community organizations, among others. Students reported that they had rarely thought about schools—or themselves, as students—in such a way, but some found the idea powerful. This idea that the school was situated in relation to various other contexts with which they had relevant experience positioned students as having important perspectives to contribute both in and beyond the school.

The media artifacts that students created in the MPM served as tangible products that concretized and represented students' learning in shareable form (cf. Blikstein, 2013). When Devi created his digital story, for example, he carried it around on his phone and showed it to multiple people—he was motivated not only by the material process of creation, working with the camera settings to zoom in on one aspect of his performance or leaning into the computer to splice the audio track, but in the tangible evidence of his work that literally and figuratively spotlighted his voice. Youth used the media resources at hand to amplify their reach to audiences beyond immediate contexts and connect themselves to others in new configurations (in Poyntz's [2009] words, to engage in publics acts in the presence of others). In using new media tools to engage in civic action across local and global networks, young people could participate in public discourses in consequential ways, as they saw the impact of their media artifacts on wider publics and came to see themselves as people with contributions to share. Recent examples of youth activism and engagement in the public sphere (e.g., Conner & Slattery, 2014; Soep, 2014) illustrate how young people can use new media tools and resources to create counter-narratives that reframe deficit discourses about youth of color and challenge traditional notions of success and failure in schools (Duncan-Andrade, 2007; Stornaiuolo & Thomas, 2017). In the process of making publics, we found that some students began to articulate new connections and use media artifacts to mobilize audiences toward collective action.

We turn to the case of Crystal to illustrate how the process of making publics played out for some students in the MPM, as they not just found and cultivated new audiences like Devi but also connected themselves and those audiences in new configurations, in turn mobilizing those audiences for civic purposes. Crystal was an outspoken, gregarious, and cheerful 15-year-old in the MPM, with little experience with media production but comfort performing on stage as a dancer and singer. After writing an essay on gentrification in her humanities class, Crystal decided to further explore the topic by creating a short film in the MPM. A fan of television talk and variety shows, she filmed a short interview-style video, first asking a fellow student what he knew about the issue before turning to explain it directly to the camera. Taking advantage of her performing skills, Crystal worked to pull the audience into her video by addressing them directly, first turning toward the camera and then talking to her audience to help them realize how gentrification may be happening in their own neighborhoods and what to do about it. When asked who her audience was for the film, Crystal was not sure exactly, except she hoped that people from the neighborhood, university, and high school might see it and realize how extensively the issue of gentrification affected everyone in the area.

Crystal's efforts to bring viewers into the film by addressing them directly proved to be one of its most powerful elements and helped it reach more audiences than her original essay. Invited by Sam to present her video at three public venues (a teacher convening and two academic conferences), she was eager to talk about the topic but initially hesitant to show her video. In an interview, she explained that the video had different affordances than the paper: "I actually wrote a paper before I did the video, so the video was like a spinoff. . . . The paper was more informational. The video was more about my opinion . . . I live in that area, and what if that was to happen to me?" She went on to say how she might have used these modes differently, given the audiences she was speaking to: "People weren't reading my paper, they were looking at my video. So I would have tied more [research] into that." While she wished the production values had been higher and she and her interviewee had been more rehearsed, she recognized that the genre of the short film was meant to capture the audience's attention and motivate them to action—and not necessarily inform them in any depth about the issue itself. Like Devi, Crystal began to expand the audiences that she imagined for her work as she participated in events beyond the school; unlike Devi, however, she saw her film as a broader call to action.

One of the most important elements for students in the process of making publics involved creating connections between different audiences with the goal of taking action. For Crystal, her video was only the first step in mobilizing audiences into broader publics, serving not just as a tool to bring awareness to the issue of gentrification but also as a means for her to connect to others doing this work in the community. She began to see herself as someone who had the power to make change in the world and to participate in broader conversations with people she did not yet know: "When I talk to my friends about [gentrification], they're like, What are you speaking? . . . But when I go out and give my presentation to people and they start clapping, I'm like, 'Yes, this is me.'" Crystal's sense of herself, honed in relation to others and responsive to them, affirmed her role as someone who had important contributions to make to a shared world. This effort to make connections between her video and broader conversations about gentrification represents a key step in making publics, as Crystal saw herself as someone who could mobilize others into collective action.

Part of her effort to mobilize audiences involved linking outside audiences with each other and with the school. She participated in a number of panels, including representing the district on a citywide panel about education, and often talked about how the schools needed to be in conversation with neighbors and universities to begin assessing the impact of gentrification on citizens. After her classmates saw her film as part of an

exhibition, they became more interested in the topic of gentrification. When residents of the neighborhood visited the school to be interviewed for a community organizing project, many of Crystal's peers asked the representatives pointed questions about the specifics of how gentrification worked, who was responsible, and how it could be addressed. When Crystal saw this impact of her work on fellow students and community members, she realized that she could act as an influential civic agent capable of contributing her perspective and mobilizing local and community audiences into collective action. Crystal has since gone on to engage in a number of making activities that have carried forward some of these insights, not least the sense that she has an important perspective to share and can intervene to address inequality.

In many ways, Crystal is an ideal representative of what can happen when students, supported by their teachers and schools, invest in the project of making publics, as she has gone on to represent the school on numerous education panels, win local and national writing contests, participate in prestigious internships, engage in protests and organized action against discriminatory practices affecting youth, and volunteer for numerous youth activist organizations and partnerships. Yet we want to emphasize that no one could have predicted that she would become so invested in the process of making publics. Like Devi, she is a charismatic person but ambivalent learner in school, and she still struggles to see the relevance of all of the work she does in school. As a young Black woman, she has and will continue to face additional hurdles in having her voice recognized, promoted, and valued (Muhammad & Haddix, 2016). However, she has come to believe strongly in her capabilities to effect change through her literacy practices, and it is her belief in the power of her voice and her knowledge of how to find, cultivate, and mobilize audiences for collective action that guided her participation in and across school and community contexts.

NAVIGATING TENSIONS: WHEN AUDIENCES ARE NOT MEANINGFUL OR RELEVANT

What we learned through documenting this process of making publics in the MPM was that our (the teacher and research team's) ideas about what constituted meaningful and relevant audiences and how those connected to broader publics were not always in alignment with students' views. This central tension—between divergent conceptions of (and inclination toward) audiences and publics—played out differently for individual students at various moments in time. Sometimes that meant that a student did not participate in one project at all, or reluctantly at best, but in the

next project became highly motivated after talking with a speaker who presented to the class. Other times students expressed no desire to connect their work to broader contexts or conversations beyond the classroom. While Sam thought audiences that included his colleague and friend networks and publics that connected to shared local communities might be motivating because they were real world (and thus "authentic") contexts, those publics were not seen as meaningful at that scale (more meaningful, often, was the local scale of the classroom or the concrete presence of a known audience like family or friends).

This tension was illustrated in one project sequence Sam designed—a survey in which students could gather data for use in a future media project on a topic meaningful both to them and to broader communities. One student, Dauntey, developed a survey exploring causes and solutions regarding police brutality, which Sam sent out to friends and colleagues on his networks. Initially reluctant to begin the project, Dauntey did not know where to begin, so Sam sat with him at the computer as he wrote his introduction. When Sam probed as to why Dauntey was interested in the topic, what he wanted to know, and how he could invite others to respond, Dauntey came up with an initial set of many yes/no questions. At Sam's urging, members of the research team tried to help Dauntey deepen and revise his questions, but Dauntey was loath to change any question he initially wrote. He repeatedly said that he just wanted to do whatever the teacher said he needed to do to get a passing grade. When asked about one of the questions on the survey ("What do you think is the main cause of police brutality?") and whether he wanted to expand the choices he offered respondents ("power, stupidity, ignorance, or fear"), he responded that he would get credit just by writing the question and did not need to worry much about the responses. After a conversation with classmates, teacher, and research team members about the role of racism in recent instances of police brutality aimed at young Black men like himself, and at Sam's urging, he added two additional choices ("racism, other"). When asked who would take his survey, Dauntey shrugged and gestured to Sam, indicating it would be whomever the teacher invited or told to do it.

As Dauntey's example reveals, discourses about correctness and evaluation in schools are deeply pervasive. Even though Sam encouraged Dauntey to iterate on his survey in order to learn something from and connect with a broader public, Sam's identification of audience (adult colleagues) and his locating of the issue of police brutality in broader conversations about race and policing were not especially motivating or relevant to Dauntey in that moment. What motivated Dauntey was credit for the assignment and finishing what he had to do in order to be "successful." For him, the teacher was the intended audience, and his worry over

grades and assessment colored how he saw iteration and the risk of failure. As someone who had participated in years of schooling as a young Black man, Dauntey was reasonably cautious about how much he was willing to risk revealing about himself, his experiences, and his beliefs.

Making publics involves taking a risk—putting oneself in front of others, making visible one's commitments and positions, and opening up the possibility of failure, shame, or embarrassment. For students whose relationship with school has been tenuous or contentious, such risks can make them feel unsafe and vulnerable. For those with histories of "failure" in school, the idea of iterating and potentially failing in front of others can echo previous failures that may have been ascribed to individuals themselves, as if they were the ones with deficits inside their brains or bodies (see McDermott & Varenne, 1995). Such efforts to ascribe failure, disability, or deficit to students from historically underserved groups have a long history, one that inadequately theorizes culture and fails to take into consideration broader cultural and historical processes of oppression (Kozleski, Trent, Osher, & Ortiz, 2010). Making publics does not simply involve finding audiences and participating in collective action; significant work goes into making a public, as students must see themselves as connected with and across different people, organizations, and communities and as someone who can contribute to and participate in those publics. Such work is inherently risky, and exponentially so for youth who have already experienced longstanding, systemic oppression and deficit framing about themselves as learners, contributors, and public intellectuals.

DISCUSSION

In this article, we have argued that the work of cultivating and mobilizing audiences was central to young people's making practices in the MPM, but *how* young people mobilized those audiences—and to what ends—was shaped by a number of historical, cultural, social, and political factors. To make legible the multiple, tangled valences at work as local making practices were translated for different audiences, we introduced the concept of *making publics*. Such a concept highlights that publics are *created*, a process that involved youth mobilizing audiences and resources toward collective action in their MPM making activities. For the young people in our study, the process of making publics was motivating at different scales, illustrating the contingent and fraught nature of the process. As these kinds of new literacies get integrated into schooling practices, these tensions are likely to be exacerbated, particularly for youth whose histories and identities have been marginalized.

The process of mobilizing audiences into meaningful publics involved significant work by multiple stakeholders. Teachers, staff, and partners all

engaged in the work of finding and cultivating audiences for students' making efforts, a fairly serious commitment of time and energy. Even more time and labor intensive were efforts to help students articulate the ways their making practices could connect with and participate in broader conversations, communities, and collective action. As a social design experiment, this study involved us regularly working with stakeholders to evaluate what was working, for whom, and to what ends. This reflexivity required us to examine our own positions of race and class privilege as well as interrogate institutional structures that positioned teachers and staff to sacrifice their time and personal resources to ensure the students had access to new opportunities. We saw teachers like Sam dedicate many evenings and weekends to attend student performances and organize community/school events that helped youth engage in meaningful publics beyond school.

The process of finding audiences and articulating connections in the MPM was both motivating and challenging for students, requiring them to imagine the myriad ways school could be potentially connected to broader contexts. This idea that the school was situated in relation to various other contexts with which they had relevant experience positioned students as having important perspectives to contribute both in and beyond the school. Yet some students, like Dauntey, grew frustrated by the emphasis in the MPM and across the CDS that they needed to participate in school by making, iterating, and contributing their perspectives, which they did not see as necessarily relevant to their long-term success. Other young people in the study, like Crystal, used different resources at their disposal to participate in public discourses in consequential ways. Even though people often characterize schools as disconnected from the real world and youth voices as largely absent or ignored in broader conversations about education, recent examples of youth activism and engagement in the public sphere (e.g., Conner & Slattery, 2014; Soep, 2014) illustrate how young people can create impactful and widespread counter-narratives that address inequality, whether by reframing deficit discourses about youth of color and challenging traditional notions of success and failure in schools or by using new media tools and networks (Duncan-Andrade, 2007; Stornaiuolo & Thomas, 2017). When young people saw themselves as civic actors, whose voices and perspectives mattered and could have an impact on others, they began to mobilize audiences and resources in new configurations. This process of mobilization involved young people seeing themselves as part of a shared world, with responsibilities to act in public ways to impact others around them and to participate with others whom they had never met or, in some cases, imagined.

By tracing the tensions that arose in the MPM as students engaged in iterative making practices, we found that integrating makerspaces in schools

can lead to powerful learning opportunities and generative possibilities for engaging in making publics—for some students, in some ways, at some times. In other words, *making* should not be understood as an inherently liberatory or transformative set of practices, and makerspaces should not be positioned as panaceas that can be inserted into classrooms as an autonomous fix for "failing" schools and "at risk" students. Doing so not only overlooks the larger systemic conditions that produce "risk" and "failure" (cf. Vasudevan & Campano, 2009) but it also elides the tremendous amount of work that goes into making publics—the mutually constitutive negotiation and mobilization of students, teachers, administrators, institutions, technologies, and spaces in service of diverse and, at times, conflicting aims.

CONCLUSION

While educational research on making has highlighted how young people learn in impactful and consequential ways in out-of-school and community spaces, it is of paramount importance to study the learning opportunities of making for formal school contexts like the CDS. As more schools turn toward innovative practices to reimagine the nature and structure of schooling, we can't afford to reproduce or exacerbate inequitable practices or spend already limited financial and human resources on short-term changes, particularly for under-resourced and beleaguered urban schools. This study represents one effort to address these issues by engaging in long-term qualitative study of how maker practices are being integrated into an urban public school's curricula and pedagogies, particularly focusing on the opportunities and tensions that emerge when the ethos of iteration and risk-taking—central to notions of both making and new literacies—sits in tension with the realities of performance assessments and evaluation.

One implication of this study is the importance of taking into account histories of schools, teachers, students, and discourses—and the ways these share an intertwined lineage with educational inequality. As Vossoughi and Bevan (2014) argued, educational researchers would benefit from more explicit and substantive engagement with how making in school settings operates in relation to "issues of remediation, segregation and tracking as they have shaped and continue to shape the schooling experience of working class students and students of color" (p. 40). In examining the day-to-day, even mundane, realities of school making practices over longer time scales, we hope to temper romantic or uncritical notions about the participatory potentials of making for all students while simultaneously emphasizing the importance of recognizing—and taking seriously—youth's efforts to make publics for their work, as they engage civically and act as historical agents of social change.

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APPENDIX A

Design Cycle Overview

Design Cycle	MPM Focus & Activities	Data Collection Activities
Design Cycle 1 - Oct – Dec 2014	*Central focus:* Organizing the space as a workshop model (multiple iterations of one project, revision as key practice, projects as inquiry-driven and student-directed) centered on the design process *Central activities:* Working on two projects: one group remix poem and one focused on researching 'wicked problems' students care about (e.g., gentrification, gun violence) and reporting via one genre (story slam, podcast, or blog)	*Observational data:* photos (102), video (22), audio (17), and field notes (35) *Artifactual data:* scripts, drafts, reflections, feedback forms, and final projects (68) *Interview data:* informal student interviews; 2 design meetings with teacher *Survey data:* 54 survey responses
Design Cycle 2 - Jan – March 2015	*Central focus:* Continuing the workshop model; introducing the option of sharing work with community; emphasizing media literacy skills; focusing on quality of finished product (shortened calendar this trimester due to a number of snow days and other school cancellations) *Central activities:* Trimester-long final projects that included collecting data on 'wicked problems' via survey and creating reports that combined visualized survey data (e.g., charts and graphs) with outside research	*Observational data:* photos (72), video (11), audio (12), and field notes (22) *Artifactual data:* scripts, drafts, reflections, feedback forms, and final projects (49) *Survey data:* No survey data *Interview data:* informal student interviews; 1 design meeting with teacher
Design Cycle 3 - Apr – Jun 2015	*Central focus:* Continuing the workshop model; expanding opportunities for students to share work on field trips, at conferences, and in community events, both locally and nationally; de-emphasizing final products; emphasizing process of collecting data personally relevant to students *Central activities:* Trimester-long final projects that included collecting data on 'wicked problems' via survey and creating reports that combined visualized survey data (e.g., charts and graphs) with outside research	*Observational data:* photos (114), video (12), audio (15), and field notes (33) *Artifactual data:* scripts, drafts, reflections, feedback forms, and final projects (74) *Survey data:* 47 survey responses *Interview data:* 51 semi-structured student interviews; 1 design meeting with teacher; 1 formal teacher interview

APPENDIX B

Student Survey

1. Please type your first and last name.
2. Which Innovation Lab were you assigned to from September through December?
3. What did you enjoy about this lab?
4. How would you rate your learning in the lab? (0 – I did not learn much; 4 – I learned a lot)
5. Write 1–2 lines about what you learned most in the lab.
6. Write 1–2 lines about how learning in the lab could be improved in the future.
7. How many projects did you work on in your Innovation Lab this quarter?
8. How many projects did you finish?
9. If zero, why didn't you work on any projects in the lab? (conditional, based on #8)
10. What was Project X? (conditional, based on #7)
11. How satisfied were you with the way Project X turned out?
12. What project were you most proud of? Write 1–2 lines telling why.
13. In what ways do you consider yourself a designer, writer, or maker?

APPENDIX C

Interview Protocol

1. Can you tell me more about yourself?
   a. Hobbies and interests outside of school
   b. How is the CDS similar/different from what you expected high school to be like?
   c. Favorite/least favorite parts of your CDS experience
   d. Outside of school, are there things you like to make?
2. If you were going to describe the Innovation Labs to someone just arriving to CDS, how would you describe them?
3. What have your experiences in the Labs been like this year?
   a. How are the labs similar and different from one another?
   b. Are you familiar with makerspaces?
4. Can we look through some of the projects that you made in the Innovation Labs?
   a. Can you tell me about the different projects that you created?
   b. Can you walk us through your process of creating one of your projects?
5. We are really interested in knowing more about how people learn in these kinds in Innovation Labs. How would you describe your learning in the Labs?
   a. Can you give me an example of a time you learned something?
   b. How did the design of the Lab itself play into your learning?
   c. Let's look at some of the self-report questionnaires you filled in over the year. Can you tell me about these self-reports?
   d. Were there other things you wished you had learned?
   e. Was there anything you would change about the Innovation Labs to support your learning better?
6. One of the major areas of focus in the labs is design thinking. How would you describe design thinking?
   a. In what ways did the labs support your sense of yourself as a designer? As a problem solver?
   b. In what ways do you think about the problems facing our communities or world based on the work you've done in the labs?
7. We are particularly interested in learning more about your experiences in the Highlight Lab because of the integration of media and literacy in those projects. How did your experience in that lab compare to the others?

a. How did you use different media in your design thinking and problem solving work?
b. In what ways were the projects in this lab similar/different to other reading/writing activities you've done elsewhere?

8. How do you think of yourself as a reader? Writer?
   a. Would you say your self-perceptions have changed over this year?
   b. Do you like to make things with technology?
   c. The National Writing Project talks about writing as a kind of "making." What do you think they mean?
9. People are interested in whether these Innovation Labs would work in other schools for students your age—do you have any thoughts about this?
10. One of the big areas of focus for the school is around competency learning. In what ways do you feel like you are gaining expertise or competency through your work in the Labs?

APPENDIX D

Sample Transcription Coding

Interviewer: How did you decide to do gentrification as your topic?

Interviewee: Everybody was doing something related to—it really came up when they said something about poverty, because it was like: yeah, so I looked in—I actually had to—we had to research before we can find what we wanted to actually do, because he wanted a couple paragraphs that said why we wanted to do it. I researched poverty, and I came across gentrification, and I saw—and I remember seeing it, and so I organized—because they were doing that at the time, and I actually starting looking into it more, and I found out that it wasn't a lot of—on it, but it was actually a big problem. **[M-C]**

I felt as though that I needed to talk about gentrification, so I started to look up or scrape up any dirt on gentrification that I can get, and I saw that [local university] was to, well, really, anything big around here was actually pursuing that to get more money and more space. **[M-I]**

Interviewer: Yeah. Cause you ended up doing a video?

Interviewee: Yeah.

Interviewer: How did you go about making that?

Interviewee: I actually wrote a paper before I did the video, so the video was like a spinoff, because he said—why I really did the video, cause he said I can get extra credit, extra credit if I did that. I mean I like talking, so I might as well **[M-R; R-I]**. I used my paper as a spin, but the video was more—the paper was more informational. The video was more about my opinion, I feel as though that this is a big problem, or where I come—I live in that area, and what if that was to happen to me? It was more about what I was feeling more than—what my paper said about what—what people were actually feeling, or the statistics. **[R-M]**

Interviewer: Had you made a video before?

Interviewee: I made videos before. I mean, usually, we'd rap about cells inside school. It was not one of my first, but one of

my first actual opinion videos. Usually, when I had to do a video, I didn't usually do a paper, and my video was my—was, basically, what I needed to have in there. **[R-I]**

Interviewer: Right. What was it like then? I mean you said—you've gotten to show this at a couple places, and you're going to be showing at more places. What was it like to take something that you did here out to an audience?

Interviewee: It was actually interesting, cause it's gentrification; who's interested in gentrification? **[T-U]** It was interesting to find people that was actually interested in listening to me, cause I like talking, so if you're interested in listening to me, then I'm all—then I'm all mouth, so—yeah. **[M-REC]**

Interviewer: Do you feel you were happy with the response that you got from different persons?

Interviewee: Yeah.

Interviewer: Yeah?

Interviewee: Cause people usually don't tend to be interested in it. When I tried to talk to my friends about it, they were like, "What are you speaking? Chinese?" It's really funny to see how they are towards my paper towards when I go out and I—and I give my whole presentation to everybody, and they start clapping. I'm just like, "Yes. Yes, this is me." **[M-REC]**

Interviewer: Cause it's been a while now since you made it. After making it and—

Interviewee: Since December. I made it in December.

Interviewer: Was it in December? Wow. Yeah, I mean between making it and then presenting it different places, are there things now that you would change about it if you were to go back and rework it, or would you still be—

Interviewee: If I was to go back and rework it, I'll make—I'll redo my video.

Interviewer: Yeah?

Interviewee: Because after I was—cause people weren't reading my—they weren't reading my paper, they were looking at my video.

Interviewer: Right.

Interviewee: My video, I think I should have tied more stuff into that, because me giving it to [Sam], I say, "Here, you have the paper, and you also have the video." With them, they didn't—they don't really know about it, so I can tie more of my thing into that, but you know it's always room for improvement. I try to explain as much as I can, while I'm presenting. **[M-REL]**

Interviewer: Yeah. Yeah. That's a good point. I mean I guess when you turn those in, they were—

Interviewee: Yeah, they was together, balanced.

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