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Rethinking Availability in Multimodal Composing: Frictions in Digital Design

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Focusing on frictions in multimodal composing can help teachers understand the hidden infrastructures that students work within and against in their digital literacy practices.

The idea of availability has long been central in multimodal literacy education. Early advocates of multimodal composing stressed that the narrow specificity of print-centric literacy instruction overlooked the range of available materials that people use to make meaning. The advocates argued for greater attention to these available resources (Jewitt, 2009) and available designs (New London Group, 1996): the sounds, gestures, speech, and images that might be incorporated alongside conventional texts in school-based literacy learning. Their suggestion has only been reinforced with the spread of digital technologies. Such devices exponentially increase the availability of photos, videos, and texts with which students might create (Lankshear & Knobel, 2011). Recently, however, scholars have questioned whether the availability offered by connective technologies is so straightforward. Images and text, they noted, do not flow effortlessly from smartphones and social media. Rather, their availability is conditioned by the digital infrastructures that animate such technologies (e.g., hardware, interfaces, algorithms, code; Berry, 2011; Nichols & Stornaiuolo, 2019).

This article examines the relationship between digital infrastructures and availability in multimodal composing. Drawing on data from a technology-rich humanities classroom, we (two researchers and former classroom teachers) show how students did not simply use available resources in their multimodal composing, but negotiated the availability of modal materials by working within and against digital infrastructures, many of which were invisible to them, their teacher, and the research team at the time. We argue that a focus on frictions in digital practices helps make these infrastructures visible for educators. This can attune teachers to opportunities for instruction about the mechanisms that shape availability in multimodal composing and their uneven implications for equity. Furthermore, it creates openings for inquiry alongside students about what it means to live and create in a world increasingly mediated by digital infrastructures.

Multimodal Composing in Literacy Classrooms

Multimodality refers to the various semiotic resources, or modes, that can be used to convey messages (Kress, 2010). From a multimodal perspective, literacy education's emphasis on print-based texts elides the role of other modes in the production and interpretation of meaning. In response, scholars have argued that literacy educators might incorporate additional modal

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resources—sounds, gestures, speech, and images—into instruction. Over time, this has opened literacy classrooms to more expansive composing practices, from digital storytelling (Hull & Nelson, 2005) and songwriting (Watson & Beymer, 2019) to making and crafting activities (Stornaiuolo & Nichols, 2018).

Importantly, multimodal composing not only expands the "available means of signification" (Hull & Nelson, 2005, p. 226) in literacy education but also creates space for cultural practices historically marginalized in schools. Scholars have shown how, in decentering printed text as the locus of classroom knowledge, multimodal frameworks can affirm the intellectual legacies that students from nondominant communities bring to formal learning contexts (Campano, Nichols, & Player, 2020). Morrell and Duncan-Andrade (2002), for example, demonstrated how hip-hop music and culture became sites for literary analysis in their English classrooms. Player (2019), likewise, highlighted how playwriting and performance created openings for social critique and solidarity among middle school girls of color in an after-school writing club. In nurturing such practices, multimodal pedagogies contribute to a culturally sustaining (Paris & Alim, 2017) orientation that centers students' identities and histories as resources for collective inquiry.

Availability and Digital Media

Multimodal literacy research often emphasizes availability. Where conventional composing is bounded to alphabetic text or dominant cultural forms, scholars of multimodality have advocated expanding literacy education to include the full range of available resources (Jewitt, 2009), available designs (New London Group, 1996), and available means (Hull & Nelson, 2005) for making meaning. For this reason, mobile and connective technologies, which dramatically increase the availability of images, videos, sounds, and other modal materials, have been pivotal in the spread of multimodal pedagogies in schools. In a *Journal of Adolescent & Adult Literacy* commentary, Siegel (2012) narrated this shift: "The privileged status of language is being challenged by the ease with which you can access semiotic resources of all varieties—visual, aural, gestural, spatial—to assemble meanings" (p. 671). In other words, the growing availability of multimodal resources, facilitated by digital media, has further highlighted the limits of print-centric approaches to literacy education.

This perspective has inspired a robust literature exploring how youth are taking up new forms of multimodal composing using phones, Web 2.0 applications, and other multimedia software (Pandya, Pagdiliao, Kim, & Marquez, 2015; Rowsell & Walsh, 2011; Wargo, 2018). Haddix and Sealey-Ruiz (2012) showed how integrating cellphones into instruction fosters opportunities for students of color to bring out-of-school digital practices to bear in formal literacy learning. Price-Dennis (2016), likewise, described how digital tools helped support Black girls in composing counternarratives to challenge misrepresentations of their lives and experiences. Such studies spotlight how digital connectivity extends the boundaries of classrooms, making available not only tools for producing modal materials (e.g., photos, videos) but also resources that allow students to find, share, and analyze such artifacts (e.g., search engines, social media platforms, applications). This availability, in turn, can support students in developing an authorial stance that merges home, school, and community practices in ways that have not historically been encouraged in classrooms, especially for students of color (Vasudevan, Schultz, & Bateman, 2010).

Amid these promising developments, however, research on digital media is beginning to complicate how we might understand the availability afforded by connective technologies. Although it is true that digital tools streamline how students access or create modal resources and that software applications make it easier for them to remix these into new compositions, the underlying mechanisms that facilitate such activities are more complex. The process by which digital platforms make photos, videos, and audio accessible for multimodal composing is not a frictionless transfer, but one mediated by often invisible infrastructures—hardware, interfaces, algorithms, and code—that enable or constrain how resources are made available and for whom (Nichols & LeBlanc, 2020). In other words, availability does not flow inevitably from digital technologies but is negotiated as users work within and against digital infrastructures in their multimodal composing. Attending to these infrastructures, then, becomes a critical concern for educators invested in the culturally sustaining potential of multimodal literacies in classrooms.

Infrastructures of Digital Design

One approach for examining the underlying mechanisms that facilitate availability in digital environments comes from research on infrastructure. *Infrastructure* refers to the often invisible processes that make our day-to-day activities possible (Star, 1999). For instance, we might think of Wi-Fi as an ephemeral cloud to which our devices connect, but it is actually dependent on deeply material infrastructures whose interplay allows

it to appear, to us, as available: city electrical grids, telecom wiring systems, legal codes, permitting paperwork, transoceanic cables, as well as the ecological resources and human labor required to produce and maintain such artifacts. Attending to infrastructure, according to Peters (2015), means examining "the basic, the boring, the mundane, and all the mischievous work done behind the scenes" (p. 33) in our uses of technology. In the context of multimodal composing, this means examining not only the exciting multimodal projects that students create but also the prosaic processes by which their component parts become available and are enrolled in student work (Nichols, 2020).

This orientation is especially relevant in digital environments, as a growing literature is now exploring the infrastructures of digital platforms, including those where students often seek modal materials (e.g., search engines, social networks, mobile apps). This work highlights the technical dimensions of platforms—hardware, interfaces, algorithms, and code (Berry, 2011)—and their economic ones, such as the governance structures that regulate them and the business models that make them profitable (van Dijck, 2013; see Table 1). Crucially, these dimensions do not operate in isolation. In previous studies, Phil (first author) showed how shifts in one form of infrastructure (e.g., an app interface, a platform algorithm, a software company's funding strategy) can support or work against other infrastructural relations, which in turn influence how, for whom, and for what purposes a platform operates (Dixon-Román, Nichols, & Nyame-Mensah, 2020; Scott & Nichols, 2017). For digital multimodal activities, this means that no part of the composing process—from the literacy practices used, to the availability of modal artifacts, to the completed compositions themselves—is untouched by the infrastructures that underwrite their associated technologies. Figure 1 offers a map of the relations between the process of digital multimodal composing and its underlying infrastructures.

In what follows, we use this map to trace how students negotiated availability in their multimodal composing. We attend specifically to moments of friction in this process, that is, when various infrastructural forms and students' composing practices bumped against one another. We do so because, as Star and Ruhleder (1996) suggested, it is in such moments of breakdown that the invisible work of infrastructure is most legible to everyday observers. This legibility, we suggest, can help clarify the implications of these infrastructures for multimodal literacy education. Practitioners attuned to such dynamics are better positioned to support students not only in navigating such frictions but also in critiquing and intervening in the inequitable circumstances that can produce them.

Method

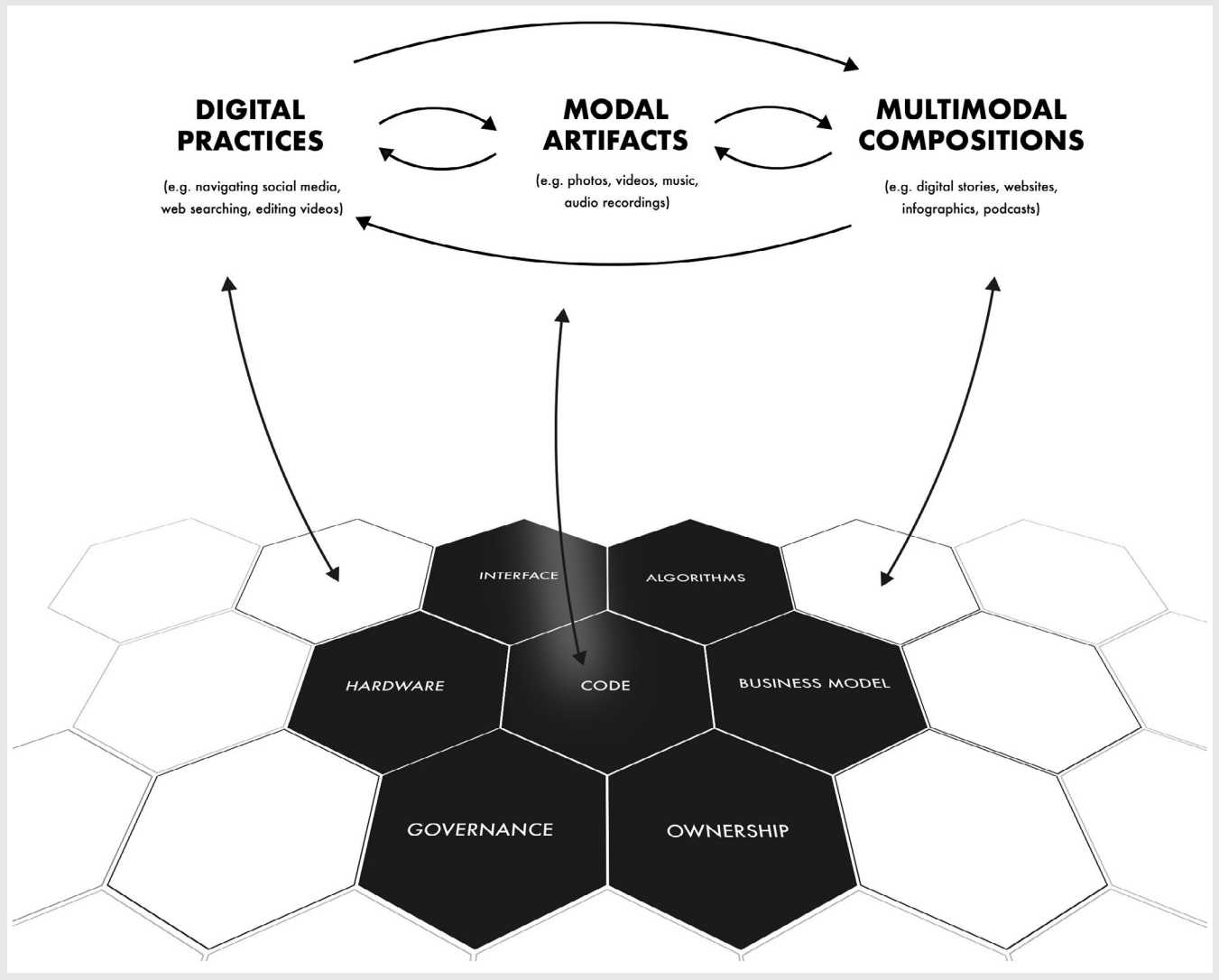
Research Site and Positionality

For this study, we drew on data from a longitudinal partnership between a private research university and The Innovation School (all names are pseudonyms), an urban public high school organized around principles

Table 1
Key Digital Infrastructures

Infrastructure	Definition
Hardware	A physical medium (e.g., laptop, phone) and its related accessories (e.g., charging cords, keyboards, dongles)
Interfaces	Visible features (e.g., buttons, screen layout, icons) that mediate how users access and interact with software's underlying code
Algorithms	Automated instructions that translate user-input (e.g., information, click data) into particular outputs (e.g., filtered content, personalized advertisements)
Code	Machine-readable language that structures how software operates
Governance	Formal or informal regulations that encourage (or discourage) particular uses of a technology
Ownership	The organizational arrangement (e.g., public, private, nonprofit, for-profit), values, and commitments of a technology's owner
Business models	The profit motives and incentive structures embedded in a technology's design

Figure 1
Relations Between Digital Infrastructures and the Multimodal Composing Process



of design thinking. The school opened in 2014 as part of a district effort to bring technology-rich, project-based learning to students who might be excluded from similar programs due to income, geography, enrollment caps, or past academic performance. The school's demographics were comparable to those of nearby neighborhood programs: The population was 80% African American and 15% Latinx, and all students received free lunch.

Phil managed the research partnership from the school's opening through 2017, working with a team of graduate students to provide support in the school's makerspaces and humanities classrooms and to document the multimodal literacy practices unfolding therein. As a white cis man and university-based researcher, this role demanded continual examination of his place in the matrix of domination (Collins, 2000) that allows colonial logics and social injustices to persist in (and outside of) schools. Such reflections took varying forms throughout the partnership: from reflexive memo writing and deliberations in research meetings to vulnerable conversations with the teachers and students enrolled in the study.

In collaborating with Kelly (second author), a white cis woman and university researcher, to consider the role of digital infrastructures in multimodal composing processes, we have continued to wrestle with the ways that our privileges and positions are implicated in our analysis. In particular, we have felt a tension in how to take seriously the uneven impacts of digital infrastructures (and the ways that these are refracted through raced

and classed identities) without replicating the damage-centered gaze (Tuck, 2009) that often infuses research on digital media and communities of color. In keeping with this article's larger theme, we have come to see this friction as a grounding for inquiry and a resource for resisting simple explanations that downplay either the force of digital architectures or the agentive ingenuity of students working within and against such structures.

Classroom Context

We focus on one design cycle in a ninth-grade humanities classroom during the school's first year. In a previous unit, students wrote "Where I'm From" poems, modeled on George Ella Lyon's (1999) *Where I'm From: Where Poems Come From*, which lists artifacts, dialogue, and images depicting the contexts that shaped her. Now, students were tasked with collaboratively remixing their poems into a "Where We're From" digital story. Working in groups, students combined elements from their individual poems and brought the resulting text to life with photos, video, and music. Students were given resources for storyboarding these multimodal assignments, and their teacher, Sam, provided video-editing tutorials so they could create their planned design using iMovie.

Within this context, we focus on one group as a telling case (Mitchell, 1983) of the process by which students negotiated availability in multimodal composing. The group comprised three young African American men: Kyrie, Kendrick, and Dante. According to Mitchell (1983), a telling case is derived from data that surface hidden or poorly understood relations. It is not representative of what occurred for all, or even most, in the site but rather highlights clarifying and qualifying details that might otherwise be overlooked.

We selected our case because it was overlooked at the time. To the research team and teacher, Kyrie, Kendrick, and Dante's project was exemplary, a demonstration of the power of multimodal composing as a form of expression and social critique. It was not until months later, in an end-of-year interview with Kendrick, that we learned how frustrating the process had been for the group: "We couldn't make it like we wanted to," he said. It was hearing Kendrick's words that prompted our return to the data to make sense of the frictions the group experienced and how they were missed by the teacher and research team at the time.

Data Sources and Analysis

The research team documented the "Where We're From" design cycle using photographs and other classroom artifacts (e.g., poems, remixes, storyboards, planning documents; $n = 33$) and collected completed digital stories ($n = 7$). Team members also captured interactions with students through field notes ($n = 19$) and analytic memos ($n = 4$) that mapped students' movements, challenges, and successes as they navigated the assignment. We focused our analysis on the subset of this source material pertaining to Kyrie, Kendrick, and Dante, although we also note where themes from their collaboration were echoed in other groups' projects.

We analyzed data in two stages. First, following Star and Ruhleder's (1996) assertion that hidden infrastructures announce themselves in moments of breakdown, we read the source material to identify such instances in Kyrie, Kendrick, and Dante's composing process. We conceptualize these as frictions: moments when students' planned activities, or spontaneous problem solving met resistance from some external obstacle. These moments were identifiable by overt expressions of frustration from students or by deviations from their planned course of action. We then analyzed these frictions using the map in Figure 1, tracing the infrastructural relations implicated in this particular moment of breakdown.

Negotiating Availability: Three Frictions

Three frictions emerged from our analysis. As will be clear, these were not equivalent, either in their political weight or their impact on the group's process, but together they demonstrate the varied ways that digital infrastructures are implicated in multimodal composing. We present them here chronologically, in the order that Kyrie, Kendrick, and Dante navigated them.

Algorithms and the Availability of Images

When Sam introduced the "Where We're From" remix (a multimodal redesign and repurposing of the original poem), Kyrie, Kendrick, and Dante were energized. They had taken the "Where I'm From" poetry assignment seriously, reflecting on the ways that they had been shaped by their city, neighborhood, and families. Kendrick wrote about his relationship with his father, Kyrie wrote about his activism related to gun violence, and Dante celebrated figures whose words and actions moved him, such as Martin Luther King Jr. Now, they would braid elements from these poems into a multimodal composition.

Kendrick, a gifted rapper, took the first pass at combining lines and themes from the original texts. He was intimately familiar with forms of remix that predated the term's usage in multimodal literacy—those rooted in the cuts, splices, and fades of dub and hip-hop. Kyrie and Dante highlighted portions of their poems that they wanted retained in the remix, and Kendrick went to work in the corner of the room, mouthing words to an imagined beat and pausing periodically to scribble another line. The next day, he returned to the group with a completed draft (see Figure 2). "I stayed up all night making it perfect," he told Kyrie and Dante, who eagerly read over the text. After some collective revisions, the group began storyboarding visuals to accompany the remix (see Figure 3).

It was trying to find these visuals that the first (and most insidious) friction surfaced. The group planned to open their digital story with an image of the city skyline, followed by one from their neighborhood. They had no trouble finding the first in Google Images, but

Figure 2
Remixed "Where We're From" Poem

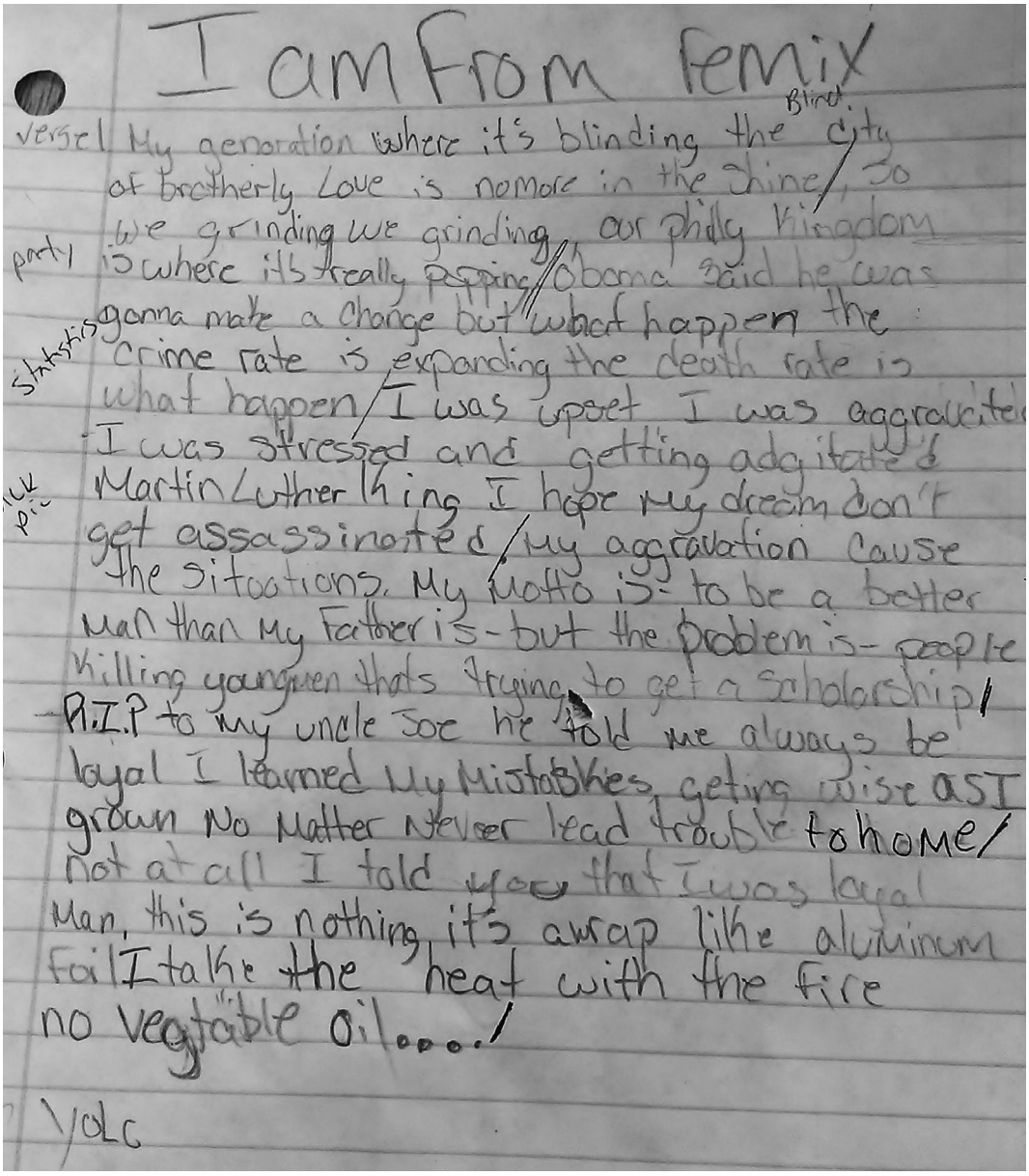
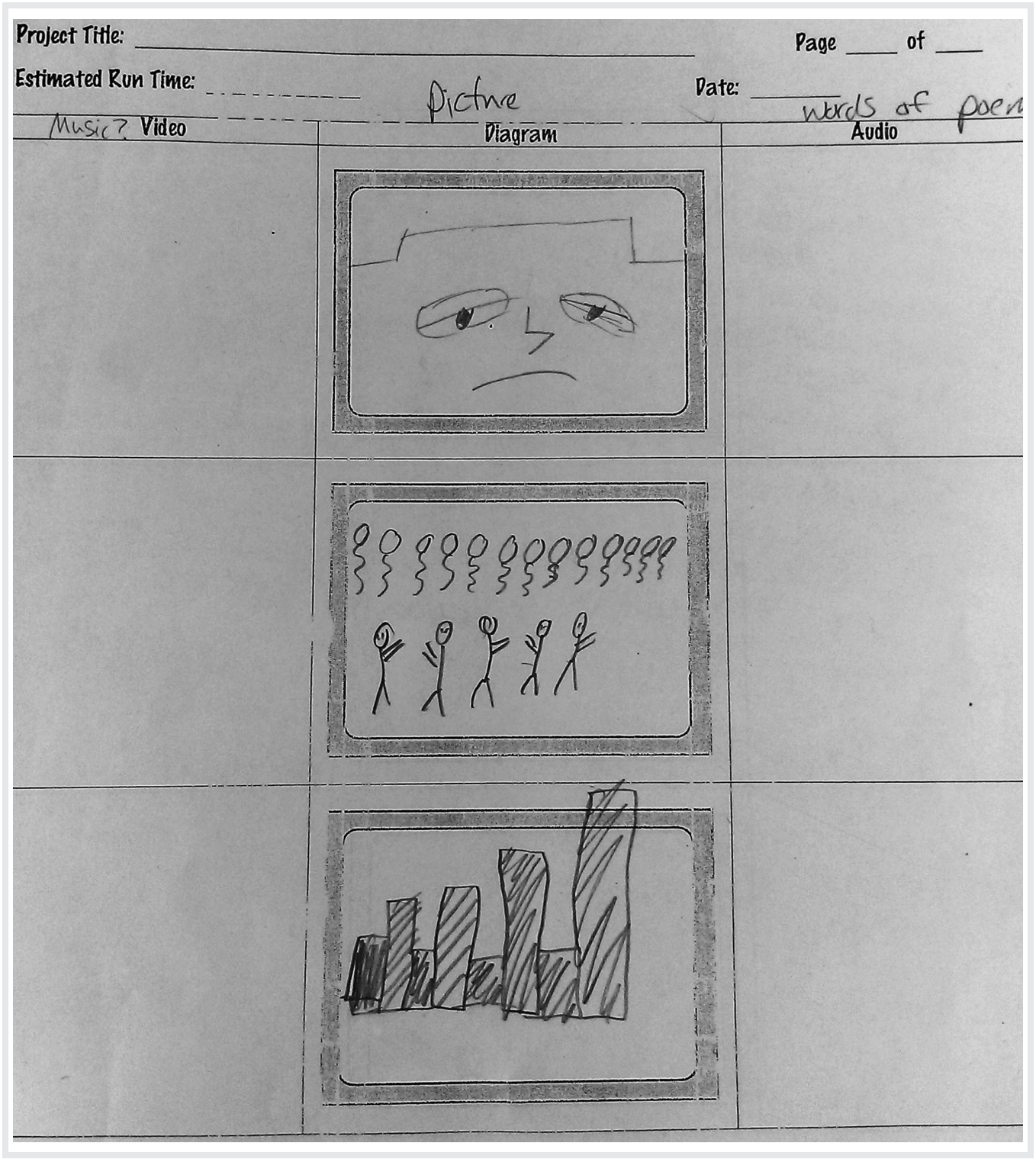


Figure 3
Part of the Group's Storyboard



the second proved more difficult. Searching for "[city] neighborhood" yielded photos of affluent homes and tourist destinations in town—visuals different from what the group hoped to represent. After scrolling for some time, they eventually decided to abandon the depiction in their storyboard, resorting to a collage of tourist landmarks that showed up early in the search results.

This friction emerged from an interplay of algorithms, modal materials, and digital practices and reflects what media scholars call algorithmic bias. In *Algorithms of Oppression: How Search Engines Reinforce Racism*, Noble (2018) described how search engines reproduce formations of difference by delivering, under cloak of algorithmic objectivity, results that cater to white, straight, cis, male, able-bodied users. For Dante, Kendrick, and Kyrie, this meant that even though the platform made images of the city available, certain representations of the city were more available than others. Ultimately, this incongruity reshaped their composing process, pressuring them to abandon the planned vision for their digital story's opening and, instead, to infuse imagery reflective of the search interests of white, affluent internet users.

It is worth noting that the group was not alone in experiencing this friction. Returning to the field notes, we found other references to groups that struggled to locate representative images. One group, searching for a photo of a family, almost used the first Google result, a white couple with two children, until a researcher suggested that they could amend their search to "black family." It is telling (and unsettling) that such occasions were significant enough to be recorded in field notes yet were not recognized as a wider pattern until we returned, later, with an eye toward these frictions.

Governance, Business Models, and the Availability of Audio

While Kendrick was still finalizing the remix lyrics, Kyrie and Dante were searching on their phones for music to accompany the project. They took turns playing clips, discussing which tones and rhythms would best match their composition. Dante suggested a local rapper's track, which intercut verses with audio from city news reports. Kyrie liked this idea, noting that they could sync pauses in Kendrick's rapping with these newsclips to punctuate their lyrics with local reporting.

However, importing the song into their project surfaced a second friction. Dante had accessed the track using a subscription-based music service, but there was no way to download it onto the iMac where they were assembling their project. After some troubleshooting, he and Kyrie devised a clever workaround. They located the song on YouTube and attempted to download it through an online YouTube-to-MP3 converter, but the school's firewall blocked this site, as it did the pirating website they tried next. Frustrated, Kyrie created a simple backing track using online beat-making software. It was better than iMovie's prepackaged soundtracks, but nevertheless, the group was disappointed that they could not use the song they really wanted.

This friction, very different from the first, surfaced as governance and business models mediated students' access to modal materials. Governance is reflected in the constraints that made the group's preferred song available, just not in any form usable in their digital story. This is clearest in the incompatibility between Dante's music subscription and iMovie's importing capabilities. Such breakdowns may appear as unfortunate software flaws but only exist because humans design them that way. Behind all software are human choices about what problems should be solved (or not) and what practices should be possible (or prohibited). This is another way of saying that all software is political: It is embedded with the interests, aims, and values of those who create it.

This is true not only of iMovie (owned by Apple, a company with an interest in controlling how music is circulated and used) but also of the school's firewall, which regulates the resources available to students as they create, improvise, and troubleshoot. In both instances, the governance structures of the software were closely tied to a business model that enjoins the music industry and digital streaming platforms and that adjudicates proper from improper ways of accessing and using commercial content. This is not to suggest that such regulation is necessarily bad, only that it is unavoidably present in the composing process and, therefore, may create frictions that are worth examining.

For Dante, Kendrick, and Kyrie, this friction meant that their vision for the project was intimately entangled with the constraints of intellectual property law and corporate profit motives. Also, as scholars of media law have argued, these regulations are rarely designed to support, much less endorse, the forms of creative remixing that connective media might otherwise make available (Lessig, 2008). Even as Kyrie's homemade track reflects the group's ingenuity in working within and against the digital infrastructures they encountered, that they needed to settle on this workaround demonstrates the force that digital architectures bring to the composing process.

Software Interfaces and the Merging of Available Resources

With images and music inserted into iMovie, all that remained was for Kendrick to record their remix and for Kyrie and Dante to smooth out timing and transitions in the video. Pacing around the computer, Kendrick rehearsed his delivery, mouthing the words to find the right cadence before recording. For his first take, Kendrick rapped the entire poem, only to find that he was out of sync with the background music. He tried a second time, allowing the beat to play softly so he could monitor his timing. But now, the mic picked up the snare of the backing beat, creating an odd syncopation. After several more takes, now with headphones to mute the background noise, Kyrie suggested recording one section at a time, which they could then splice together afterward.

Editing these segments surfaced a third friction. Although Kyrie, an aspiring music producer, had experience in using professional recording software, he struggled to align segments to the backing track using iMovie's clunky audio-editing interface. For several days, the group tinkered with the audio, trying to get it perfectly matched to the beat and images, even staying in the room during their lunch period to rerecord vocals for a particularly complex section of the remix. But as the software continued to give problems to them, frustration set in. They began deleting some of the more technically complicated lines from the poem, hoping to make it possible to sync. In the end, they never managed to align the audio as they planned. When they presented the project to their classmates, Kendrick rapped the poem live while the music, images, and text from the digital story projected behind him. This was, once again, a creative workaround that demonstrates the group's ingenuity and their commitment to the project, but it was also a significant departure from their planned vision.

This friction emerged as the software interface mediated how the group was able to combine modal resources into a new composition. Although iMovie's recording tools made the moving parts of the composition available for editing, rearranging, and revising, these processes were shaped by the software's usability. This was most clearly evinced in the group's willingness, in a moment of desperation, to cut lines from the poem to make it work with the program. This highlights how a software interface can assert itself in the composing process as a clumsy coauthor, molding the composition to fit its most frustrating limitations. It is for this reason that media scholars have suggested that interfaces are not only a plane of contact between users and technologies but also a "border zone between cultural systems" (Drucker, 2013, p. 216)—in this case, where students' aspirations and creative practices bumped up against the logic and constrictions of iMovie's design. The breakdowns that surface at this border zone highlight the infrastructures that young people often work with and against to combine available resources into a multimodal creation.

Discussion and Implications

Reading across these frictions helps make visible the digital infrastructures at work in Kyrie, Kendrick, and Dante's multimodal composing process. In doing so, it also complicates certain well-rehearsed narratives about mobile and connective media: for instance, that they increase accessibility, democratize participation, and promote creative production (cf. Jenkins, 2006; Lankshear & Knobel, 2011). Our findings suggest that although digital media can make available the possibility of such outcomes, this availability is not inevitable or stable; it is negotiated as student practices bump up against the technical and economic infrastructures that constitute and animate digital media environments. Also, crucially, the terms of these negotiations are not fixed; their impacts are experienced unevenly. Whereas the second and third frictions that we described could surface in any classroom where students are using software, the first specifically impacts students whose racial, sexual, gender, and class identities diverge from the dominant norms of white heteropatriarchy. In this way, such frictions raise critical questions about justice and equity in multimodal literacy education.

Our purpose in examining these infrastructures of availability, then, is not simply to show that multimodal composing is complex (although it is) or that unexpected power relations emerge through its process (although they do). Rather, our findings suggest that attending to the frictions in the multimodal composing process can point educators to pedagogical possibilities that might be overlooked when the agentive moves of multimodal composers or the dynamic features of multimodal creations are isolated from the infrastructures that mediate them. Within Dante, Kendrick, and Kyrie's project, we see many powerful practices that are often associated with multimodal composing: It was personally meaningful and culturally relevant, it mobilized existing interests and abilities, and it encouraged the integration of a range of semiotic resources. Indeed, at the time, the teacher and research team celebrated the power and

ingenuity of their performance. Yet, the students had a different relationship to the final product. It was not until the interview, months later, when Kendrick referred to the project as a low point of his year, saying, "We couldn't make it like we wanted to," that the outsize impact of these frictions became apparent to us.

Kendrick's frustration points to a danger of treating such frictions as aberrations, rather than the norm, in multimodal composing. When the process is positioned as a neutral integration of available materials, it becomes possible for students to understand breakdowns as personal failures rather than upshots from competing infrastructures working to shape the availability and use of modal materials. A more generative approach, then, is not only to identify frictions but also to foreground them in the teaching and practice of multimodal composing, that is, to see such breakdowns as a starting point for instruction, inquiry, and action related to digital environments whose infrastructures are often invisible to us and whose design may not align with our own values and commitments.

For example, a project where students gravitate to Google Image Search presents opportunities not only to teach search strategies but also to explore the politics of algorithms and the ways that algorithmic bias might shape what and how we compose. This orientation can build on the work of educators using critical media literacies to analyze and respond to racialized representations in popular media (e.g., Baker-Bell, Stanbrough, & Everett, 2017). It does so by extending this critique not only to the images made available through search engines but also to the algorithmic infrastructures that launder racism, sexism, and heteronormativity as neutral or depoliticized search results. Such extensions might also move beyond critique alone, opening inquiry into what levers might be available for intervening in these algorithmic architectures (e.g., raising public awareness, organizing forms of collective action).

We see similar opportunities for broaching governance and business models. Although it is commonplace to hear about the upsides of connective media—its forms of participatory culture (Jenkins, 2006) and connected learning (Ito et al., 2013)—the same platforms that facilitate such activities are also deeply enmeshed with shifting regulatory arrangements and commercial interests. Treating platforms as neutral resources for multimodal composing overlooks the important ways that these spaces are also bound up with ethical questions related to data, privacy, and surveillance. As these become central issues in civic life, their associated frictions in the process of multimodal composing offer opportunities for important engagements with such topics in literacy classrooms. Stornaiuolo (2020), for example, showed how these tensions can be a starting point for student inquiry into the uses of data for counterstorytelling and social action—practices associated with critical data literacies.

In closing, we want to emphasize that although we have focused on particular frictions that surfaced in Kyrie, Kendrick, and Dante's project, this is not an exhaustive account of the interplay between digital infrastructures and multimodal composing. Researchers and educators in other contexts might find different dynamics depicted in Figure 1 to be more integral to a certain moment of breakdown than those we outline here. Although all of these infrastructural relations have potential to produce frictions in the process of multimodal composing, they do not do so always, or equally. Our purpose, then, is not to emphasize the universal importance of certain infrastructures over others but to demonstrate how attention to frictions in the composing process can direct educators toward those that are most salient to their contexts. This orientation means rethinking availability not as something that flows inevitably from digital media but as something negotiated through practice.

TAKE ACTION!

1. Prompt students to reflect on moments of friction in their usage of technology, moments when hardware or software seemed to work against their desired outcomes. Invite them to consider what infrastructures were associated with this friction, and who or what contributed to designing them.
2. Discuss algorithmic bias. Ask students to examine their day-to-day contact with algorithms by highlighting common examples (e.g., Google searches, Amazon recommendations, targeted advertisements on websites and social media platforms). Conversation starters might include the following: Where do these algorithms come from? Who benefits more or less from them? What is gained and lost as decisions are turned over to algorithmic reason?
3. Invite students to analyze a digital platform they use regularly (e.g., Instagram, TikTok). They might consider how its interface encourages or discourages certain uses or presentations of self. Or, they might conduct research into who owns that platform, what its privacy policies are, or how it makes a profit. This could be the basis of an inquiry project into how everyday technologies work and what their social implications are.

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