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Looking At Screens: Examining Human-Computer Interaction and Communicative Breakdown in an Educational Online Writing Community

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Abstract

This study, a qualitative examination of students' experiences within an online writing community, frames human-computer interaction (HCI) as a dialogic negotiation of users and systems within networked publics. It demonstrates how an interface-level examination of these interactions, particularly at moments of glitch and error, reveals their impact on the landscape and design of educational online writing communities, puncturing the technological transparency that permeates HCI. Using a micro-ethnographic approach, this study draws from screen capture recordings, questionnaires, observations, and visual-elicitation interviews to construct two cases that demonstrate the significance of interface-level interactions in shaping the networked public square of an educational online writing community, re-framing conceptualizations of both student and system "error." By encouraging readers to look *at* (rather than *through*) the interfaces mediating students' interactions with online writing communities, this article shows how interface-level interactions emerge from and fold back into complex dialogic systems with implications for the teaching, research, design, and analysis of educational online writing communities.

Keywords: writing; online writing community; interface; human-computer interaction; dialogic interaction; Bakhtin; screen-capture; digital literacy; glitch

Introduction

It is no secret that interfaces are designed to disappear. We have heard this before from many scholars of digital composition, such as Cynthia L. Selfe and Richard J. Selfe, Jr. (1994), Christina Haas, 1996, Anne Frances Wysocki and Julia Jasken (2004), Ben McCorkle, 2012, and Lori Emerson (2014) to name a few, and there has even been a special issue of this journal devoted to the topic (edited by Joel Haefner, 2009). Yet it remains easy for teachers and researchers of writing to let writers' interface-level interactions recede into the background of inquiry into online composing environments – such as online writing communities. More specifically, writing teachers and scholars often direct their attention toward the compositions created, relationships cultivated, and information shared within online writing

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communities without accounting for the interfaces that mediate them, and this tendency can have consequential impacts on how students are assessed, curriculum is designed, and technology is implemented within writing classrooms.

The tendency to overlook the interface is analogous to how we rarely think about our interactions with a door handle: we are much more likely to simply think about what we will do once we pass through a door. Of course, as Benjamin H. Bratton (2015) reminds us, we are only able to ignore the door handle (i.e., interface) until something goes awry with its functionality or it is not accessible to us. Similarly, except in moments of breakdown or error, the computer interfaces that seamlessly facilitate our desired interactions with computational systems achieve what many theorists discuss as "transparency" and, as Haefner (2009) warned, "accommodating the idea of a transparent interface without question or examination, is actually a dangerous course" (p. 135). Following the lead of other digital writing scholars who turn to moments of "glitch" or error to make the transparent opaque (e.g., Boyle, 2015), in this article I focus on two moments of technological breakdown within an online writing community as reminders to look *at* rather than *through* the interface (Lanham, 1993). Looking *at* the interface opens the door to new conceptualizations of the its role in shaping the n̈etworked publicsn̈ in which students write within and beyond the classroom. (boyd, 2010). For teachers and researchers of screen-mediated writing, reframing the role of the interface in this way also opens up possibilities for reframing student and system error in networked composing, with implications for the instructional and infrastructional design of educational online writing environments.

In what follows, I demonstrate the importance of such new conceptualizations by drawing on two "telling cases" (Mitchell, 1984) that document the interface-level human-computer interactions of three high school students during moments of technological error within an educational online writing community called Write4Change. These three young men, who joined the Write4Change community as part of a larger study about educational social networking, each encountered a moment of technological and communicative breakdown in their interface-level interactions that had repercussions for how they presented themselves and participated within the community going forward. I provide micro-ethnographic accounts of the students' interactions to reveal how seemingly small-scale actions such as mouse clicks and the interface's response time can have ripple effects that alter digital composing landscapes and students' participation within and attitudes toward them.

Ultimately, I argue for looking *at* the interface-level origin-point of such ripples from a Bakhtinian, dialogic perspective that accounts for socio-historical, cultural, and material contexts in order to better account for, respond to, and design in anticipation of the inevitable moments of human-computer communicative breakdown in online writing communities that so often appear as student or system ërror.T̈he proposed dialogic reframing of ërrorär̈ as communicative breakdown between interface and students also allows for an examination of the power differentials at play in its negotiation, which can prompt changes in the way we design, assess, and teach students to critically navigate technological landscapes of networked writing.

Digital dialogism: The entanglement of HCI and interpersonal interaction online

I argue that one way of better understanding the role of human-computer interaction (HCI) within online writing communities is to adopt an analytic approach that understands interface-level interactions as part of a dialogic digital landscape. Specifically, I draw a connection between an understanding of online writing communities, like Write4Change, as "networked publics" (boyd, 2010) and Mikhail M. Bakhtin's (1984) theorization of how discourse and power operate within the "public square" – ultimately arguing that dialogic interactions with an interface are a powerful, yet often overlooked, force within the public-square discourse of online writing communities.

Write4Change and "Networked Publics"

Communal online writing spaces, whether they are social networking platforms or discussion forums within learning management systems, are ubiquitous sites of social writing for many students, and, for many U.S.-based adolescents – such as the ones in this study – writing online for educational and social purposes is a daily activity (Anderson & Jiang, 2018; Purcell et al., 2013). These spaces for online writing in the presence of others can be usefully considered as "networked publics," which danah boyd (2010) defined as "the space constructed through networked technologies and ... the imagined collective that emerges as a result of the intersection of people, technology, and practice" (p. 39). In other words, networked publics are both platform and community. boyd and others argue that the technological architecture of these public writing spaces, as well as the people that occupy them, are central to how such networks

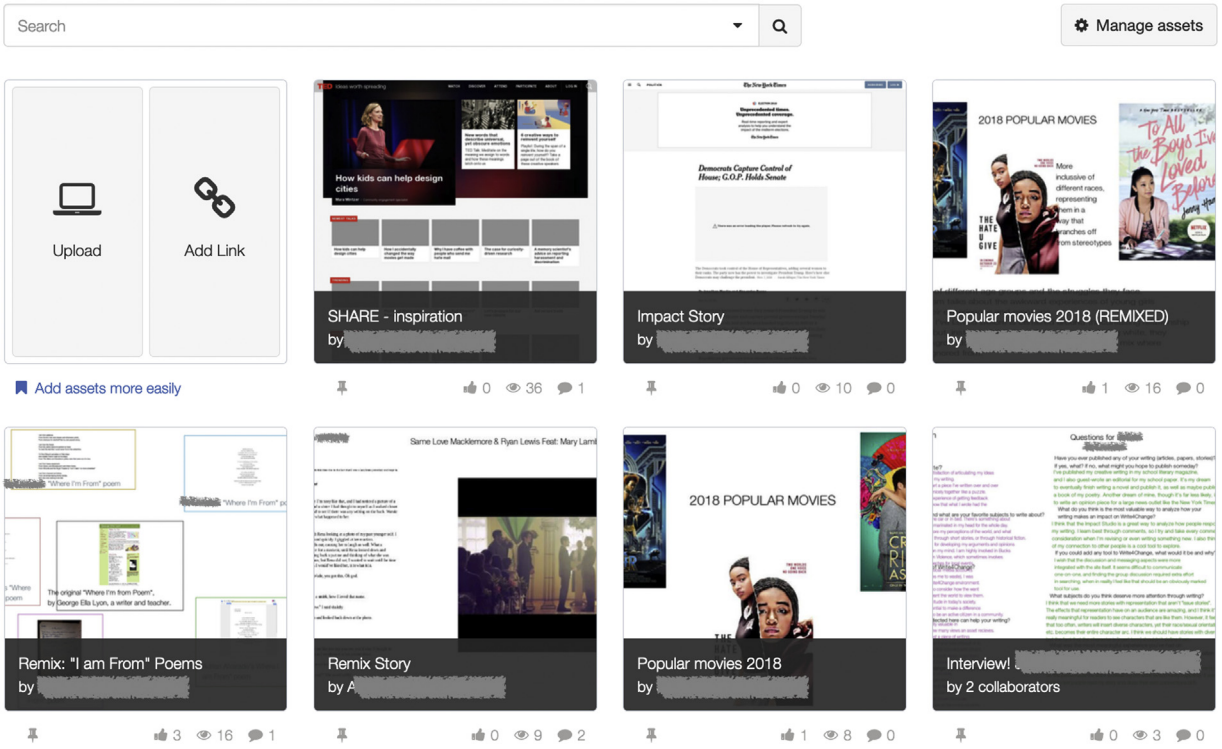

Fig. 1. View of the Asset Library in Write4Change, illustrating its design and content.

are constructed; therefore, it is worth establishing a brief overview of the technological architecture and history of the Write4Change community at the center of this study.

At the time of this study, Write4Change was an educational social networking space that convened high school students (ages 14–18) from around the world and prompted them to share writing, media, and hyperlinked content with each other (see Hall & Stornaiuolo, 2019; Stornaiuolo & Jung, 2017 for more details). Participants each had a Write4Change profile and could share multimodal content with other students who may have been across the classroom, across the city, or across the world. The goal of the Write4Change community, as defined on its website and presented to participants, was to foster cross-cultural communication and knowledge sharing as students developed as writers who impact local and global communities, and participants were encouraged by their teachers, the research team, and online prompts to share writing and media with each other based on these goals and their personal interests (write4change.org). Students were granted access to Write4Change at the request of their teacher or through their participation in an ongoing, long-term research study of the community, of which this study is a part. As such, the Write4Change community was both private and public – it was private in that access was moderated and limited, but it was public in that student writers were posting to a real, broad, and often unknown audience of peers, educators, and researchers.

While the Write4Change community has existed across a variety of platforms, the iteration studied here was mediated through a bespoke learning management system platform (Canvas) modified by the researchers and developers of the community, in which a social-media style "feed" had been developed for students to share, comment on, and like multimedia posts, known as the "Asset Library" (see Fig. 1). These modifications were designed to mimic some of the features of popular social media sites within a closed, educational platform in order to create a sense of community and promote interaction and dialogue between students.

A Bakhtinian perspective: Dialogism & the public sphere of Write4Change

Following the lead of other scholars of online writing communities, I find Bakhtin's ideas about dialogic processes to be a useful heuristic for understanding how students' engagements with each other and with interfaces unfolded within

an online writing community (Magnifico et al., 2019; Hall & Stornaiuolo, 2019; Liew, 2010; Gillen & Merchant, 2013). I add to this conversation an argument for taking into account the role of the interface in such dialogized interactions. Bakhtin's conceptualization of the public square helps us understand how meaning, change, and identity can be negotiated in public spaces of debate and performance, and, if we think of online writing communities like Write4Chance as a kind of "networked public square," we understand that the meaning negotiated there is both a product of the interpersonal interactions that play out online and the technological architecture that mediates them. However, I posit that the technological architecture itself is not merely a receptacle or platform for such negotiations, but a dialogic actor participating in and shaping the discourse of the community, as students and interfaces communicate with each other through the production of "utterances": keystrokes and screen responses – each made in expectation of an "answering word" (Bakhtin, 1981, p. 280) – whether the utterance is a social media post made in expectation of "likes" or a mouse-click made in expectation of a computer's response.

It is important to clarify that this notion of dialogism is not simply a way to categorize the back-and-forth responses of online writers or of humans and computers. Bakhtin (1981) writes of the "internal dialogism" of each utterance, in which each utterance is filled with the words of others even as it itself becomes an "active participant in social dialogue" (p. 276). Thus, dialogism describes both the internal forces shaping each utterance and the atmosphere surrounding it, which every utterance contributes to and sustains. Therefore, when applying the concept of dialogism to interfaced and interpersonal interactions, it is important to examine the socio-historical, cultural, and technological architecture of the networked public squares in which utterances occur and the internal dialogism of individual utterances in online writing communities like Write4Change.

Writing about the development of literary genres, Bakhtin (1986) also explained how, when utterances are filled with "others' words" within a heteroglossic landscape, some discourses hold more authoritative or ideological power than others (p. 89). In considering HCI as a dialogic process, it is also important to ask where authoritative and ideological power are held in our negotiations with interfaces. As the cases in this article will show, moments of communicative breakdown between students and computers can not only demonstrate the authoritative power of the interface in human-computer interaction, they can also show how this authoritative power shapes the networked public.

I acknowledge that many of the concepts discussed in this article – HCI, online learning communities, writing systems, etc. – have also been helpfully theorized through cultural-historical activity theory perspectives that position the interface as a mediational tool in system of object-oriented, socio-culturally situated activity. Recognizing the long history of work in both HCI and writing studies that takes an activity theory perspective, I focus my analysis here through a Bakhtinian dialogic frame, remaining cognizant of the dialectic activity system that is also at work within Write4Change and other online writing communities. Although some (e.g., Matusov, 2011) see Bakhtinian theories of dialogism as incommensurable with activity theory approaches rooted in Vygotskian notions of dialects, I align my thinking with those that view Vygotsky's dialecticism and Bakhtin's dialogism as both compatible and complementary (e.g., Freedman, Hull, Higgs, & Booten, 2016; Roth, 2013) and find dialogic framings to be particularly useful for a micro-ethnographic analysis of the back-and-forth interactions between students and systems that unfold across the interfaces of networked publics. Framing the inquiry in this way means understanding the interface not only as a mediating tool participating in an activity system but also as a dialogic partner within the public square of an online writing community.

A Bakhtinian, dialogic lens also allows me to position interfaces as authoritative dialogic actors in the heteroglossic sphere of the online writing community rather than tools that mediate subjects' individual or collective goals. Thus, I am able to re-frame a glitch or a moment of technological error not as a tool that is broken but as a communicative breakdown, and to subsequently trace how these breakdowns in communication between humans and computers wield power to reshape the dialogic landscape of the online community. Power is not distributed evenly within the heteroglossic spaces of online writing, and considering the interface as a dialogic actor in a networked public square can prompt continued interrogation into the authority with which it is imbued, with implications for how student writing is assessed and analyzed when it intersects with the authority of the interface at moments of technological and communicative breakdown.

Online writing, interfaces, and error: A brief literature review

While others have used a Bakhtinian lens to analyze the interaction between writers online, few scholars have combined dialogic analyses of interpersonal interactions with analyses of interfaced interactions in online writing

communities. In the following sections, I review literature that has accounted for the dialogic practices of human-to-human interactions in online writing communities and scholarship that explains the dialogic process of human-computer interactions. I then review arguments for turning to glitches and technological error as illuminative measures for seeing and understanding the often-invisible authority of the interface on our everyday online interaction. Following this brief review, I offer two telling cases that also use moments of "glitch" to clarify the relationship between interpersonal and interfaced dialogue within the networked public square of Write4Change.

Dialogism and online writing communities

Scholars of technologically-mediated composition have often turned to Bakhtinian theory to understand how online writers participate in and shape heteroglossic discourse in networked writing spaces. For example, Julia Gillen and Guy Merchant (2013) have analyzed twitter as a dialogic space where utterances (in the form of tweets) are shaped in response to each other, and Julie Warner (2016) has explained how the broader discourse landscape as well as the internal dialogism of individual utterances are materialized within digital social networks of youth composing with mobile phones. Similarly, Julia Davies (2012) has examined youth writing on Facebook to show how online writing communities develop their own norms and rituals, forming a communicative space in which the social environment surrounding online ütterancesïnfluences the internal dialogism of the posts themselves. Additionally, Brittany Kelley's (2016) and Rebecca W. Black's (2006) analyses of fanfiction communities have shown how writers engage in dialogic remixing of cultural and linguistic resources within their individual posts and in interpersonal dialogue through practices such as feedback and peer review. Of particular relevance to this article, Matthew Hall and Amy Stornaiuolo's (2019) previous examination of Write4Change also used a dialogic framing to conceptualize the ways in which online writers drew on the discursive and material semiotic resources of their lived experiences to engage with, contribute to, and shape the interactional landscape of the educational online community. These and other studies have reiterated that the dialogic nature of writing in networked public spaces has implications both for the development of writerly identities and the community as a whole; however, it is also important to consider the dialogic nature of HCI in the construction of online discursive space and identities within it.

Interfaces as zones of dialogic engagement

Scholars and developers of HCI have long analogized human-computer interactions as a conversational, dialogic relationship between human and machine (Brennan, 1990). Early computer interface designers conceptualized user input and computer response as a conversational process, with Susan E. Brennan (1990) explicitly referring to user-input in terms of "utterances." A Bakhtinian (1986) understanding of utterances suggests that they cannot exist without "addressivity," defined as "the quality of turning to someone" (p. 99); for example, in the dialogic system of human computer interaction, a human moving a cursor or a computer displaying a dialog box also indicates a "turning to" in expectation of a response. In this way, both the human and the computer exhibit addressivity through the affordances of the interface, such as the graphics displayed on screens and the timing and sequence of their appearance. In other words, interfaced interactions of humans and machines are scripted and programmed in dialogic relationship to each other, and each utterance is made in expectation of socially and programmatically scripted responses.

The dialogic nature of human-computer interaction is exemplified by the timing of these responses and the importance of System Response Time (SRT) within user experience design – a concept that holds particular significance for the cases presented forthwith. In their textbook on designing interfaces for effective HCI, Ben Shneiderman and Catherine Plaisant (2010) define SRT as "the number of seconds it takes from the moment a user initiates an action, usually by pressing the Enter key or a mouse button, until the computer begins to present results" (p. 407). SRT is an illuminating feature of the dialogism of HCI because the communicative loop of interaction can be interrupted if "delays interfere with perceptual feedback and knowledge of the results of user input" (Dabrowski & Munson, 2011, p. 557). In other words, unexpected responses or delays can cause feedback loops to break or, in dialogic terms, they can cause utterances to lack their expected rejoinders. In 1968, Robert B. Miller's early conversational conceptualization of HCI drew a resonant comparison between SRT delays and unexpected silences in human-human interaction, with his analogy that "in conversation of any kind between humans, silences of more than four seconds become embarrassing because they imply a breaking of the thread of communication" (p. 267). In this way, delays and breaks in what can otherwise be a cybernetic, self-regulating dialogic system of HCI can cause frustration and miscommunication to occur, the

effects of which can ripple and resonate through broader interactional contexts. Thus, a close look at such moments of communicative breakdown at the interface level can illuminate the powerful role that computer interactions play in the formation of networked public dialogue in communities such as Write4Change.

Communicative breakdowns and technological opacity

These technological communicative breakdowns can also push the invisible systems that support HCI into the foreground, rendering opaque what is often transparent. Using the notion of the "glitch" to theorize such moments, scholars such as Casey Boyle (2015) have remarked on their potential to provoke attention to the "transparent mechanisms" the govern our interfaced interactions with digital devices (p. 13). In dialogic terms, a glitch can serve as a moment when we see the rejoinder in the dialogic engagement of HCI; for example, when waiting on the computer to respond, or when receiving an unexpected response, we notice its presence (and its power) in a different way. This noticing is particularly important for teachers and researchers of educational online writing communities because breakdowns in communication between humans and computers can have broad yet often overlooked effects on the participation patterns of student writers – effects which might otherwise be interpreted solely as the choice or error of an individual student.

In what follows, I explore the effects of such technological communicative breakdowns within Write4Change, examining how they can shape the networked public square and students' individual experiences and participation there. Previous studies of online communities have focused more on human-to-human interactions – the posts made, the comments left – and have largely overlooked the role that technological breakdowns play in shaping the dialogic landscape of online communities. A more comprehensive view that takes into account HCI is particularly necessary in educational contexts, where there are significant implications for students whose teachers look to the individual, the activity design, or the content of a post when assessing why a communicative breakdown occurred in an online writing environment, rather than accounting for the technological system itself as a possible factor.

For these reasons, noticing interface-level dialogic interaction within schools can become a way of combating deficit orientations and alleviating the pressure put on teachers and students for ensuring the expected outcomes of seamless interactions within educational online writing communities. The following telling cases offer examples of how attending to human-computer interactions while studying an educational online writing community offers a more robust and comprehensive view of the interactional environment, with consequences for analyzing, assessing and developing student writing within such communities.

Methods for examining interface-level interactions

The telling cases presented in this article are drawn from micro-ethnographic case studies of three high school students who were participating in Write4Change. As part of a larger, multi-year study of the Write4Change community, I used screen-capture recordings and visual-elicitation interview methods to explore the following question: How did high school students' interactions with the Write4Change interface shape the online writing community?

Data collection & analysis

One method for looking *at* (rather than *through*) the interface is using screen-capture recording software that makes visible interface-level interactions for analysis (Bhatt & de Roock, 2013). In this study, seven students volunteered to participate in a screen-capture study I conducted to better understand the role of the interface in mediating student interactions within Write4Change. Using a free Google Chrome plug-in called Loom, participants made recordings of their screens while participating in theWrite4Change community, which they subsequently shared with me for analysis. Two of the seven student volunteers recorded their screens while using Write4Change at school, and five recorded their screens in an out-of-school context. I then used a micro-ethnographic approach to analyze the screen-capture recordings moment-by-moment and noticed multiple moments when breakdowns in the students' interaction with the interface impacted their participation patterns or the online community landscape as a whole. Drawing inspiration from Kevin M. Leander's (2008) connective ethnographic approach, I combined my analyses of the screen-capture recordings with analyses of stimulated-recall visual-elicitation interviews (Dempsey, 2010; Harper, 2002), questionnaires, and

in-person observations to better understand the socio-material and historical context framing students' interface-level interactions.

In selecting focal cases for micro-ethnographic analysis, I reviewed over six hours of screen capture footage provided by all seven participants, creating a content log and noting moments of communicative breakdown between the students and the platform that punctured the transparency of the interface and could serve as "a telling case in which the particular circumstances surrounding a case serve to make previously obscure theoretical relationships suddenly apparent" (Mitchell, 1984, p. 239). In watching and re-watching this footage, I noticed many moments of communicative breakdown between humans and computers, from isolated typos to an idiosyncratic string of 7777777s that turned out to be the result of a student cleaning up syrup that had spilled across the number row of his keyboard while he was eating breakfast. In selecting focal moments for further micro-ethnographic analysis, I looked for moments of communicative breakdown that had particularly noticeable ramifications for the Write4Change community. Ultimately, I selected two focal cases.

In visual elicitation interviews (Harper, 2002), I re-watched these sections of the screen capture recording with students to structure a stimulated recall (Dempsey, 2010). This visual elicitation strategy allowed us to discuss what happened before, during, and after the scenarios documented in the screen-capture recording as well as the students' reactions and attitudes about the events and their effects. I then transcribed the interviews and created multimodal transcripts for the identified sections of the screen-capture videos. I analyzed these transcripts by constructing vignettes (Miles et al., 2014) that contextualized screen-capture data within students' descriptions of and reflections on the interactional moment, narrativizing their experiences within the broader scope of their reported experiences and the online community. Constructing these vignettes revealed two insights: 1) how students' interface-level interactions shaped the landscape of the online community, and 2) how students' interface-level interactions shaped their participation within that community, both of which have implications for teaching, researching, and designing networked writing.

Setting: The Write4Change interface

The cases described below occurred within "The Asset Library" section of the Write4Change community: the main platform for public interaction and content sharing within Write4Change. Functioning as a "public square" for the community (Bakhtin, 1984) and designed to be analogous to a social media f̈eed," the Asset Library comprised a gallery of all writing and media that students had uploaded to the site, displayed via small thumbnail images. Scrolling through the Asset Library, a student would see hundreds of thumbnail images of all the media, images, links, and writing that other members of the community had posted (refer back to Fig. 1). Students perusing this library of thumbnail images could then click on assets to expand them, read the writers' descriptions, and leave comments. Within the Asset Library, these assets re arranged chronologically in a grid pattern, with the most recently uploaded assets appearing in the top left of the grid. Thus, while the Asset Library mimics other social media feeds in that students can scroll through a variety of multimodal posts, unlike most social media feeds, students see every post made by all Write4Change members (there is no f̈riendingör f̈ollowing), and the Assets are arranged chronologically rather than algorithmically.

Telling cases: Illustrating the impact of interface-level interactions within Write4Change

While not intended as generalizable or representative examples of interface-level interactions, the following cases illustrate moments of communicative breakdown that puncture the transparency of the technologies that mediate online communication. In making human-computer-interaction visible, they demonstrate the implications for how students may be perceived and assessed in digital writing environments, particularly at moments of communicative breakdown. "error."

David's telling case: Shaping the landscape

The first vignette is derived from screen-capture recordings and my interview with David (all names are pseudonyms), a tenth grader who was using Write4Change in an out-of-school context. David, who self-identifies as a Korean male, attended a suburban high school in the Northeastern United States at the time of this study. He volunteered to join the Write4Change community in his extracurricular time as part of a research fellows program, in which the Write4Change

research team recruited youth to join and participate in the online community and provide feedback on their experiences there. David was compensated for his participation.

It is important to understand a bit about David's prior experiences with online writing communities and his motivations for participation in the Write4Change community in order to fully make sense of how his interface-level interactions were informed by previous interactions with interfaces, or filled with "others' words" (Bakhtin, 1986). In David's intake questionnaire, he listed several online communities of which he was an active member: Instagram, Snapchat, Reddit, and Quora. He expressed a commitment to writing publicly about issues that were important to him and a strong interest in getting feedback from others on his writing, and he said that, before joining the Write4Change community, he shared writing with others "about once a week" and sometimes received comments from others that he used to inform future posts. He expressed a specific interest in using his writing to shed light on more "sensitive" topics, such as immigration, and inspiring others to do the same. As the following vignette illustrates, David brought these interests, beliefs, and experiences to bear on his experiences in Write4Change, and his interest in getting feedback on his writing, when put in tension with the technological breakdown that occurred, shaped his interactions with the interface and ultimately with the community as a whole.

> *David told me that, typically, when he posted on Write4Change, he would use "other people's posts as a gauge of what [he] should post." For example, if other students had recently made a lot of "political posts like voting or immigration," he would try to post onadifferent topic in an effort to ensure the community could "read different varieties of posts." In order to do this, David usually scanned the Asset Library and assessed the landscape of what had recently been posted before deciding what he wanted to share.*
>
> *One Tuesday, David opened up the Asset Library. After scrolling through to see what others had recently shared and reading the community's weekly prompt, which asked him to "add a link to a website or social media post that has had an impact on you or others," he clicked the¨Add Link¨button and copy-pasted a URL to an article about immigration. He spent over two minutes carefully crafting an explanation for the article in the description box, including his personal take on this issue from his self-described perspective as a "non-citizen," and then he clicked "Add Link" to share his chosen article and commentary in the Asset Library. However, when David returned to the Asset Library to view his post in the public area of the site, he saw - to his disappointment - that the article he linked to was represented by a gray box with a generic link icon in the middle of it, while every other post in the Asset Library was represented by a colorful thumbnail image showing an intriguing glimpse of content. This technological failure of the interface to show a thumbnail image that represented David's chosen article did not meet David's expectations for the interaction, and he clicked on the generic link icon to try to negotiate with the interface and correct the problem. This took him to a page where he expected to see his article in an expanded format, but instead the interface presented him with another generic link icon and the phrase "preparing a preview." Frustrated, yet determined to have his article appear in the Asset Library alongside others', David spent five minutes trying multiple strategies to generate a thumbnail image for the article he wanted to share, all to no avail. Eventually, he ended his session in Write4Change without posting the article at all. A few days later, he returned to the platform, and after scanning the Asset Library again – now full of new posts and new topics – he decided to post a link to a completely new article about liver cancer. Thus, David's insights into the immigration debate were never aired within the public square of the Write4Change Asset Library.*

From this vignette, we can see the power that the interface's responses wielded over the public dialogue unfolding within Write4Change. Because the interface did not immediately show David an accurate thumbnail image of the article he originally wanted to share (Fig. 2), and because the community moved on to new topics during the time period before he attempted to share a new article, no one (except me) was given the chance to read the article he originally intended to post – an opinion piece about President Donald Trump's proposed end to birthright citizenship – or David's carefully constructed response to it, which he wrote from his own perspective as a self-described "non-citizen."

When David received an unexpected response from the interface (the link icon rather than a thumbnail image), he based his response to this ütteranceön his goals for participation in Write4Change and his previous experiences in other online writing communities. Presumably because he did not believe the non-descript link icon associated with error messages would garner the attention or feedback he wanted from other members of Write4Change, he abandoned his attempts to post the article on immigration, and when he decided to later post a new article, he re-assessed the community landscape and decided to post on a different topic. When I asked him why he changed his topic so dramatically when

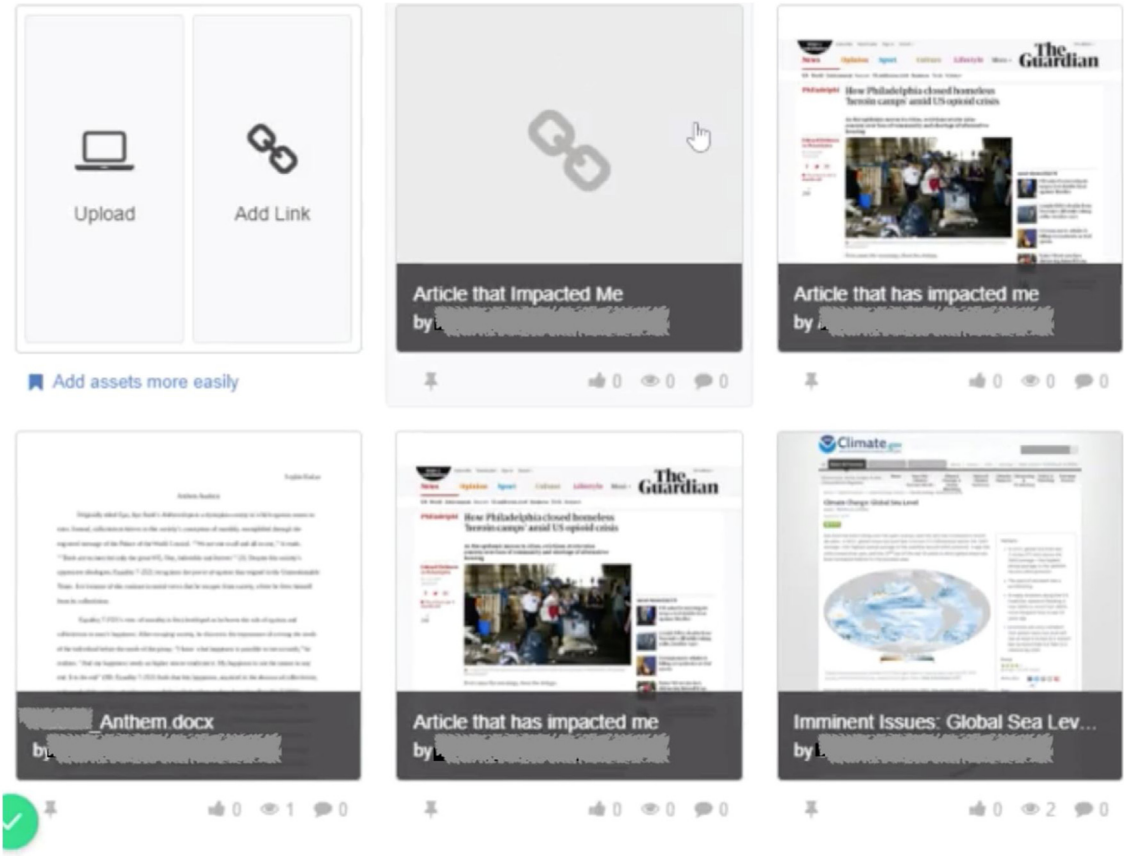

Fig. 2. Frame from David's screen-capture video, showing his cursor hovering over the generic thumbnail that appeared when he attempted to share an article in the Asset Library.

he returned to share a link with the community a few days later, David told me: "I mean it was generally a direction, again, the direction of what the other people were posting, largely political. I wanted to go away from that." In this way, the public landscape of the online writing community was shaped not only through the dialogic process of David's kairotic responses to other students' posts in the Asset Library, but also through David's dialogic engagement with the interface itself.

In other words, there was a power struggle within the converging of voices within the networked public square: the authority of technological power exerted within David's interaction with the interface intertwined with the ongoing heteroglossic dialogue of the Asset Library and David's individual commitments and goals for interaction there, all of which resulted in a public dialogue that did not end up including David's opinions on immigration. This complex dialogic action between David, his computer, and the community effectively rendered his initial response invisible, only able to be recovered and discussed here because of the use of screen-capture recording and reflective interviewing. And, because David had written a caption for his original post in which he identified himself as a "non-citizen" and spoke from this perspective, a part of his identity was rendered invisible as well.

Tyrese and Alex's telling case: Shaping participation

While David's story illustrates how HCI shaped the landscape of Write4Change, the next case demonstrates how interfaced interactions shaped individual participation patterns there as well. This second vignette is drawn from screen-capture recordings, observations, and interviews with Tyrese and Alex, tenth graders who were both using Write4Change while seated next to each other in their high school classroom. Tyrese is a Black, male student who enjoys playing video games and watching anime. Alex, who self-identifies as an American male who speaks Spanish

and was born in Puerto Rico, shares many interests with Tyrese, including memes, games, and anime, and he also told me that he participates in an online community discussing and translating song lyrics. The boys sat next to each other at a table in their high school civics class where they used Write4Change at least once a week on their school-issued Chromebooks. Together, they volunteered to participate in my investigation of the Write4Change interface and took part in an initial usability walkthrough, the screen capture recording process, and follow-up interviews over lunch that I brought to them at school. The following vignette shows how their engagement with the online community and its interface was shaped by their expectations for the type and timing of interface responses and how their negotiations with the interface at moments of error caused a shift in their attitude toward Write4Change.

> *One Thursday, during the time designated for students to use Write4Change in their civics class, Tyrese decided to share a video he had made in the Asset Library. At this point, Tyrese – and Alex who sat next to him – had been using Write4Change for about eight weeks, and both students posted more frequently on the site than most of their classmates; with Tyrese posting fifteen times and Alex posting four times. Often, they posted.gifs in the Asset Library "just for fun" and with relative ease.*
> *On this Thursday morning, when Tyrese decided to share his video, he followed the steps usually required to post a new Asset and clicked the¨Add Link¨button. However, he noticed no change on his laptop screen. Tyrese assumed that the link had not been posted, and he clicked the "Add Link" button again, but he again received no noticeable response from his computer. The same sequence of events was repeated a third time. However, unbeknownst to Tyrese, the video was actually being posted to the Asset Library each time he clicked the¨Add Link¨button. Alex, who was looking at the Asset Library on his own computer next to Tyrese, soon noticed the duplicate posts that Tyrese accidentally made and asked him "Why'd you upload the same picture twice?" Tyrese was surprised by Alex's question, and went to the Asset Library to investigate. When he realized what had happened, he exclaimed, "It posted three times! Oh geez…" A few minutes later, Alex had a similar – if not more dramatic – experience when he tried to share a link to the image of an internet meme in the Asset Library. Receiving no visible response from the computer to let him know that his link had been posted, Alex also continuously clicked the¨Add Link¨button. Soon, his surprise exceeded Tyrese's when he realized that the link had been posted ninety-two times, completely flooding the Asset Library with identical posts. When Tyrese noticed this, he told Alex: "Dude. Ya done ruined the site.*"
> *Significantly, this is the last time that Alex posted on Write4Change. After the incident, Alex described the site as "complicated," and during our final interview said he was only "maybe" interested in continuing to use the website because it "needs a little bit more work.*"

This vignette illustrates how an unexpected response from the interface provoked atypical responses from both Tyrese and Alex, which altered the landscape of the Asset Library and the students' experiences within it (Fig. 3). User-experience and HCI research shows that delays in expected SRT can cause frustration, psychological strain, or anger (Jacko et al, 2000; Shneiderman & Plaisant, 2010; Dabrowski & Munson, 2011; Szameitat et al., 2009), and, in the moments described above, both Tyrese and Alex seemed to experience similar emotional responses, evidenced in the form of groans, impatient tapping, and other verbalizations of annoyance captured by the screen capture recording.

During my follow-up interview with Alex and Tyrese, we re-watched the screen capture videos together and talked about how they felt when they realized that they had accidentally posted more times than they had intended. Tyrese explained his feelings upon realizing the mistake as "Oh, snap!" and Alex said, "I was like 'Oh god, what did I just do? Did I break the flow of it?'" When I asked Alex to clarify what he meant by "flow," he explained that usually students only post one thing at a time in the Asset Library but that he posted the same post too many times in a row. Alex also expressed regret about the extra posts he accidentally made and concern about their impact within the community, saying, "I feel bad – there's too many!" In addition to expressing concern about breaking the "flow" of the Asset Library, Alex and Tyrese also expressed curiosity about how these extra posts might affect the experiences of other students visiting the Asset Library. Tyrese hypothesized that people might see all of Alex's posts and say "Who's this man, and why is he posting so many times?" Alex requested that I delete all the extra posts he accidentally made.

In other words, Alex realized that he had acted outside the normal system of interaction between students, posts, and the Asset Library, breaking the framework of social habits that govern how people generally share information within this and other online communities. In this way, an accidental deviation from the normal code of dialogic interaction within the networked public square of Write4Change resulted in a shift in his willingness to engage in further dialogue with the interface and, subsequently, the community. Alex's shift in attitude and decrease in participation within

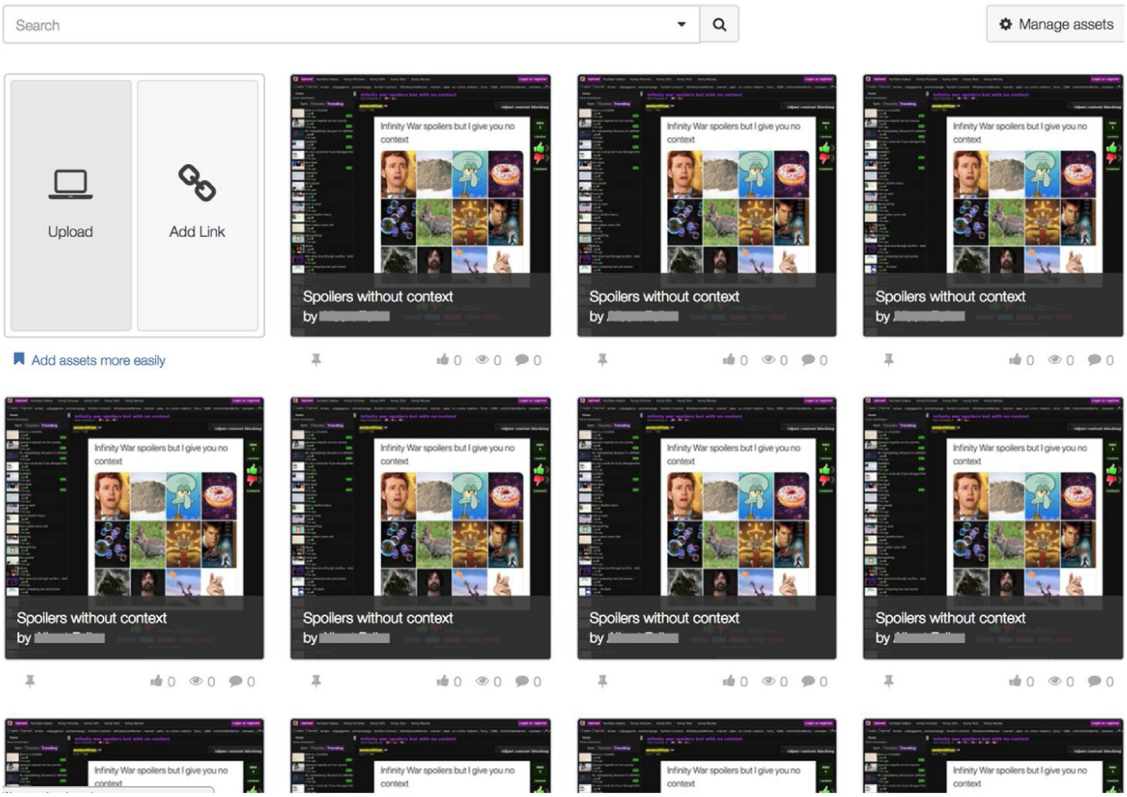

Fig. 3. Frame from Alex's screen-capture recording, showing the duplicated meme he posted an accidental 92 times in the Asset Library.

Write4Change demonstrates the importance of understanding the complex factors impacting student engagement and participation in online writing communities. This should provoke educators and researchers of online writing to consider how the authoritative discourse of the technological architecture within which we ask students to interact online can play a powerful role in silencing or embarrassing students as they negotiate speaking roles there.

Looking at, *through*, and *from*

Together, these two cases illustrate how breakdowns in human-computer interaction can impact interpersonal interactional patterns within online communities, reiterating Richard Lanham's (1993) discussion of a bi-stable oscillation that requires us to look *at* and *through* the technologies that mediate digital writing practices. As demonstrated in the vignettes, delayed and unexpected responses from an interface can puncture the carefully constructed illusion of its invisibility, rendering it visible as a dialogic partner in moments of communicative breakdown within networked publics. In moments of SRT delay and computer error, the transparency of the interface dissolved into an opaque interactional situation that forced David, Alex, and Tyrese to improvise negotiations with the interface based upon their previous interactions with interfaces writ large and their present goals for representation and communication within Write4Change. These scenarios help us understand more about the social scripts and expectations that framed these students' actions with the interface, such as their expectations for the visual and temporal cues by which the interface would respond to their requests, as well as the consequences of human or machine deviation from these scripts within online communities.

A final and even closer look at Tyrese's and Alex's interfaced interactions elucidates this point. The screen-capture video reveals that, in reality, the W4C interface *did* visually respond to their clicks of the Ädd Linkbutton: the recording shows the button changing from light blue to dark blue to light blue again, indicating that the interface had given a small indication that their Chromebooks had registered and responded their input and the platform had posted their content in the Asset Library. However, Tyrese's and Alex's failure to notice this slight change in button color indicates

the degree to which their expectations were shaped by previous dialogic interactions with interfaces. Tyrese and Alex did not recognize this change in button color as indicative of the computer responding to their Ädd Linkřequest because they were expecting a more dramatic visual change to occur within a shorter time frame: an immediate replacement of the current page with a new one, as Alex explained: "I expected it [the Write4Change interface] would show me the screen where I posted it, like it mostly does." Tyrese and Alex most likely expected this more immediate and noticeable change in the W4C interface because "replacement" of one visual frame with another is a common feature of HCI used to signal the computer's response to clicking a hyperlink (Bolter and Grusin, 1999). Therefore, the delay in replacement, most likely caused by a server lag or bandwidth delay, unsurprisingly caused Alex and Tyrese to overlook the slight change in button color, creating a breakdown in communication.

In this way, just as our dialogic engagement with each other is "filled with others' words" (Bakhtin, 1986, p. 89), interfaced human-computer interactions are filtered through and formed by our previous interfaced experiences. Therefore, any analysis of interaction, whether human-human or human-computer, should not merely view interaction as a back-and-forth volley in which events unfold in a linear progression; rather, each (re)action drags with it a wide net of dialogic influence, inflected by the power and position of each participant. As Boyle (2015) puts it, "a user sees an interface that is the result of interactions that occur between the past uses of that interface, the device, and even geographical location" (p. 18). This understanding of our dialogues with computer systems as emergent from our previous interfaced interactions resonates with Collin Gifford Brooke's (2009) admonition to not only look *at* and *through* interfaces but to also attend to where users are looking *from*. Reminding us that the at/through oscillation "encourages us to treat interfaces as static objects rather than dynamic practice," Brooke (2009) advocates for a consideration of the interface as a dynamic interactional zone within which the user's histories, location, and expectations are equally worthy of consideration, since, "users participate in the construction of our interfaces" (p. 133–134). To put this idea in the terms of this article's argument – the dialogic zone of the interface is a dynamic, heteroglossic arena where the users and systems draw on historically-derived responses when negotiating meaning and authority, sometimes in full view of a networked public. In educational contexts, such as Write4Change, this means the interface is also a zone where teachers, researchers, and designers can create more equal terms of engagement though investing instructional time and infrastructural resources in designing curricular, technological, and assessment systems that support critical and reflective approaches to interfaced interactions.

Considering the *from* of David's, Tyrese's, and Alex's interfaced interactions means reflecting on how they each brought their own previous experiences with interfaces to the negotiating table when navigating moments of delayed or unexpected response within Write4Change. As students who have been engaged with screens throughout most of their lives, they based their interactions with the Write4Change interface on their previous interactions with it and with other online communities: David expected a colorful thumbnail image to appear and Alex and Tyrese expected the immediate replacement of an image with a new one after they clicked "post" because such responses are standard within Write4Change and across social media platforms more broadly. The ubiquity of these standard responses contributes to their transparent yet powerful influence on interactions with interfaces; however, it is important to remember that such expectations are not universal but are specific to students' individual histories and locations. For example, expectations for SRT have changed over time and differ with varying access to high-speed connectivity or device type.

As David's, Tyrese's, and Alex's cases have shown, even though an interface holds a great deal of power in shaping the dialogic zone of human-computer interaction, its design is also materially, socially, and culturally situated, and interactions between humans and computers never occur in a value-neutral vacuum. Even though engineers and designers strive to determine an ïdealS̈RT and to increase the transparency and efficiency of platforms like Write4Change, no interface response will be experienced in the same way by every student. Although Write4Change was designed to meet students' expectations, when glitches appeared within the system, it was the platform's response that set the terms and conditions of the resultant dialogue. However, David, Tyrese, and Alex still had a variety of options for improvisation and response.

In other words, although our interactions at the level of interface are ritualized, scripted, and culturally constructed, they are not mechanistic. As Jay David Bolter and Richard Grusin (2000) along with Johanna Drucker (2011) remind us, people interacting with machines act and react not merely as passive users or consumers of technology but as agentive subjects, whose interactions with computers - while perhaps habituated - are constructed dynamically and dialogically through individual frames built of previous experiences; thus, deviation and improvisation will occur. For David, the implications of these improvisations resulted in a shift in presentation of content (and of self) within the community. For Alex and Tyrese, they affected their current and future participation within Write4Change as well as

their attitudes toward the platform. With cases like these in mind, we should be looking *at* interfaced interactions as well as the social, cultural, historical, and material locations *from* which both students and systems approach the interaction, always accounting for how power is structured within the technological architecture of the networked public square, particularly at moments of technological error and communicative breakdown.

Implications for writing teachers and researchers

Such an approach is especially necessary for writing teachers and researchers examining students' interface-mediated interactions within *educational* online writing communities, such as Write4Change and the other digital writing platforms being used with increasing frequency in schools and universities. This approach not only has implications for how teachers and researchers of computer-mediated composition conceptualize and respond to student and system "error" within online educational writing communities, but also suggests opportunities for more reflective, critical, and intentional teaching and design within such spaces. When educators and researchers of computer-mediated composition look *through* the interfaces that mediate digital writing – focusing solely on the outcomes of students' technology use – they miss critical opportunities for building a culture of reflecting on and responding strategically to interfaces, both at moments of communicative breakdown and in more seamless everyday interactions. However, taking a more critical, dialogic approach can circumvent deficitizing responses to ërrorẅithin online writing communities. Rather than oversimplifying Alex and Tyrese's multiple clicks as m̈istakes, or David's abandonment of his original article as giving up, we can reframe their cursor-clicks and keystrokes as agentic responses emerging in complex negotiation with an interface, with broader ramifications for the networked public of the entire online writing community.

It is not enough to simply develop a more nuanced understanding of these processes and their ramifications: it is also important to address them in the development and design of curriculum and technological infrastructure. Taking action on these ideas might look like investing in campus infrastructure that ensures SRT is aligned with students' expectations. It might also mean choosing or designing platforms for online writing in schools that share technological architecture to the networked publics of social media were students may already feel comfortable. By creating networked public squares of online writing within schools that are more aligned in both type and timing with students' everyday interfaced interactions outside of schools (or on their phones), we can create spaces where adverse communicative breakdowns within the zone of the interface are less likely to occur.

However, glitches, delays, and other communicative breakdowns are inevitable within any dialogic system; therefore, teachers who ask students to engage in computer-mediated writing might account for this inevitability with more explicit instructional focus on how to strategically approach interfaced interactions. By teaching student writers tactics for negotiating with computational systems at moments of error, and by developing and practicing these strategies together in the classroom, we can adjust the power asymmetries at moments of interfaced communicative breakdown so that students also bring scripted and routinized responses to "glitchy" interactions with computers. While the enduring authoritative power of the interface cannot be overlooked in such an approach, teaching students to more critically look *at* screens and respond more confidently to unexpected interactions with interfaces can mitigate some of the negative effects of glitch and error in educational online writing communities.

As this article models, one way of taking this approach is to ask students about the backstories of their participation in online writing communities, reflect together on the interface-level interactions that shaped it, and account for this in any assessment or analysis of the community's landscape and students' participation there. By critically looking at the *from* of students' interfaced interactions alongside students themselves, we can not only dismantle the myth of technological transparency that can lead teachers and researchers of computer-mediated composition to deficitize student writers, mis-locate error, and overlook key interactional moments within networked publics, we can teach students to do so as well. When students, teachers, and researchers learn to look *at* screens together, reframing and responding to communicative breakdown from a place of reflection and criticality, we can create online writing communities where writers work in productive dialogic partnership with interfaces as they express themselves in networked public squares.

Ultimately, actions such as interrogating and investing in technological infrastructure, developing and teaching strategic responses to error, and critically reflecting on the histories and presents of interface-level interactions in networked publics represent an insufficient but necessary beginning to dismantling the myth of technological transparency that continues to permeate digital writing in educational spaces. As Christina Haas warned over two decades ago: "believing that technology is transparent does not in fact make it so, and does not preclude technology having pow-

erful effects on literacy." For teachers and researchers of computer-based composition, looking *at* screens is certainly not enough, but it is a good place to start.

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