Materiality Matters: How Human Bodies and Writing Technologies Impact the Composing Process

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This article explores the materiality and embodied effects of writing by asking the research question: how are writers' composing processes affected by the writing technologies they employ? Current scholarship on the embodied effects of writing highlights lived experiences and merits of specific technologies but does not fully investigate the importance of the body itself in the composing process. Drawing together select studies on embodied composition with my own autobiographical study, I investigate the interrelationship between a writer's body, writing technologies, and the text produced. I build this understanding using Saldaña's coding methods and inductive analysis of screen recordings, material recordings, and think-aloud protocols. Findings indicate that technologies that caused the most physical discomfort resulted in the fewest generated words and sentences in response to the given prompt and the least amount of time spent writing or generating prose. While these results are unsurprising, the primary takeaway is that writing practices should not be seen as universal or generalizable. Instead, writing ought to be understood and researched as a deeply personal experience that matches technologies to a writer's individual comfort. Although limited, this study also has pedagogical implications, suggesting teachers reimagine the composition classroom by centering the unique, lived bodies of their students.

Introduction

Writing studies scholarship has long acknowledged the role of cognition in the composing process (see, e.g., Emig; Flower and Hayes; Torrance et al.), but in recent studies, researchers have foregrounded the materiality of writing, identifying ways in which the physical world influences a writer and the text they produce. Such studies tend to emphasize how writers negotiate time, space, objects, technologies, and political or social situatedness. While it may seem obvious that these aspects affect the composing process, they had often been overlooked by scholars. This now-burgeoning interest in materiality has challenged long-standing key concepts in the field. The current study aims to further these recent conversations; specifically, I investigate the intersection of a writer's body, mind, and chosen writing technologies and their impact on writing endurance and efficacy.

There are three terms I wish to explicate before presenting my methodology and findings: writing technology, materiality, and embodiment. First, writing technologies are not limited to technological devices such as computers or tablets; rather, they are any object that allows a writer to transfer language from thought to material text.

Materiality and embodiment are more difficult to tease apart, markedly within current scholarly discussions. Researchers have adopted various focal points on materiality in writing activities, such as politics of space (Reynolds), *kairos* and felt-time (Rickert), expressions of emotion (Micciche), and knowledge transfer (Nowacek; Wardle). While some researchers highlight the social nature of materiality (Micciche; Miller), others, like Christina Haas, have linked their findings to cultural situatedness. It is evident—especially given these few examples—that this area of study has been approached both broadly and ecologically. For the purpose of this article, I relate materiality to space, writing technologies, bodies, and movements and gestures. It is not within the scope of this article to explore social, political, or cultural materiality, though they are important to writing studies scholarship.

In the current study, a prominent component of materiality is embodiment. While materiality encompasses the many physical aspects that affect a writer's process, embodiment is more focused, dealing primarily with body-mind connection. There prevails, as Lauri Goodling aptly puts it, "the question of how intimately tied the body (sometimes as self, other times as physical entity) is to the composing and revising process" (131). To better understand these dimensions of embodiment, I gesture to rhetoric and composition scholar Sondra Perl and her description of "felt sense" (*Writing with the Body*).[1] It is, she explains, "how our bodies and our minds are connected...and how the body itself is implicated in knowing and in the construction of knowledge" (*Guidelines for Composing*, xvi). Though Perl uses the construct of "felt sense," many researchers attribute the role of the body, bodily knowledge, and lived experiences to the term embodiment instead. Embodiment, as I define it in this article, resembles Perl's "felt sense." Specifically, it's an effect where the body—as "physical entity" as opposed to "self"—plays an influential role in information processing and meaning-making

The embodied effects of writing continue to interest scholars, especially as writing technologies advance and change. For example, Christian Ehret and Ty Hollett explore embodied experiences of students using digital, mobile devices. Researchers within the field, they argue, artificially bifurcate body and screen, "focusing intently on the screen" (431). To combat this emphasis on texts and technologies, their study foregrounds mobility and examines how changes in tools, spaces, and timescales influence the body during the composing process. By focusing on the embodied nature of meaning-making and new media composition, they work to bridge the gap between writing technologies, bodies, and a writer's cognition. Further, they call for more expansive and embodied approaches in future research.

Kim Owens and Derek Van Ittersum also argue for emphasizing embodiment in composition but focus more on writers' physical bodies by spotlighting "the bodies of writers as they write" (88). In their study, they observe writers with body pains and injuries to explore the embodied effects of writing and bring attention to the importance of posture, movement, and body positioning during writing activity. Their findings indicate ergonomic solutions or technological accommodations to be inadequate as they tend to address a symptom rather than "an unhealthy infrastructure" (91). Essentially, they advocate for general mindfulness of the body when writing and composing. I will expand upon correlations between their study and mine in the Discussion section.

I bring attention to the above studies because of their instrumental role in highlighting the embodied effects of writing. These studies add to and continue the scholarly discussion on materiality and embodiment in writing; yet, it is evident that writing activity requires further research through the lens of the physical body itself. Thus, this article builds on the important and insightful studies mentioned and their findings on the embodied aspects of writing. Drawing together their research with my own autobiographical study, this article illuminates the innately individual nature of writing and composition. I aim to further understand the interrelationship of body, mind, and writing technologies by asking the research question: how are writers' composing processes impacted by the writing technologies they employ? I examine this dynamic using screen and material recordings, where I responded to two similar writing prompts in conjunction with retrospective think-alouds. I was led to a focus on embodiment and materiality through inductive analysis of the collected data. Based on my findings, I support Owens's and Van Ittersum's call for body-mind awareness during the composing process. Specifically, I suggest that writing endurance and efficacy are best augmented when writing technologies are matched to a writer's individual comfort in combination with mindful awareness of their general comfort or discomfort during writing activity.

In the following section, I describe methods for conducting an autobiographical study and how I employed Johnny Saldaña's coding methods to analyze the collected data. Then, I present analytic details and key findings, separating results and analysis into their own sections. I conclude with a discussion on critical embodiment pedagogy and how results from the current study can inform writers about their own composing processes.

Methods

Study Design

Why an Autobiographical Study? I decided to conduct an autobiographical study instead of seeking external participants. Several factors played into this decision, but ultimately, I felt an intimate awareness of my own writing process would provide a different and potentially deeper understanding of the research question posed. Essentially, familiarity with my own habits, I felt, would make it easier to discern what was truly a result of the technology and what was not.

In addition to awareness of my writing process, my comfort responding to prompts also played a role in choosing an autobiographical study. Before collecting any data, I anticipated my primary focus would be on textual components. Thus, I speculated that elevated skill or comfort with writing, which I further narrowed to university students who wrote with moderate frequency to assigned topics, might produce more usable data. These factors alone would have provided adequate data if using outside participants, but I felt that I could identify more nuances if I coupled this with my familiarity with my own writing habits. For these reasons, I believed an autobiographical study would best allow for the unique effects of the writing technologies to emerge.

Triangulation. I recorded myself during two separate composing sessions of roughly ten minutes each as I responded to two similar but different prompts. To achieve triangulation, data was collected from three different points: screen recording, material recording, and retrospective think-aloud (RTA).

Technology and Prompt Criteria. I selected technologies based on accessibility and screen recording capability. In addition, I chose technologies that are distinct from one another in order to observe their unique impacts, which I felt more aptly addressed the research question.

I crafted the prompts to be similar in style and topic but different enough not to influence whichever session came second. Additionally, they needed to sustain the participant for the full time limit, generate a writing process more than, say, asking them to write a grocery list would, and be adaptable to various skill levels. See Appendix A for each prompt's exact verbiage.

Data Collection

I conducted an autobiographical study by employing Google Docs, a desktop computer, and a keyboard to respond to the first prompt and the handwriting application Squid, a passive stylus, and a Galaxy S7 Active for the second prompt. To capture my composing process, I recorded screens using Quicktime and XRecorder, respectively.

The study was conducted on the evening of February 19, 2020, in my home office. I mounted a Canon EOS Rebel T5i roughly two feet in front of and facing me to record my body position during both composing sessions. I responded to the first prompt, hereafter referred to as Computer-Keyboard, for 10:24 minutes. Then, to take advantage of my "mental flow state" (Csíkszentmihályi), I transitioned to the second prompt (subsequently referred to as Phone-Stylus), which lasted 12:17 minutes. As I addressed in the RTA, this decision was impromptu. I extended it intentionally due to the limited data that had been produced in the original ten-minute time limit. Once both composing processes were completed, I immediately recorded the RTA using a voice recorder software on the Galaxy S7 Active and a pair of headphones with a microphone. I watched the Computer-Keyboard screen recording and material video simultaneously. Afterward, I followed the same steps for the Phone-Stylus recordings.

Analytic Procedures

Since this study aims to uncover the effects technologies have on a writer's composing process, I felt the most apt approach was inductive analysis. This allowed for the unique influences of the technologies to emerge. Data analysis was performed in two stages: coding the data and analysis of codes.

Coding Protocol

My coding process mirrored the general movements of Saldaña's "streamlined codes-to-theory model." Specifically, I examined the raw data, developed codes, organized codes into categories and subcategories, and used recurring themes and concepts to develop "small-t" theories. All steps of the coding process were accompanied by analytic memoing.

I conducted an initial round of open coding on a roughly three-minute segment at the beginning of the Computer-Keyboard material recording. From there, I reviewed my initial jottings, identified a handful of broad categories, such as "shifting in seat" and "adjusting hair," and drafted a first-round coding schema. To test whether these open codes held up, I applied them to the next three minutes of the video. I then refined the open codes into more specific descriptive categories. Following this revision, I conducted axial coding on the six-minute segment already observed. A set of robust, stable, and salient codes were subsequently composed. These selective codes were labeled using Saldaña's "descriptive codes," which summarize a given segment of data (Saldaña 4). Table 1 shows select codes at each stage.

Table 1: Select Open, Axial, and Selective Codes for Computer Keyboard Material and Screen Recordings

Material			Screen		
Open	**Axial**	**Selective**	**Open**	**Axial**	**Selective**
sitting up in chair; taking hand off keyboard and grabbing mouse; leaning back in chair; moving leg up; shifting in seat; hand to face; adjusting hair; reading screen while not typing; tilting head; looking down at keyboard	comfort; facial expressions; fidgeting; mouse; reading	Comfort - descriptor; Fidget - descriptor; Mouse; Read	added comment - clarification of audience; added comment - revising wording; outlining - placeholder; generating new prose toward prompt; highlighting text; revision of text; corrected spelling; in text comment	formatting; add comment; corrections; generating prose; outline/notes in text; jumps; edits while typing; proofreading; word choice	Revise - Mid; Revise - Post; Jump - location; Generate - Mid; Generate - New; Outline - New

After coding the entirety of the Computer-Keyboard material video, I transitioned to the Phone-Stylus material recording. This was deliberate as I intended to apply the already-drafted coding schema to it. Once I finished coding both material recordings, I then executed the exact steps, as delineated above, on the screen recordings. That is to say, I coded Computer-Keyboard first, just as I did its corresponding material video, and applied the developed coding schema to the Phone-Stylus screen recording, tracking additional codes as they emerged.

For all recordings, I mapped codes on exact timestamps (± one second due to human error) using Google Sheets. The choice to code all four recordings to this level was intentional. I felt that a comparative analysis between recurring composing tendencies and corresponding corporeal habits provided a far richer understanding of the research question posed. Thus, I combined codes and their corresponding timestamps into two lists: Computer-Keyboard screen and material, and Phone-Stylus screen and material (figure 1).

As seen in figure 1, timestamps and codes in italics were documented while watching the screen recordings. Regular font indicates codes and corresponding timestamps which emerged in the material recordings. This helped me to visually identify patterns and relationships between the technologies and material habits. Some nuanced differences may likely have been overlooked otherwise. Combining these into one list also afforded me both qualitative and quantitative insight into the data.

Data Point	Timestamp	Code
Screen Recording	*0:00-0:21*	*Format*
Material	0:09	Fidget - LF
	0:20	Mouse
	0:20-0:28	Read
	0:27	Fidget - LB
	0:28	Fidget - LU
	0:22-0:27	*Invent - New*
	0:32	Mouse
	0:27	*Proof - Spell - Mid*
	0:33-0:36	Read
	0:30	*Memo - Intent - Mid*
	0:56	Mouse
	0:56-0:59	Read
	0:53-1:02	*Invent - New*

Figure 1. Screenshot of Computer-Keyboard Codes - First Minute Note, some codes were further refined or eliminated after this point.

See table 2 for an example of codes from the final stages of the coding process. Included in Appendix B is a comprehensive list of codes and their corresponding definitions and dimensions.

Process for Analyzing Codes and Data

In this section, I discuss the qualitative and quantitative procedures for analyzing the final list of codes. Again, I include analytic details in the Results section but delineate my methods here.

First, I investigated any repeating sequences. I compiled a list of which codes tended to precede/proceed others and wrote analytic memos regarding potential significance. After looking at qualitative details and patterns within the data, I quantified several aspects

Table 2: Example of Final Codes and Definitions

Final Code	Definition
Generate	Generating or writing words and sentences toward prompt; excludes memos, outlines, or comments; excludes editing/revising/proofreading words already written toward prompt
Read	Reading screen while not employing technology
Previous	Transition to previous page in Squid app
Jump	Jumping to place in text that does not chronologically follow last sentence written
Proof	Alterations to spelling and punctuation, changes that are typically done when proofreading

using the "COUNTIF" function in Google Sheets. Specifically, I used this function to identify frequency, outliers, and codes present in one session but not the other. These results allowed me to calculate many basic statistics, such as percentages of total occurrences. Also, since timestamps were documented when coding data, I was able to track the duration of specific codes, like "Generate" or "Read."

Results

In this section, I provide relevant analytic details from my study. While many facets of the data invited rich analysis, I found specific codes to be the most illuminating.

One of the most revealing codes in this study was "Generate." It describes any instance where the participant generates new words, specifically in response to the prompt. This category, therefore, does not include words written toward a memo, comment, or outline or revision of words previously written toward a prompt.

Total time spent creating new prose was 225 seconds in Computer-Keyboard (36.1% of total session time) and 237 seconds in Phone-Stylus (32.2%). In Computer-Keyboard, instances of "Generate" (aside from the first) are always preceded by "Read." Quantitatively, time spent reading the screen was between two and nine seconds. The instances of "Generate" that followed were between nine and 59 seconds. One limitation of this study was the difficulty in identifying "Read" in Phone-Stylus. This phenomenon was easier to identify in Computer-Keyboard because I moved my head while reading the screen. Since the phone screen was much smaller, and I did not have access to eye-tracking equipment, I was unable to recognize the subtle instances of "Read." With help from the RTA, I coded only two instances in Phone-Stylus. They also preceded "Generate," and each lasted ten seconds. Interestingly, "Previous," which notes anytime I moved to a previous page in Squid, preceded both occurrences of "Read" and the majority of "Generate."

For a micro-level analysis of "Generate," see tables 3-6.

Table 3: Total Occurrences of "Generate" in Each Session

Prompt	N	Percentage of total N
Computer-Keyboard	9	60.0
Phone-Stylus	6	40.0
Total	**15**	**100.0**

Table 4: Total Number of Words Written in Each Session

Prompt	N	Percentage of total N
Computer-Keyboard	116	62.0
Phone-Stylus	71	38.0
Total	**187**	**100.0**

Table 5: Duration of Each Instance of "Generate" Listed in Chronological Order

Prompt	Time (s)	Percentage of total	Prompt	Time (s)	Percentage of total
Computer-Keyboard	5	2.2	Phone-Stylus	15	6.3
	9	4.0		26	11.0
	35	15.6		40	16.9
	59	26.2		9	3.8
	30	13.3		49	20.7
	10	4.4		98	41.4
	38	16.9			
	15	6.7			
	24	10.7			
Total	**225**	**100.0**		**237**	**100.0**

Table 6: Duration Between Each "Generate" Calculated from End of Previous Occurrence to Start of Next Occurrence

Prompt	Time (sec)	Percentage of total	Prompt	Time (sec)	Percentage of total
Computer-Keyboard	26	8.7	Phone-Stylus	8	1.9
	106	35.3		226	53.2
	32	10.7		113	26.6
	28	9.3		39	9.2
	5	1.7		39	9.2
	32	10.7			
	12	4.0			
	59	19.7			
Total	**300**	**100.0**		**425**	**100.0**

It was upon collecting quantitative data that I questioned my analytic constructs of "Comfort" and "Fidget." I realized that my intentions in splitting the two codes were not initially systematically applied. For example, the code for when a participant leans back in their seat was originally "Comfort - LB" while the code for touching their face was "Fidget - TF." As "Comfort" and "Fidget" both aim at qualifying corporeal habits, I questioned the necessity for their distinction. It was in this thought process where one of the most enlightening patterns emerged. I subsequently defined "Comfort" as physical interaction *with the technology*, while the latter marked body movement within the given environment. Thus, "Comfort" transmuted into a category unique to Phone-Stylus. There were, in total, 53 occurrences of "Comfort" in the Phone-Stylus material recording, ten being "Comfort-Phone" and 43 "Comfort-Stylus." However, there were no instances in the Computer-Keyboard material recording where deployment of the technology appeared to influence the subject's comfort level.

I was also intrigued by two aspects of "Fidget": frequency and sequence. As seen in table 7, below, the majority of "Fidget" was in Phone-Stylus.

Table 7: Total Occurrences of "Fidget" in Each Session

Prompt	N	Percentage of total N
Computer-Keyboard	18	30.0
Phone-Stylus	42	70.0
Total	**60**	**100.0**

What is not seen in table 7, but is evident when observing the raw data, is that "Fidget" increased in frequency further into Phone-Stylus.

Correlation between "Fidget" and "Generate" proved intriguing, as well. In Computer-Keyboard, only two instances of "Generate" (22.2% of times "Generate" occurred) were preceded by any form of "Fidget." In comparison, in Phone-Stylus "Generate" was preceded by "Fidget" four out of six times (66.7%).

Table 8 shows the frequency of other codes found to be salient in this study.

Table 8: Total Occurrences of Remaining Salient Codes

Code	N (Computer-Keyboard)	N (Phone-Stylus)
Read	26	2
Previous	0	3
Jump	3	0
Revise	3	0
Proof	3	1

As seen in table 8, codes such as "Read" and "Proof" occurred in Computer-Keyboard but were nearly nonexistent in Phone-Stylus, with "Read" occurring 26 times in the former and only two times in the latter. "Jump" and "Revise" were exclusive to Computer-Keyboard, while "Previous" was exclusive to Phone-Stylus.

Analysis

Analysis of "Generate" Code

As demonstrated by table 3 and table 4, Computer-Keyboard accounted for more than half of the total words written (62.0%), instances of "Generate" (60.0%), and total time in session writing.

Based on table 5, conclusions can be drawn regarding the technologies' influence on writing endurance. As I define it in this study, writing endurance is the ability to sustain inventive thought and generate prose. Table 5 shows that the duration of each "Generate" varied between sessions. Computer-Keyboard remained fairly steady, with the largest percentage being 26.2% in the middle of the session. However, in Phone-Stylus, the final instance of "Generate" comprised 41.4% of total time writing. Further, Computer-Keyboard had 3.9% more time spent writing in session than Phone-Stylus. Interestingly, the bulk of writing in Phone-Stylus occurred after the initial ten-minute time limit.

It can also be seen in table 6 that time in between each "Generate" varied between sessions. The longest time spent not writing toward the prompt was in Phone-Stylus, at 226 seconds. This is more than double Computer-Keyboard's longest time between "Generate" (106 seconds).

Based on the findings presented tables 3-6, the technologies employed in Computer-Keyboard seem to aid in generating prose. Or, at least, they interrupt the writing process less.

Analysis of "Comfort" and "Fidget" Codes

The study suggests that aptitude and comfort with the technology are also factors in the participant's composing process. This is evidenced by the numerous instances where I adjust the stylus or phone in my hand for comfort. The most pertinent observation that supports this theory is that "Comfort"

is missing from Computer-Keyboard entirely. Further, "Comfort" occurs more frequently than any other code. As seen in table 8, the next most frequent code is "Read," with 28 total instances.

As shown in table 7, "Fidget" is also more frequent in Phone-Stylus than Computer-Keyboard. Although the increased frequency may be due to the sequence in which data was collected, the Phone-Stylus RTA suggests that frustration with the technology was a more prevalent factor. Thus, I suggest that the level of discomfort when using a stylus and phone interrupts the composing process, which made it more difficult for me to retain or generate new thoughts toward the given prompt.

Because "Comfort" and "Fidget" are such dominating codes in Phone-Stylus, especially when compared to Computer-Keyboard, I contend that my composing process was hindered when employing the phone and stylus. It is evident, though, that this theory needs further testing, whether in another study or by expanding this one.

Interrelationships Between Salient Codes

The interrelated findings of this study indicate that, for a deeply recursive style of writing, technologies used in Computer-Keyboard appear to help my process, while technologies in Phone-Stylus seem to impede it.

As evidenced by the results in table 8, Google Docs allows for more movement within and manipulation of a document. While revising, proofreading, and non-sequential movements were present in Computer-Keyboard, they were nearly nonexistent in Phone-Stylus. These differences suggest that Google Docs offers more space and tools for composing.

Additionally, the relation between "Previous," "Read," and "Generate" implies that skimming is constrained by the Phone-Stylus technologies. This suggests that a more intensive style of reading is used, which subsequently interrupts the writing process more than skimming would.

Discussion

Through this study, I aimed to understand how writing technologies impact writers' composing processes, focusing specifically on my own composing processes. I found that the interrelationship between the body, writing technologies, and text produced is profound and often subtle. I mobilized the computer and keyboard more efficiently and successfully than phone and stylus, resulting in a greater volume of text written toward the prompt and time spent actively writing.[2] Discomfort with both the environment (presented in the form of "Fidget") and writing technologies ("Comfort") led to decreased writing endurance and efficacy ("Generate"). I contend such findings reveal more about materiality and embodiment and less about the specific technologies employed.

Foregrounding Embodiment

Results of this study can be further understood by returning to the previously established definition of embodiment. For example, instances of "Fidget" on their own indicate discomfort within the given environment. But when examining the correlation between "Fidget"

and "Generate," it becomes evident that this discomfort had an instrumental role in my information processing. Simply put, discomfort reduced the ability to generate or sustain inventive thought. Other codes not explicitly addressed showed embodied effects as well. In several cases, either the writing technologies or writing space altered how I responded to each prompt. Based on this evidence, I suggest that more expansive, embodied approaches to research would benefit writing studies. Writing practices cannot be separated from corporeal components, which cannot be separated from the writing technologies employed. These conclusions seem neither novel nor groundbreaking; the primary takeaway here is that writing is not a disembodied practice and therefore cannot be researched as one.

Future Research: Towards a More Expansive, Embodied Approach

Since no human body is generalizable, universal, or capable of standing in for another, a nuanced understanding of embodiment requires more robust data. As such, future research ought to incorporate more technologies, body movements, and participants for longer amounts of time using the coding schema I have developed to extend beyond my individualized experience.

Additionally, one technology I suggest researchers integrate is a graphic organizer, either online (e.g., Curator, Evernote, Pinterest) or as a PDF file (i.e., search Google for "graphic organizer" or create your own and print or fill in on a tablet, computer, or phone). These feature a critical part of the composing process not investigated in this study: prewriting. In both composing sessions, I outlined ideas within the body of the text using text. It would be intriguing to analyze how that type of planning impacts writers' processes versus using a graphic organizer.

Another technology future researchers may consider mobilizing is text-to-speech. With software like Read&Write, which reads aloud text as it is typed, both the impacts of technologies on writers' processes and participants' unique body-mind connections can be examined further. An equally telling technology would be speech-to-text. Embodiment is all about how the body is implicated in knowing; therefore, more observed movement could mean greater understanding of embodiment. Contrast speech-to-text to the technologies I utilized, and it becomes apparent how much more body movement, positions, and gestures in writing could be researched. For example, other more-mobile writing positions include standing, pacing, or some kind of light exercise, all of which can be done while using speech-to-text to write. Speech-to-text has the added benefit of being usable in other environments as well.

I want to briefly address my study's limitations, which may help future researchers improve upon my methodology. Resource and spatial limitations restricted the depth of the study. For instance, some material aspects could not be captured, such as the computer mouse and my full body. It is possible that an additional camera located behind or on the side of the participant would have provided

richer, more insightful data. Additionally, I was unable to explore how technologies affected reading on-screen text or how screen size influenced the composing process.

Implications: Fostering Body-Mind Awareness During Writing Activity

Findings from this study complement other recent studies. I would like to point again toward Owens's and Van Ittersum's work on writing-related pain. While their study examines mostly specific injuries and chronic pain, my research relates more to discomfort. I feel that this distinction adds an additional layer to their implications. Specifically, I wish to expound upon two pieces of their discussion.

As previously mentioned, Owens and Van Ittersum advocate for body-mind awareness throughout the composing process. This conscious reflection on posture and movement, they claim, brings a writer's body and mind together. Though their implication aims to attend to the writer's health, specifically the health of the body while in the act of writing, I suggest that it can be taken one step further. Not only might the body benefit from general awareness but writing endurance and efficacy may, too. As findings from my study suggest, writing endurance and efficacy are altered by the technologies employed and other material considerations. It is reasonable, then, to consider how mitigating discomfort might enhance the composing process. By fostering body-mind awareness, a writer may experience fewer interruptions caused by discomfort when writing, which may result in more frequently generated and sustained inventive thoughts.

The next implication of their study goes beyond the body. Owens and Van Ittersum claim that it is not enough to address one specific area of pain or one specific object; instead, writers ought to attend to the material aspects holistically. For example, in my study, discomfort was still pervasive in Phone-Stylus despite the many times I adjust body position or posture. To effectively reduce interruptions caused by discomfort, I would have needed to change writing technologies, environment, sitting position, and various other factors. This conclusion relates to my original assertion that their implications can improve *both* the writer's health *and* the text they produce. I echo their sentiment but also suggest that writing endurance and efficacy may be augmented by attending to more than just the body or to an uncomfortable technology and approaching changes holistically instead.

Finally, I want to touch upon what my study could mean for writers when selecting writing technologies. Previously published studies have revealed the effects of technology on the composing process, typically making generalized claims about its capabilities and features. Often though, their research neglects the human body and its influence on information processing. Instead, based on my study's findings, I argue what is more important is how a body acts on and is acted upon by the technology employed. Promoting mindfulness and developing healthy writing habits means paying attention to what is comfortable and changing what is not. Writing is a dynamic and embodied practice; thus, what a writer finds comfortable may change from session to session or even within the same session. Therefore, I contend

that writers should choose writing technologies most attuned to *their bodies and minds* and be aware that technology may change.

Implications: Reimagining the Composition Classroom

Here, I conclude with a brief discussion on critical embodiment pedagogy, which Christina V. Cedillo explains as "pedagogies that explicitly center the embodied perspectives of students and their audiences." While she relates embodiment to "self," I want to extend her implications to include the body as "physical entity," as I have done in this study. Educators ought to center not only the perspectives but also the corporeality of their students. Teach, not just to their lived truths, but their lived human bodies.

Consider, for example, standardized testing. The intention is to "standardize" space, technologies, time, and prompts, with the remaining variables being their minds and bodies. How many students, then, are at a disadvantage because their bodies are forced into "normate" spaces never meant for the comfort of their unique bodies? Relate this line of thinking to the composition classroom, and it becomes exigent how teaching methods need reimagining. Students may also find this study salient now that distance learning has changed standard writing environments. Despite having more freedom to choose spaces, technologies, and body positions, students may not currently utilize body-mind awareness, as discussed above. By developing and deploying this mindfulness, they may be better attuned to which spaces and technologies fit best with their bodies.

As Cedillo points out, the body is the "crucial factor" in accessing knowledge and information. And, I add, it is critical in writing and composing. Yet, the body is often—if not nearly always—overlooked in pedagogy. How can something so essential to cultivating knowledge, acquiring information, and composing or revising go unacknowledged? How can students and teachers achieve their writing potential when their most vital tool remains ignored?

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Notes

1. I discovered Perl's use of the term "felt sense" in her book titled *Felt Sense: Writing with the Body,* while the direct quote was later extracted from *Felt Sense: Guidelines for Composing*. I felt that I owed both works proper citation.

2. Not enough was written in either session for quality of writing to be assessed.

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APPENDIX A

Prompts:

1. Describe a dessert you enjoy baking.
2. Describe a dish you enjoy cooking.

APPENDIX B

Code	Definition/Dimension
Color Switch	switching pen color in Squid app
Comfort	manipulation of technology to improve comfort
Comfort - Phone	moving position of phone in hand
Comfort - Stylus	moving position of stylus in hand
Fidget	any movements by the subject that are not in relation to the technology
Fidget - LB	leaning back in seat (LB stands for "leaning back")
Fidget - LD	moving leg down so that knee is no longer against edge of desk (LD stands for "leg down")
Fidget - LF	leaning forward in seat (LF stands for "leaning forward")
Fidget - LU	moving leg up so that knee is against edge of desk (LU stands for "leg up")
Fidget - MH	turning or tilting head to side or up or down (MH stands for "moving head")
Fidget - ML	subject moving position of leg but does not bring it up or down, adjustment (ML stands for "moving leg")
Fidget - Gesture	facial expressions, including sticking tongue out, contorting face, etc.
Fidget - TF	TF stands for "touching face"
Fidget - TH	TH stands for "touching hair"
Format	changes to visual aspects of document, such as font size/style, document title, etc.
Generate	generating or writing words toward prompt; excludes anything written in a memo/outline/comment; excludes revising or proofreading words already written toward prompt
Generate - Mid	words added to an already existing sentence; excludes revision of words already written
Generate - New	starting new sentence
Jump	moving/jumping to a place in the text that is not in a sequential order, writing that doesn't chronologically follow last place written
Jump - Back	moving/jumping to a place in the text that came before the last location written
Jump - Forward	moving/jumping to a place in the text not chronologically next

Memo	notes to self that are not considered "generated" prose and are inserted using Google Docs comment feature (see above definition for "Generate" code)
Memo - Note - Mid	subject notes revision is needed but does not offer syntax or diction changes while in process of writing a sentence
Memo - Note/Word/Outline - Post	memo added once a sentence was completed
Memo - Outline - Mid	subject notes intentions (such as inserting certain ideas in specific places) while in process of writing a sentence
Memo - Word - Mid	words are not deleted from page, instead subject makes a comment with different word choice option(s) while in process of writing a sentence
Mouse	grabbing mouse
Outline	notes to self that are not considered "generated" prose and are inserted into body of text (see above definition for "Generate" code)
Outline - Mid	added while in process of writing a section
Outline - New	added before or after new prose is written
Previous	scrolling to previous page in Squid app
Proof	proofreading, alterations to spelling and punctuations
Proof - Punct - Mid	changes to punctuation while writing a sentence
Proof - Punct - Post	changes to punctuation after finishing a sentence
Proof - Spell - Mid	changes to spelling while writing a word
Proof - Spell - Post	changes to spelling after writing a word
Read	reading screen while not employing technology, subject is not actively writing
Revise	revising, alterations to word choice or syntax
Revise - Mid	revisions done while writing a sentence or word
Revise - Post	revisions done after sentence is completed