



DMAC After Dark: Toward a Theory of Distributed Invention

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Abstract

This essay outlines the concept of “distributed invention” (DI), an idea stemming from our experiences at the Digital Media and Composition Institute (DMAC) when we roomed together and worked on projects “after dark” late into the night. Specifically, we argue that proximal composing, or composing near another person, helps facilitate distributed invention, which we define as a process involving two or more people engaging in idea-generating activities together and where, through negotiation, ideas become mutually appropriated. We describe how DI developed during DMAC and we outline the principles of DI. We also explain how we applied DI to our teaching, our department, and our institution after returning home. We conclude with recommendations for how teachers can implement DI principles into their classrooms. Our findings are significant for understanding possibilities of invention, feedback, and collaboration in print and digital composing environments and in structuring student learning.

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“For apart from inquiry, apart from praxis, men [sic] cannot be truly human. Knowledge emerges only through invention and reinvention, through the restless, impatient, continuing, hopeful inquiry men [sic] pursue in the world, with the world, and with each other” (Freire, 1970, p. 58).

On the first day of the 2013 Digital Media and Composition (DMAC) Institute, we were instructed to record a personal story about literacy and then reflect on that story with a partner through interviewing and asking follow-up questions. Danielle told Kara a story about sitting with her grandfather as he translated letters that she had received from her pen-pal cousin who lived in Italy. As the interviewer, Kara became interested in the literacy practice of translation and asked Danielle content questions that encouraged Danielle to flesh out the story; she also posed reflective, meaning-making questions to prompt Danielle to explore the story’s significance. Kara’s interventions during the invention process ultimately changed the shape of Danielle’s literacy narrative—as did Danielle’s when the roles were reversed—and culminated in a new final product that resulted from our combined efforts. The shared invention process we experienced while telling and recording our literacy narratives set the tone for our future interactions during our two weeks at DMAC and after returning home to our university; it also led to new discoveries about the invention process and the benefits of composing near someone else.

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These discoveries were inspired by the social learning environment established by the DMAC co-directors, Scott DeWitt and Cynthia Selfe. At DMAC, students are in class together Monday through Friday from 8:30 a.m. to 5:30 p.m. for two straight weeks, and the daily schedule of activities is organized to encourage participation, discussion, and interaction. Knowledge is shared, ideas are developed and refined, and growth occurs through social interaction. The scheduled activities signify the importance of co-participation and co-learning in fostering individual learning and growth. DMAC thus bears the influence of the theory of *distributed cognition*, or the idea that knowing, learning, and thinking are fundamentally social processes made meaningful through co-participation in situated, relevant, social, and intentional activities (Gee, 2004; Lave & Wenger, 1991; Vygotsky, 1978; Wenger, 1998).

Although DMAC encourages and facilitates co-participation and social learning throughout the planned class time, there is a lot of unstructured time in the evenings and on weekends when participants are working individually on their course projects. These extended chunks of time can be beneficial because they allow participants to stay focused on a single project for a long time, but they may also present challenges because participants are by themselves during much of the time when they are inventing and learning new technologies.¹ As we quickly discovered, however, our cost-saving decision to share a hotel room allowed us to take the principles of distributed cognition we were learning during the day and continue generating ideas together *after dark*. This situation created conditions for the resulting practice of what we have come to term *proximal composing*, or composing texts in the vicinity of others. As we worked on our projects next to each other in the hotel room—from both the earliest stages to the latest—we experienced a generative and collaborative invention process that expanded our original ideas into more than what we would have produced by ourselves. We term this sharing of knowledge and resources *distributed invention* (DI). We define distributed invention as a process of thinking that involves two or more people engaging in brainstorming, problem-solving, and idea-generating activities together where original ideas become mutually appropriated and evolve into something different altogether. DI does not emphasize the product (either alphabetic print or digital/multimodal) so much as it highlights what is actually occurring during the collaborative interaction.

In this essay, we offer a construct of distributed invention forged from our experiences during and post-DMAC. Our study builds on research that attends to how the shift from print-based writing to digital writing environments changes the nature of writing (Ball, Bowen, & Fenn, 2013; DeVoss & Porter, 2006; Grabill & Hicks, 2005; Selber, 2004; Yancey, 2004) by highlighting how these new composing environments present opportunities for us to rethink and envision our understandings of invention. Martine Courant Rife (2013) argued, “In the twenty-first century, we must. . . invent new theories [of composing] grounded in an understanding of writing where authorship is complex and multiple and includes digital and networked environments” (pp. 4–5). Likewise, Kathleen Blake Yancey (2009) argued that we need to “articulate the new models of composing developing right in front of our eyes” (p. 5). We hope that pointing toward a theory of DI is one response to these calls.

As a way to frame DI, we begin by examining theories of distributed cognition and of invention. We then analyze the ways that proximal composing and the material environment at DMAC facilitated processes of DI by presenting examples from our experiences composing during DMAC. Additionally, we highlight instances of how, after returning home, we continued to apply DI activities in our courses and institution. We conclude by offering recommendations for how writing teachers can bring DI principles into the classroom and to their home institutions. Our findings are significant for understanding possibilities of invention in both print and digital composing environments and for re-conceptualizing our classroom pedagogies.

1. Perspectives on distributed cognition and invention

As an opportunity for technological professional development, DMAC can be viewed as a “community of practice” where distributed cognition occurs: it provides newcomers with a situated context for learning through social engagement with the context, and it also operates as a space that inspires new insights to be created and transformed into knowledge (Lave & Wenger, 1991; Norman, 1993; Rogoff, 1990; Vygotsky, 1978; Wenger, 1998). The theory of distributed cognition challenges the traditional understanding of learning as an internal process confined, or solely placed,

¹ DMAC did make a computer lab available in the evenings for participants to use, and we tried to work there once, but other than an occasional technical question fielded by the lab monitor, the room was mostly quiet while participants worked alone on their projects. In addition, the lab closed at 10:00 P.M., and participants often worked much later than that each evening.

within individual minds. Instead, as [Jean Lave \(1988\)](#) described, distributed cognition regards knowledge as “stretched over, not divided among—mind, body, activity, and culturally organized settings (which include other actors)” (p. 1). In distributed cognition contexts, individuals use the material and conceptual tools, artifacts, and resources (e.g., to-do lists, calculators, smart phones, calendars, computers, templates) to “extend their own capacities” ([Winsor, 2001](#), p. 6). In short, theories of distributed cognition posit that individuals are “encouraged and enabled to act with others and with various mediating devices. . . in such a way that their partial knowledge and skills become part of a bigger and smarter network of people, information, and mediating devices” ([Gee, 2004](#), p. 86). The whole is greater than the parts, and knowledge is mutually appropriated ([Brown et al., 1993](#); [Newman, Griffin, & Cole, 1989](#)).

The sharing of knowledge and resources impacts invention in important ways. Invention, one of the five rhetorical canons, is thought to be the central device that rhetoricians use to find arguments appropriate to specific rhetorical situations ([Crowley, 1985](#); [Young, 1978](#)). Invention not only involves discovering, using, and arranging existing information, but also involves finding, developing, and creating new information ([Haller, 2000](#); [Lauer, 2004](#); [Miller, 2000](#)). [Sondra Perl \(1979\)](#) claimed, for instance, “Composing always involves some measure of both construction and discovery” (p. 331). These acts of construction and discovery can occur not only at the beginning of writing—for instance, when one is brainstorming ideas—but also throughout the writing process as one revises, rereads, or re-sees ([de Beaugrande, 1979](#); [Emig, 1971](#)). Although the writing process is highly individualized, scholars now locate invention processes away from the individual writer and toward the dynamic interplay between the writer, text, genre, and social context(s), thus seeing invention as a social act where individuals interact dialectically with people, society, culture, and context in distinct ways ([Bawarshi, 2004](#); [LeFevre, 1987](#); [Rife, 2013](#)). Anis [Bawarshi \(2004\)](#) located invention within genre, at the “intersection of the dialectic between the social and the individual, where agency is acquired, negotiated, resisted and deployed,” (p. 50). Similar to [Bawarshi](#), [Karen Burke LeFevre \(1987\)](#) distinguished four interpretations of invention that fall along a continuum from a private, asocial process to a social, collaborative one. LeFevre considered the first two interpretations—individual and internal—to be severely limited because they established the individual as the agent of invention and the invention process as particular and private. The next two interpretations, however, better represent invention because they highlight its social nature. The “collaborative” perspective “maintains that people interact to invent and to create a resonating environment for inventors” (p. 50), either as partners who invent together or through social interactions that directly or indirectly support one person in inventing. The “collective” perspective concerns the way that invention is (or is not) transmitted at the institutional level, by the force of social units beyond the individual. It is these last two perspectives that are most readily applicable to our purposes here. Since invention is viewed as a social activity, then it seems important to understand the role of distributed cognition in social situations and how it affects composers during the invention process.

Our research seeks to extend [Bawarshi’s](#) and [LeFevre’s](#) views of the social elements of invention by drawing attention to proximal composing, or being near or in the physical vicinity of others who are available to generate ideas and offer feedback. Ultimately, DMAC situated us in a community of practice that valued distributed cognition. Then, when we left DMAC at the end of the day, we continued composing side-by-side. The spatial condition, the energy and enthusiasm we had about the assignments, and our commitment to helping each other encouraged us to apply these principles to the invention and drafting of our projects and to realize the generative potential of distributed invention. In the next section, we examine the materiality of proximal composing in order to develop this theory of distributed invention.

2. Creating the conditions for distributed invention: Understanding the materiality of proximal composing

The idea of proximal composing—where ideas and texts are generated in the presence of others—is predicated upon a material environment that places composers physically next to each other. The spatial arrangement thus facilitates “face-to-face communication, close proximity, lots of informal social interaction, [and] quick feedback” ([Hinds & Kiesler, 2002](#), p. 55). More importantly, the spontaneous communication enabled by this collocation encourages the development of “strong personal ties—ties that are frequent, reciprocal, and extending over multiple content domains” ([Kiesler & Cummings, 2002](#), p. 66). Analyzing the spatial and material conditions of DMAC—both in class and after dark—thus contributes to our understanding of the affordances of proximal composing. Recent research on materiality has examined the tools used to compose ([Baron, 1999](#)), dimensions of literacy and writing ([Alexander, 2013](#); [Hayles, 2002](#); [Shipka, 2011](#); [Sorapure, 2003](#); [Wysocki, 2004](#)), the configuration of the workspace ([DeVoss, McKee & Selfe, 2009](#); [Hawisher & Selfe, 1991](#)), and the institutional infrastructure ([DeVoss, Cushman & Grabill, 2005](#)). This research

has been valuable in helping us understand the diverse situational, physical, and spatial contexts surrounding composing. Yet, scholars have not fully accounted for the ways that material composing spaces impact invention, particularly as ideas are generated in the presence of others.

The instructional material spaces at DMAC created the conditions for proximal composing, which paved the way for distributed invention to occur. The classroom space was lined with rows of tables that seated two to three people each, thus encouraging small-group conversation throughout the instructional day. Additionally, the computer labs where software demonstrations occurred featured rows of computers facing each other as well as computers lining the outer perimeter of the room. The close arrangement of these two workspaces allowed participants to easily view each other's monitors and engage in spontaneous discussions. In addition to the unconstrained interactions enabled by the spaces, over half of the computers in the lab faced away from the front of the room, which, in many cases, made it easier to seek immediate feedback from peers instead of turning to ask questions of the instructors.

The instructors at DMAC also demonstrated instructional practices that caused us to think more deeply about the materiality of composing. These practices included working on individual projects in close proximity to others, brainstorming ideas with small groups, using questioning and probing techniques as part of the invention process, and receiving feedback at multiple phases of the composing process. Furthermore, the tools used within the material space—most notably, the high quality digital audio and video recorders made available to DMAC participants—created opportunities for hands-on assistance, discussion, and content creation. Cumulatively, DI emerged from the material conditions made possible at DMAC.

The design of the classroom spaces created the conditions for proximal composing to emerge; however, shared space is only one aspect of creating prime DI conditions. A secondary crucial element of proximal composing is understanding how the materiality/ies of a space and the tools within that space afford certain potentials and limitations. Materiality as a concept considers how a range of factors—social, political, religious, political, affective, etc.—contribute to a message composed in a space (Ball, 2006; Kress, 2000; Manovich, 2001; Wysocki, 2004). In this case, the embodied presence of other people in the social context at DMAC could be seen as making a contribution to the material landscape through their comments, interruptions, troubleshooting assistance, and responses. Being aware of fellow composers in a material space and their potential influence on projects composed in that space is an important part of understanding the practice of proximal composing. Also, being willing to engage with and support others is another valuable element.

Just as material space and tools can contribute to the goals of distributed cognition, they can also offer limitations. Consider the use of headphones in digital composing environments. Headphones can either be used productively to eliminate distracting ambient sound or serve as a tool for disengagement with the space and its materiality. Headphones reduce noise indiscriminately, affecting the transmission of instructional information and moments of informal peer teaching as well as reducing general noise pollution. This material consequence of new media composing can limit the kinds of interaction that can take place, despite the spatial arrangement of the classroom participants. Thus, on the first day of DMAC instruction, Scott and Cindy taught participants how to circumvent this limitation to ensure that the social elements of learning remained intact by encouraging us to wear our headphones so that only one ear was covered. Admittedly, this method of wear affects the isolating capabilities of the headphones, but that was exactly the point. From a practical perspective, this “half-off/half-on” technique allowed us to multitask, leaving us open to extemporaneous moments of instruction and discussion as we worked with new technology. Cancelling only half of the “noise” enabled us to receive instruction that, though it might not have been related to our needs at the moment, was necessary for our technological professional development. More critically, we remained aware of our peers in the surrounding workspace instead of retreating into the isolation of our screens and the demands of our immediate tasks. These hands-on lessons—what Cindy Selfe might call “small, potent gestures”—at DMAC contributed to corollary lessons that began to shape how we thought about the social elements of digital composing.

In sum, the context at DMAC was intentionally social not only because the material space (the classroom and the lab computers) enabled it but also because of the choices we made to be receptive to—and therefore responsible for—the needs of others. A simple modification to one of the key material tools changed how we worked alongside each other in the space(s). As a result, we were available to assist those around us by sharing information and resources even as we were focusing on our own work and developing individual technical proficiency. The spatial and material environment at DMAC facilitated distributed cognition by encouraging discussion and informal peer teaching during class hours; however, once the lab hours ended, most of the participants—who had attended the institute without a built-in buddy—returned to their hotel rooms alone. For us, that is when our work would really begin.

3. Distributed invention at DMAC: In class and after dark

When the formal instruction at DMAC ended each day and we returned to the hotel room, we brought this understanding of the materiality of the classroom back with us as we practiced proximal composing in a new physical space after hours. We continued to modify the use of our headphones, which encouraged distributed cognition by preventing us from getting lost in our individual projects. As we worked side-by-side composing finger exercises² and DMAC course projects, we embraced a recursive composing process: we shared notes, resources, and experiences; offered each other support and feedback; and asked important conceptual questions that enabled us to invent more complex and advanced projects because of the time spent generating ideas and conceiving the projects rather than troubleshooting technical difficulties. By writing and working on projects near each other in class and in the hotel room after hours, we were able to feed off of each other's ideas and create final products that neither of us had originally envisioned. Instead, the product became transformed through our inventional activity. In this section, we highlight these after-dark DI moments.

At times, DI took the form of question-posing and personal encouragement. One memorable moment came when Kara was trying to commit to a project idea for her “Concept in 60” video, a finger exercise that asked participants to develop a video concept in sixty seconds. After further discussions with Danielle, she decided to focus on issues facing mothers in academia in order to negotiate some of the insecurities she had felt during her seven years as a tenure-track mother-scholar. Kara had examined these issues before—on her blog, in guest lectures, in a women's colloquium, and informally in discussions with others—but she had never articulated them multimodally or used writing to reconcile some of the internal anxieties she had felt during the process. She thus used this project as a way to make sense of her identities as a woman, mother, and scholar.

At first the piece was going to be more formal, less personal, about the challenges women in general face on the tenure-track, and the concept was going to be “tenure.” Kara was going to emphasize and show research on how few women and even fewer mothers are awarded tenure; she was also going to discuss some of her personal experiences on the tenure track. Although the topic was clear, she was unsure that this approach would connect with her audience or effectively appeal to ethos and pathos. As Danielle viewed the initial stages of her draft, she thought Kara was adopting a stance that was too detached and unemotional, too “safe.” Danielle encouraged Kara to focus on the intersections of tenure and motherhood in a more personal way by incorporating some of the (thousands of) pictures and videos of her children Kara had brought with her from home (and that Kara had shown Danielle upon first arriving in Columbus since we didn't know each other very well). Danielle's generative questions about tone, stance, ethos, and the reader/viewer helped Kara clarify her intentions. As Kara proceeded with the video, she continued to consider Danielle's comments and fine-tune her concept. She scoured numerous home videos looking for one that would work with the new concept of *Both/And*, an anthem affirming the idea that a woman can be *both* a successful academic *and* an engaged mother. She identified three potential videos and began integrating them into her video.

Kara ultimately chose a video where her two older kids (then 3 and 6) were giggling and playing peek-a-boo with her youngest child (then 6 months old). One of the constraints of the DMAC assignment was that any video artifact used in the project had to have the audio detached from it; that is, the audio from a video could not be aligned. As a result of this constraint, Kara extracted the audio track from the video she was using and loaded it into Audacity. Kara also incorporated other audio tracks from videos where she was talking with her kids in order to add additional voices and sounds and to emphasize her role as “mom.” When Kara asked Danielle to listen to a draft in Audacity, Danielle noticed visually (by looking at the audio tracks) that Kara was already utilizing several audio tracks for her project. She could tell that Kara had already become adept at editing multiple audio tracks, so she recommended Kara layer the audio from the giggles video onto three additional tracks so the voices would be repeated and layered throughout the piece. By overlapping Kara's laughter with her kids' laughter, as well as visually displaying the letter ultimately granting her tenure, Kara reinforced the message that she was *both/and*. In the end, Danielle's generative questions, her understanding of Kara's rhetorical purpose and the context of the video, and her attention to the technical and rhetorical needs of the piece inspired Kara to generate new ideas about the topic and productive ways to appeal to readers/viewers in ways she had not foreseen. This example demonstrates

² Finger exercises are Cindy Selfe's term for low-stakes activities designed to teach someone technology before embarking on larger projects.

how processes of DI created an end product that had been mutually appropriated and developed from our inventional interactions.

In addition to the generative feedback we gave each other during the invention stages of our projects thus deepening the personal—and universal—meaning of our writing, processes of DI also had epistemic value. For her final DMAC project,³ Danielle wanted to create a course trailer that incorporated student interviews and projects from previous years to advertise the special topics course she would be teaching in the fall. However, the semester after DMAC, Danielle was also going on the job market, and Kara thought that designing a professional website might be more beneficial to her because it would demonstrate important technical, rhetorical, and design skills required of digital rhetoric scholars. Consequently, Kara asked Danielle questions to help her think through the risk/benefit of her options. Such questions included: “Which one of these projects would be more beneficial to complete with the assistance of the resources available at DMAC? Could you complete one of these tasks on your own time away from DMAC? If you only had time to complete one project, which one would it be?” After several lengthy discussions, Danielle ultimately chose to design a professional website using Dreamweaver. This epistemic process involved dialectical interactions that resulted in problem-solving, rhetorical awareness, and a consideration of Danielle’s professional goals.

In addition to DI being epistemic and socially informed, the process is also negotiated, reciprocal, and informed by mutual trust and admiration. As the first graduate student in Baylor’s English department to pursue a specialization in rhet-comp, Danielle needed extra help figuring out how to position herself on the academic job market. Kara helped Danielle recognize how she occupied interstitial territory as a scholar in more than one way: rhet-comp and literature as well as composition pedagogy and digital media. Instead of allowing one of these elements to subsume or obscure another, Kara encouraged Danielle to control the narrative by claiming the strengths of her multiple community memberships, which aided Danielle as she planned and created her website. We also began to talk about other, more personal ways we claimed dual identities in different communities as academics, feminists, residents of small towns in Texas, Christians, and left-leaning voters, which not only built trust between us—laying the foundation for DI to occur—but also confirmed to Danielle that her academic identity was forged at the intersection of a number of seemingly disparate communities and that she could make them work together to benefit her career goals. These late-night conversations while we worked on our projects, combined with a DMAC lecture on controlling metaphors,⁴ led Danielle to doodle a Venn diagram on her DMAC notes, which turned into the website header she designed using Adobe Photoshop. On a conceptual level, Kara’s insight and feedback became instrumental in the layout, design, and content of Danielle’s website and final DMAC course project. Later, when she was on the job market, Danielle displayed the Venn diagram theme during her job talk on campus and landed a position as a writing scholar. By sharing the burden of our invention processes, we came to a fuller understanding of the benefits of proximal composing.

Not only did proximal composing result in both personal and professional rewards, but it also gave us the opportunity to build a relationship conducive to DI, which led to us trusting the process of DI. Even though DI meant that we often interrupted the other person as she was working, we each learned to put aside our desire to work on our own projects and to engage with the other person’s problems in ways that helped her. We grew to trust that discussing the composing problems and answering questions the other had would benefit both of us. This mutual sharing and engagement with distributed invention led to reciprocity: Danielle had taken so much time responding to Kara’s projects that Kara wanted to do the same for Danielle; and vice versa. Although trusting the DI process often meant late nights working on our individual projects, we knew that the interrupted occasions could become opportune moments for inspiration. This trust in the process ultimately led to trusting each other as writers, responders, roommates, and friends. Taking so much time out to work through the problems another writer was having sharpened our skills and underscored the benefits of pursuing technological development with a colleague. In sum, composing side-by-side might have slowed us down

³ The 2013 DMAC Final Project was a fairly open-ended assignment that asked participants to apply what they had learned throughout the Institute (about technology, multimodal composition, literacy, teaching, software programs, and so on) into some sort of final project. The project could be digital/multimodal, but it did not have to be. The project was to “be comprised of short, stand-alone media assets and traditional print-based compositions that can stand on their own, but when assembled, form a text that represents more than the sum of their individual parts.” The assignment encouraged us to take different approaches and to compose in whatever genres, modes, and media we wished.

⁴ In a lecture on visual design, Melanie Yergeau advocated that website designers use a controlling metaphor to tie disparate pieces of information together under one theme. This controlling metaphor would highlight one’s strengths and diminish one’s weaknesses and enable the audience to see the connections between the visual design and the information on the site.

and led to many hours of after-dark composing, but in the deliberate change of pace that DI fostered, we found space to challenge, encourage, and sharpen ourselves and each other.

4. Principles of distributed invention

In sum, DI is a process of thinking that involves two or more people engaging in brainstorming, problem-solving, and idea-generating activities together where original ideas become mutually appropriated and evolve into something different altogether. More specifically, distributed invention is:

- **Social.** DI must involve at least one other person and is based on the notion that knowing, learning, and thinking are social processes that involve collaboration, contribution, and co-participation (Bruffee, 1984; Gee, 2004; Lave & Wenger, 1991; Vygotsky, 1978; Wenger, 1998).
- **Mutually appropriated.** DI operates from the notion that learners come with distinct expertise, knowledge skills, abilities, and ideas and that learners of all ages, backgrounds, and interests mutually appropriate material in bi-directional and reciprocal ways. These learners therefore contribute “ideas and knowledge that are appropriated by different learners at different rates, according to their needs and to the current state of the zones of proximal development in which they are engaged” (Brown et al., 1993, p. 193; see also Newman et al., 1989).
- **Epistemic.** DI involves a dialectical interaction between participants where ideas are collectively generated through discussion, question-posing, problem-posing, and problem-solving and where the invention process is dynamic, fluid, and evolving. DI seeks to solve writing problems and answer questions so the author can make informed decisions as he or she proceeds with the writing (Berlin, 1988; Freire, 1970; Scott, 1967).
- **Negotiated.** Distributed invention entails negotiation and renegotiation. As participants discuss, discover, and invent ideas—that is, as ideas are mediated—meaning emerges and changes, and participants often develop a common mind, common voice, and common knowledge base (Bawarshi, 2004; Brown et al., 1993; Hart-Davidson, 2007; Wertsch, 1991).
- **Situated.** DI is a situated process where idea generation is shaped by and located within the context in which invention occurs (Barton, Hamilton, & Ivanic, 2000; Gee, 2004; Lave & Wenger, 1991; Rogoff, 1990).
- **Proximal.** DI requires that individuals be near one another as they work on projects in a reciprocal fashion. Physical proximity facilitates spontaneous, immediate, and informal feedback, and as such makes DI an embodied practice (Arola & Wysocki, 2012; Hindman, 2002; Kiesler & Cummings, 2002; Wellman & Wortley, 1990).
- **Responsive.** Distributed invention involves being responsive to the needs, problems, and questions of a partner(s). Being responsive is a recursive process that requires each partner to take turns responding to new ideas and suggestions and to engage with the process in meaningful ways (Anson, 1989; Hindman, 2001; Murray, 2004).
- **Interruptive.** DI involves interruptions—or frequent stops and starts—between individuals as they work to solve problems and invent new ideas for their drafts. These interruptions are not so much disruptions as they are productive moments of interaction, collaboration, and participation (Banks, 2003; Ellertson, 2003; McGrady, 2010; Selber, 2004).
- **Transformative.** DI is transformative. It has the potential to transform ideas, texts, individuals, and ways of learning, seeing, acting, and knowing (Brent, 2011; Wenger, 1998).
- **Trust-based.** DI works most effectively when individuals are equally committed to ensuring the success of all parties involved. Individuals must be willing to be vulnerable, open, and available in order for proximal composing to yield positive outcomes (Ede & Lunsford, 1983/2011; Hunzer, 2012).
- **Idiosyncratic.** Processes of DI are unique to individuals composing near each other and are inflected by a range of factors, including spatial and material environments, writing context, language use, genre knowledge, writing goals and motivations, and social factors of the composers, such as race, class, gender, age, and educational background, among others (Pigg, 2010; Lobato, 2003).

5. Distributed invention after DMAC: At home and beyond

The principles of DI can be easily transferred from the extracurricular, after-dark moments to new contexts, as we found when we left DMAC and returned to Baylor. In this section, we explain how we applied DI principles at the classroom, departmental, and institutional levels.

5.1. Course and assignment design

The principles of DI were easily applied to our courses, particularly in the ways we (re)conceived and (re)designed the digital composing courses we were teaching. Although we had both taught digital composing before, DMAC's influence and our newfound observations about proximal composing and DI resulted in assignments and student projects that were more provocative and intellectually stimulating than ones we had assigned before DMAC.

For Danielle, the experience of attending DMAC with Kara changed how she taught "Writing in the Age of Digital Media," a first-year academic seminar. When Danielle had previously taught the course, she had included only one multimodal assignment, and it was the final course project. These video projects had been moderately successful, but students were often embarrassed to discuss their projects during the drafting stage, hesitant to share their projects during peer review, and reluctant to make any changes to their videos once they had completed their first drafts. After talking through different approaches to teaching the course with Kara, Danielle decided to follow the example that DMAC set by frontloading technical instruction and assigning multiple finger exercise assignments early on. By the third week of class, these first-year writing students had recorded audio literacy narratives with a partner, composed a one-minute "Baylor Concept in 60" video that gave students space to experiment with combining audio and video elements, and submitted a 3–5 minute multimodal literacy narrative video. Danielle also structured the course and the class environment so that the learning and composing process was social, epistemic, and proximal. Students practiced distributed invention by giving each other feedback early and often, and Danielle implemented multiple in-class conferences to offer informal feedback as well. Additionally, the class collaboratively generated a grading rubric by which their multimodal literacy narratives were evaluated (Adsanatham, 2012). By practicing these principles of distributed invention throughout the semester, students possessed the confidence and skills to create a more complex digital community-based writing project.

Kara also changed her traditionally print-focused "Advanced Argumentative and Persuasive Writing" after returning from DMAC. She not only added a multimodal video remix essay to the course, but also integrated the technical skills throughout the semester rather than waiting until the day the assignment was distributed to begin the technical work. Like Danielle, she, too, assigned audio and video finger exercises, but she spaced them throughout the semester so that students had ample time to hone their skills and get accustomed to the technology. She even used the finger exercise assignments as a way to revise traditional low-stakes print writing tasks she typically assigns (e.g., reader responses, project pitches). For example, the students learned to use Audacity by creating an audio reader response, and they learned to use iMovie by creating a 60-second video trailer explaining the central argument they would make in their multimodal video remix. In addition, to encourage proximal composing, Kara set aside multiple class days for in-class composing and offered additional lab hours in the evening where students could come and work on their projects near others.

Throughout the semester, we compared notes on how things were going, discussing everything from finger exercise assignments and proximal composing to how to use iMovie and design digital assignments. After the semester was over, we met and reflected on what went well in each of our courses, offering each other suggestions for improvement on assignments, course structure, how to facilitate proximal composing, and balancing technical needs with invention and inquiry. Since DMAC had enhanced our own confidence in designing effective multimodal assignments and teaching with audio- and video-editing programs, we discovered that we had more time to focus on the synergistic creative process. In sum, DI was evident as we planned our syllabi for these courses, created assignments, reflected on what went well and what could be improved, and revised our pedagogies. DI can provide instructors with useful ways of collaborating with others, reflecting on their teaching practices, and becoming reflexive practitioners.

5.2. Departmental and institutional pedagogical applications

DI also emerged at the departmental and institutional levels. Upon returning home from DMAC, Kara entered into conversations with various constituents on campus (e.g., departmental chair, technology committee, academic consultants for the college) about restructuring the computer lab to facilitate greater pedagogical flexibility. We wanted to expand the possibilities for multimodal composition in our program and courses and also provide more opportunities for students to interact with one another, work in teams, and compose near others. Our chair was receptive to the needs of students and faculty, and she found money from the departmental and college budgets for us to remodel the room. Drawing on her experiences at DMAC, Kara engaged in lengthy conversations with different constituents as she

planned for how to make the room more conducive to the learning goals and objectives of the Professional Writing (PW) program, including an enhanced ability to create and share movies, collaborate on projects, video chat with others outside of Baylor, and move tables and chairs around to fit the needs of the students, team-based projects, and instructors. The lab was first converted from a PC to a Mac lab so that the computers contained the software needed to create more advanced multimodal compositions. In addition, the room was equipped with technology to allow for interacting with others off campus both visually and orally, and the room was reconfigured spatially to enable students to work at their computers during in-class training and demonstrations but to still be able to see the instructor console with ease. The sound was also improved in the room, which made it more conducive to sharing and viewing movies and to listening more intently to audio projects. A 75-inch HD screen was installed at the front of the room, the speaker system was replaced, the lighting was altered, student computers were equipped with larger screens, and the room developed into a place that would meet the needs of diverse assignments and pedagogies. These ideas grew out of discussions with others at DMAC, with each other, and with our departmental and university colleagues, all of whom came to understand the context and our goals for the space and then explored possibilities together.

In addition to the lab, we are also in the process of generating ideas for a new campus multiliteracy center. Our department currently has a writing center, but it is primarily focused on meeting the needs of first-year writers and alphabetic compositions. We need something broader and more comprehensive to meet the writing needs of departments across campus, including our PW program. As we invent ways to approach this need—financially, politically, departmentally, and practically—we have begun conversations with the library about creating a multiliteracy center there and with other scholars who have already designed a multiliteracy center for their university. We are asking important questions and in the process of putting together a proposal for the multiliteracy center to be realized. We have high hopes for the role that DI will play as we make this dream a reality. Ultimately, these examples indicate that DI has the potential to function in ways beyond individual composing and invention: it can have important consequences for courses, programs, disciplines, and institutions.

6. Pedagogical recommendations

Because distributed cognition and DI require situated, relevant, and authentic activity in order to be effective, it is important for instructors to consider how they might re-structure classroom experiences to better allow these principles to take shape. We conclude our essay with recommendations for bringing DI principles inspired by DMAC back to the classroom. The instances we describe above were specific to our institution, our roles, and the classes to which we are assigned. Below, we want to offer flexible recommendations to inspire instructors to approach both alphabetic and digital composing tasks with flexibility, adaptability, and enthusiasm and to encourage students to do the same.

First, we encourage writing teachers to create opportunities for DI to occur, both in the classroom and beyond. One practical suggestion is to build numerous informal and formal peer reviews and feedback opportunities into the course and assignment structure. Students can pitch ideas to each other before they begin drafting and throughout the project in order to shape their ideas and generate new ones.

Another practical suggestion is to have students work on their projects during class. They should sit beside their peers so that spontaneous, informal discussions have the opportunity to germinate. Composing side-by-side, especially during the early, inchoate invention stage, breaks down the barriers that sometimes accompany working within earshot of the teacher (and other students) and may even decrease anxiety about receiving feedback. Instructors should play as much a role in DI activities as possible by walking around, being nearby, and sharing in idea-generation discussions at all stages of the composing. This act reinforces the importance of constant feedback and response from others during and throughout the writing process. While opening our processes of thinking to others can be challenging, together, teachers and students can generate knowledge about the way writing works in various contexts and create an environment where students are engaged and enthusiastic about their own and each other's work, thus leading to personal growth and improvement.

Third, we recommend assigning each student a "buddy." DI requires trust, and in order for that to happen, students might be assigned (or choose) a partner to work beside throughout the semester. These semester-long interactions will aid students as they develop ideas, generate questions, give and receive spontaneous and immediate feedback, and better understand proximal composing. Though partnering together for an entire semester might cause some problems, it also allows time for trust to develop and vulnerability to occur. These activities also open up students to being able to

offer generative questions and the kinds of reflective critiques required for DI to occur, therefore positioning students as active co-creators of learning able to make their own discoveries.

Another recommendation we have is for writing instructors to expand the invention activities they provide students. One common practice in composition classrooms is to provide students with a list of invention questions to generate content. The literacy narrative assignment on the DALN (Digital Archive of Literacy Narratives), for instance, includes textual invention questions meant to spur memory and reflection as students compose their texts. As our experiences illustrate, however, the invention process benefits as well from social interactions with others—of thinking through ideas orally as well as in the writing typically found in the brainstorming exercises. Through these oral conversations, ideas are generated, revised, discussed, amplified, appropriated, and reappropriated, all while knowledge is being developed, constructed, and modified. So, in addition to the individual invention activities, teachers should also try to build in class time for the oral discussion of ideas and texts, thus creating some of the conditions necessary for DI to occur.

In addition to expanding inventional activities, we also recommend frontloading technical knowledge as one way to encourage DI. Because DMAC teaches participants how to use the technologies from the very first day of the Institute, we were able to focus more on idea generation and knowledge production at the after-dark DI stages. Had we been forced to work through the technology on our own or asked to do it only at the stage when the final project was due, our conversations in the evening would have been focused on technical skills and less on the invention process. We therefore recommend that instructors looking to include multimodal projects frontload technical content—even if the digital assignment is not until much later in the semester—in order to dissipate technological anxieties and foster co-participation. Utilizing low-stakes finger exercises is one excellent way to apply the technical knowledge to an assignment and to allow DI to emerge in higher stakes projects.

Finally, we recommend talking with students about authorship and intellectual property in hopes of broadening student perspectives on these topics and enhancing their understanding of DI. Some people still view ideas as internal products of one's mind and thus value original, independent, and autonomous thought rather than discussion, collaboration, brainstorming, or mutual appropriation. This traditional view perpetuated in the academy contrasts significantly with published research in our field that views knowledge as social, collaborative, relational, and shared (e.g., [DeVoss, 2009](#); [DeVoss & Porter, 2006](#); [Greer, 2003](#); [Greene, 1995](#); [Haviland & Mullin, 2008](#); [Hunter, 1998](#); [Johnson-Eilola & Selber, 2007](#); [Ritter, 2005](#)). Instructors might, therefore, use the theory of DI to engage students in discussions of plagiarism, authorship, knowledge, and intellectual property in order to raise student awareness of the social nature of writing and invention. Discussing DI in light of issues of intellectual property is a useful way to get at complex notions of authorship and originality. As instructors apply this theory to their classrooms and begin to teach students the value of DI, they also need to understand their local contexts as they utilize these practices. For instance, institutions that utilize plagiarism-detection software might be resistant to DI as a practice. Instructors should, therefore, be aware of the various conceptions of authorship held by their students, departments, and institutions in order to make informed decisions about course content and pedagogical design.

In conclusion, DMAC—as a form of technological professional development—was extremely beneficial to us but not necessarily in ways we imagined. Though we knew we would develop technical skills that would be useful to us in our teaching, research, and service, we did not know we would learn and discover new ways to conceive of the composing process, specifically the generation and discovery of ideas during invention. The theory of distributed invention we offer as a result of our DMAC experience can be a productive way for writers to develop their ideas, create innovative and rhetorically-aware projects, and learn technical skills. Future research on distributed invention should continue to examine its effects on a variety of issues, including intellectual property, student motivation, assessment, the writing process, DI's application to online collaboration, and transfer. Perhaps this research will be taken up by other DMAC alums to continue the diffusion of collaborative technology-based learning experiences scaffolded and supported by distributed invention.

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