Literacy in Composition Studies

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About Literacy in Composition Studies

Literacy in Composition Studies is a refereed open access online journal that sponsors scholarly activity at the nexus of Literacy and Composition Studies. We foreground *literacy* and *composition* as our keywords because they do particular kinds of work. We want to retain Composition's complicated history as well as FYC's institutional location and articulation to secondary education. Through literacy, we denote practices that are both deeply context-bound and always ideological. Literacy and Composition are therefore contested terms that often mark where the struggles to define literate subjects and confer literacy's value are enacted. We are committed to publishing scholarship that explores literacy at its intersection with Composition's history, pedagogies, and interdisciplinary methods of inquiry.

Literacy is a fluid and contextual term. It can name a range of activities from fundamental knowledge about how to decode text to interpretive and communicative acts. Literacies are linked to know-how, to insider knowledge, and literacy is often a metaphor for the ability to navigate systems, cultures, and situations. At its heart, literacy is linked to interpretation–to reading the social environment and engaging and remaking that environment through communication. Orienting a Composition Studies journal around literacy prompts us to investigate the ways that writing is interpretive as well as persuasive; to analyze the connections and disconnections between writing and reading; and to examine the ways in which literacy acts on or constitutes the writer even as the writer seeks to act on or with others.

LiCS seeks submissions that interpret literacy at a time of radical transformation in its contexts and circulation. We are open to a wide range of research that takes up these issues, and we are especially interested in work that:

- provides provisional frameworks for theorizing literacy activities
- analyzes how literacy practices construct student, community, and other identities
- investigates the ways in which social, political, economic, and technological transformations produce, eliminate, or mediate literacy opportunities
- analyzes the processes whereby literacies are valued or legitimated
- examines the literacies sponsored through college writing courses and curricula, including the range of literate activities, practices, and pedagogies that shape and inform, enable and constrain writing
- considers the implications of institutional, state, or national policies on literacy learning and teaching, including the articulation of high schools and higher education
- proposes or creates opportunities for new interactions between Literacy and Composition Studies, especially those drawing on transnational and cross-cultural literacy research

Editors' Introduction to the Second Issue

We present this first refereed issue of *LiCS* with three articles that represent the kinds of scholarly work we hope to foster. All three articles offer new perspectives on important issues in composition studies: writing to learn, compulsory first-year composition, and digital literacy. By drawing on literacy studies and interrogating literacy in their pieces, the authors here reorient us to these established composition topics in ways that unsettle our assumptions.

For "Writing and Learning in View of the Lab," Catherine Prendergast embarked on a study to determine the most effective forms of writing to learn in the sciences. Her work in a summer research science lab leads her to question her questions, however, and she develops "a broader framework for learning, and a narrower one for writing" consonant with Mike Rose's call for a model of intelligence that "doesn't separate hand from brain." While raising important questions about the limits of writing to learn for the sciences, Prendergast offers a fascinating study on embodied intelligence and an elaboration of method we particularly appreciate.

In "The Legibility of Literacy" Michael Harker returns to the "well-traveled" ground of the abolition debate on compulsory composition and remaps it with theories from New Literacy Studies because, as Harker argues, this is how "we better understand why literacy remains composition's most pressing problem *and* solution." After reframing the debate historically and analyzing the latent autonomous theories of literacy at work in early abolitionist proposals, Harker returns us to the present and turns the same lens on where we stand now, urging a critical examination of our definitions of literacy to better address the challenges to literacy education.

Annette Vee offers a different kind of compelling history in "Understanding Computer Programming as Literacy." Reading a trajectory for programming in the history of textual literacy, Vee argues that programming is poised to shift from a "material intelligence," or specialized skill, to a literacy, a facility necessary to negotiate the infrastructure of everyday life. Vee argues that this possible future has implications for educators because literacy learning is shaped by the literate identities available to learners and by the environments shaped by programmers. Vee proposes a model of computational literacy that can help us understand and participate in the shape of things to come.

The symposium which kicked off our inaugural issue continues in Issue 2. Here, Matthew Ortoleva, Michael Pennell, and Gerald Campano extend the conversation about the intersections between literacy studies and composition studies. These responses illustrate how we hope the ongoing "Symposium" section will function: Ortoleva, Pennell, and Campano help us re-see the contours of the conversations begun in Issue 1 and offer suggestive critiques and arguments. Ortoleva invites us to attend to the relationship between the material and discursive by reconsidering the symposium's interest in "place" through ecological literacy. Pennell cautions us to recognize that another kind of place—digital environments—do not, in themselves, produce meaningful rhetorical situations in his response to the symposium conversation about academic and non-academic genres. Finally,

Campano also expands the conversation about place and spatial metaphors by asking us to confront "key terms such as epistemic privilege and historically subordinated knowledge" in spaces where "social and cultural boundaries" might obscure certain knowledges and literacies. We note his critique that in our stated desire to "bridge" literacy and composition studies, we imply the fields remain static and metaphorically—and therefore materially—limit the possibility of mutual transformation.

Our book review section debuts in this issue with a review of Eli Goldblatt's *Writing Home: A Literacy Autobiography*. Christian Smith considers Goldblatt's work with the literacy narrative as genre and the possibilities created when we ask "not what a literacy narrative is, but rather what it can be given enough space to move."

We are privileged to have worked with all of the contributors to this issue. We have each remarked on how excited we are by each of the pieces, and have noted that our excitement has only grown with frequent rereading. We hope that readers will share our pleasure in reading this issue, will circulate it widely, and will consider adding their voices to the conversation.

Brenda Glascott, *California State University, San Bernardino*
Tara Lockhart, *San Francisco State University*
Holly Middleton, *High Point University*
Richard Parent, *University of New England*
Chris Warnick, *College of Charleston*

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Writing and Learning in View of the Lab: Why "They" Might be Right

Catherine Prendergast– University of Illinois

ABSTRACT

To interrogate the field's current understanding of writing as central to learning in the sciences, this study offers results from a qualitative, emic study of college students and their scientist mentors at work in an NSF-sponsored Research Experience for Undergraduates. I observed that the work of this professional research laboratory mainly recruited and developed literacies, such as manual dexterity and visual acuity, other than language-based ones. Describing here the various laboratory activities that fostered higher-order thinking and knowledge transformation, I conclude that "writing to learn" research must consider how writing fits in with an ever-developing understanding of the complexity of learning.

KEYWORDS

Writing, learning, science, undergraduate education, laboratory research

Recently, composition scholars have taken to publishing in scientific journals to advocate for new approaches to writing in science classes. Christopher Thaiss and colleagues have argued in the *Council of Biology Educators Life Sciences Education* journal, for example, that we need to know more about the writing tasks that promote learning in the sciences; they recommend more collaborations with science faculty to test and report best practices (Reynolds et al.). Cary Moskovitz and David Kellogg in the pages of *Science* argue that because students "do" instead of "learn about" science, writing assignments should be integrated into laboratory settings and reduced to "highly condensed" tasks ("Inquiry-Based Writing" 920). These publications recognize that Writing To Learn (WTL) has not achieved the level of acceptance or success in science instruction that it has in other areas of the curriculum. The steep hill that WTL pedagogies still have to climb to reach into the sciences is further evidenced by an exchange between a physicist

and Moskovitz and Kellogg in the "Letters" section of a subsequent issue of *Science*. Michael Goggin, the physicist, argued that Moskovitz and Kellogg had "focused on teaching writing in the introductory science course at the expense of teaching science" (Goggin 524). Moskovitz and Kellogg responded to Goggin that science lab courses "offer an essential opportunity for students to learn about the practice of science, and this practice includes presenting one's work in a clear and compelling fashion" ("Lab Course Goals" 524).

Had Moskovitz and Kellogg published their article in a composition journal rather than in *Science* where it reached an audience of scientists, it is unlikely that anyone would have voiced Goggin's concerns, particularly as they question the link between writing and learning the practice of science. As a field, compositionists have accepted the enmeshment of writing and learning since the 1977 publication of Janet Emig's "Writing as a Mode of Learning." Emig's claim that writing is integral to the process of knowledge creation, rather than merely the report of knowledge gained, helped launch the WTL movement. As John Ackerman has subsequently observed, the notion that students "write to learn" rather than learn to write is practically a charter of our field, having become the rationale for expanding writing and composition programs with requirements in every corner and at every level of the undergraduate experience. The response Moskovitz and Kellogg gave Goggin could have been supported by numerous citations of WTL literature.

In this article, however, I suggest that we resist for a moment the ready response to scientists who question the relationship of writing to learning in their fields. I read in Goggin's objections not so much a challenge to the notion that writing can contribute to learning science, but an assertion of the value of other activities important to learning that vie for precious instructional time. I further agree with Reynolds et al. that we do not yet know enough about writing in the sciences, particularly in those laboratory settings Moskovitz and Kellogg had referenced. To contribute more data to this effort, I offer here the preliminary findings from a qualitative study of undergraduate writers and their scientist mentors at work in a laboratory setting. "The Lab" is my pseudonym for the internationally renowned research field station in the United States that was the site of the Research Experience for Undergraduates program (REU) I observed in the summer of 2011.[1] During the program I followed 10 REU students and their mentors while they were, as their mentors put it, "doing" science; that is, students were embedded in funded labs where research was being conducted for publication purposes. As researchers have noted, there are significant differences in purpose, range, and exigencies that distinguish classroom from professional laboratory work (Hanauer et al.; Wenning; Zachos). As one REU mentor described the role of students in this non-degree granting setting: "They're part of a research program and they are contributing to a research program." Where better to learn the genuine practice of science?

My original intention, informed by WTL literature, was to determine what forms of writing best led to learning in this environment and to report them. A comment made by Professor Mark Lauten, one of the co-directors to the students, however, changed my plans. Introducing the requirements of the program in the first week of the summer, he told the students that their capstone writing project

would be posters rather than papers because, "We could have required you to do a paper, but then you would have less time to do research." Lauten further admitted that he felt the poster would be "enough of a problem." Lauten's was not the only concern voiced that summer about writing taking precious time from research. When I asked another mentor how he taught students to keep a laboratory notebook, he responded, "I basically want them to have more of the hands-on experience than trying to worry about teaching them about lab notebooks during the course of this, because I think they have plenty of other opportunities to get that kind of thing." [2]

Although such comments, like Goggin's, seem on their face to marginalize writing and thus challenge decades of WTL research and practice, my research suggests that many of the REU mentors were rather attempting to address an imbalance of attention; in their home institutions, they felt, writing was already well-suffused throughout the curriculum, to a far greater extent than laboratory practice. Significantly, none of the informants I spoke with disputed the importance of writing to the progress of science. As one of the REU mentors put it, "If you're going to get into biology, that's a profession of writing." While acknowledging the importance of writing, however, REU mentors spoke more often of the need for programs to develop abilities, aptitudes, and capacities they considered also critical for success in the sciences, including: the manual dexterity necessary to conduct experiments, the ability to tolerate long hours of working both independently and with others, and the capacity to pursue projects over long periods of time.

The mentors' goals largely reflected those of the sponsor of the REU program, the National Science Foundation (NSF). The NSF established the Research Experience for Undergraduates program in 1987 to make up for deficits they perceived in science instruction in traditional classrooms. The initial goals of the program were "to expand student participation in all kinds of research" and to "attract a diversified pool of talented students into careers in science and engineering" (NSF, "Overview"). In the first three years of the program's existence alone, the NSF spent 37 million dollars on 11,000 students placed at hundreds of sites. The NSF evaluates REUs by asking students if subsequently they planned to apply for graduate school, or even if participating in the program had clarified their career path. Although initiated in a moment of perceived literacy crisis in response to declining numbers of students applying to graduate school in scientific fields, the pedagogical approach of intensive laboratory or field research proffered by the REU program is hardly radical. Scientists, Neal Lerner reminds us, have embraced learning by "doing" at least as far back as the spread of science education in the late nineteenth century, following the influence of Harvard professor Louis Agassiz who advocated experiential learning. As one mentor, Professor Rudek, maintained, the "doing" of science in the lab was vital to learning science: "If you put students in the laboratory they learn science way better than ten times the hours in the classroom—because they're *doing* science. They're *doing* science." Indeed at the Lab, "doing science" left little time for writing (other than writing to record) and the composing task of the poster did, as Professor Lauten's comments suggested, cause a problem. By the last week of the REU, some students had no real data to communicate, one summer being insufficient time to let many experiments run their course. Other students were so engaged

in collecting data that they had little time to organize it for presentation. In the view of the Lab, however, preparation of the poster was not of major concern; the primary purpose of the REU was to participate in laboratory activities.

The ten weeks of intensive research were above all designed to help students learn about themselves. Students were not only to collect data, but also to develop the embodied understanding of what it felt like to collect that data (or fail to), day in and day out, day after day after day. The REU program, I came to understand, functioned as a kind of lab inside a lab, putting students in a genuine scientific context to see which ones might be drawn into science as a career, and which ones might consider a different path. According to Professor Lauten, even students who decided not to pursue graduate school after attending an REU represented a good investment for the NSF: "I think you're equally successful if they decided they hate it as well as they embrace it because the NSF would much rather spend $10,000 on a student to find out that they don't want to do science than a quarter million dollars for their PhD and find out then." All the senior scientists I spoke with understood "science" as a project that extended over vast stretches of time; research projects were routinely passed down from one generation to the next. Building that next generation of scientists was therefore ever foremost in their minds. However, in order to think in terms of generations, they appreciated individual difference: some students, they knew, would show affinity for the work, and some would not. Unless students experienced the lab, however, they would not be able to know enough about the practice of laboratory science to determine if that path was right for them.

> ***"Manual activities such as those I witnessed students doing at the Lab are rarely considered in WTL literature at all. Yet, as I observed at the REU, research at the Lab required a great deal of physical labor and repetitive manual activity as an instrumental component to student learning of science."***

After observing and interviewing the students of the REU through their summer, I concluded that the co-director, the mentors, the NSF might have been right: students weren't writing much, but they were learning a great deal. Although students periodically made written and oral reports of their progress, wrote abstracts for conferences, and all wrote and delivered a poster for the symposium, students spent most of their hours engaged in manual activities: taking photographs, handling chemicals, mixing solutions, positioning ice-fishing shelters, disposing of carcasses, and watching blips on computer screens. Hanauer et al.'s conception of scientific inquiry explains why such manual tasks are critical to the practice of science. According to Hanauer et al., scientific inquiry is a multimodal process involving not only knowledge of the discipline, relevant questions, scientific principles, and how to present them, but also "physical knowledge"—the knowledge of how to perform laboratory tasks. Based on my observations, I would add to Hanauer et al.'s composite of concepts and skills involved in learning science a few more that relate to knowing *about* the lab as

well as knowing what to do in it, among these: understanding the amount of repetition it takes to get results, recognizing the pace of scientific research, being able to handle the hours and the environs, and developing the capacity to challenge—yet work with—one's collaborators.

By many educational standards including those endorsed by WTL research, the manual tasks students performed at the Lab, and the degree to which those tasks had to be repeated daily, did not demand "higher-order" thinking. "Higher-order" thinking, according to Reynolds et al., requires "a process of knowledge transformation" rather than, for example, mere recall (17); the task of WTL researchers, Reynolds et al. further argue, is to determine what forms of writing tasks best evoke that process. The educational embrace of developing higher-order thinking tasks follows on Benjamin Bloom's influential taxonomy (developed more than fifty years ago), where recall is presented as the lowest level of cognition, and analysis, synthesis, and evaluation register further up the chain of cognitive demand. According to this taxonomy, the most frequent use of writing that I witnessed at the Lab—writing to record—would require less cognitive effort than synthesizing knowledge to compose a poster. Manual activities such as those I witnessed students doing at the Lab are rarely considered in WTL literature at all. Yet, as I observed at the REU, research at the Lab required a great deal of physical labor and repetitive manual activity as an instrumental component to student learning of science. When we look at the sciences, in other words, we need to broaden our framework for what counts as learning beyond writing.

The findings of this study have implications far outside the lab, or even science. My study of the Lab underscores Mike Rose's call for the field to embrace "a multidimensional model of intelligence and a conception of knowledge that doesn't separate hand from brain" (215). Manual skills, Rose notes, are learned not primarily through books, but through observation and doing. Rose argues that while schools tend to focus on intelligence from the neck up, much of what we consider intellectual learning has significant manual components, and much of what we consider manual labor can only be learned through significant cognitive effort. I add this study to Rose's challenge to culturally maintained boundaries between intellectual (high) and manual (low) skills and to the assertions of the relative value of them to the academic enterprise. I conclude that "writing to learn" research must consider how writing fits in with an ever-developing understanding of the complexity of learning.

METHOD AND PARTICIPANTS

Two questions initially drove my investigation:

How did students and mentors understand learning in the lab?

How did students and mentors understand the role of writing in that learning?

To answer these questions, I conducted audio-recorded semi-structured interviews (Fontana and Frey) with REU students toward the beginning and near the end of the ten-week session of mentored laboratory research. I solicited students' educational histories and accounts of how they anticipated and reflected upon the writing required in the REU. I asked students about the

relationship they perceived between this writing (including laboratory notebooks and informal writing) and the practice of research. I checked their retrospective accounts of their writing practice against the texts they produced during and prior to the REU. I conducted semi-structured interviews with mentors to ask how they used writing to mentor undergraduate students, about their own histories of writing in scientific and non-scientific settings, and about how they understood the purpose of writing in the process and presentation of scientific research. I observed students at work in their laboratories and attended lectures with students and mentors. I attended weekly meetings of the REU group where research-in-progress reports were made. Lastly, I attended and audio-recorded a peer group review session where REU students, applying to a national conference for under-represented students in the sciences, read and commented on each other's abstracts.

All ten undergraduate students in The Lab's REU program participated in the study as did ten of their eleven mentors. Through NSF funding, the Lab provided students with a stipend of roughly five thousand dollars, plus room and board for ten weeks (NSF, "Overview"). Like other REU sites, the Lab recruited a diverse group of students from disparate institutions where, for the most part, opportunities to participate in laboratory research programs were scarce. My student participants therefore included six women (including one American Indian, one Asian American, and one African American) and four men (one Puerto Rican, another of Puerto Rican and Republic of India ancestry, and one identifying as Chicano American). The exact areas of research the students conducted included molecular and cell biology, neurobiology, physiology, developmental biology, ecology, and evolutionary biology. In addition to their lab work, students were responsible for presenting at the end-of-summer "undergraduate research symposium" (there were some concurrent undergraduate programs also presenting) and for composing the poster about their research. They were also responsible for attending weekly meetings of the REU group to share research quandaries and to learn about the profession from the co-directors and other guests.

> ***"My informants' questions about my questions slowly began to erode my faith in my categories: When I talked about writing to learn, for example, they asked, exactly what kind of learning did I mean? Listening day after day to the terms they used to discuss learning, I began to consider a broader framework for learning, and a narrower one for writing."***

Faculty mentors participating in the REU from under-represented groups included one who identified as Latino, one as American Indian, and another as Chinese American (though he did not consider his demographic typically under-represented in the sciences). In contrast to the proportion of female students, all but one of the mentors I interviewed were male (the mentor who declined to participate was also female). Mentors came from various home institutions, though some were year-round affiliates of the Lab. All were senior scientists with national and international reputations. Perhaps

not surprisingly, then, one aspect of student diversity that this program did not reflect was variation in achievement level. Each student could boast of a significant history of educational achievement that had propelled them to the top of a pile of 190 REU applications. (The following year, the co-directors would choose a class of eleven students from a jaw-dropping 390 applications.) In their review of applications, the co-directors sought to identify those students with the greatest interest in science research as a career choice.[3] They told me they wanted to invest their time and effort in future scientists, not future doctors.

The distinction the mentors frequently invoked between scientists and doctors was one that might have escaped me had I not been taking an emic approach to data analysis. Emic research emphasizes constructs and terms advanced by study participants over those emerging from outside the research site (Lett). For example, while an expansive definition of "writing" in the laboratory would include outputs from computers (cf., Latour and Woolgar), my informants did not consider such outputs to be writing, therefore I did not. Additionally, rather than measure my informants' learning according to an outside rubric or standardized measure, I adopted informants' understandings—largely consistent among them—of what counted as learning. My "a-ha" moment came the day I realized that the people whose learning I studied had been themselves studying learning, albeit on the neuronal level, on animals that learn but do not write. Where writing scholars might consider writing tasks in terms of those that evoke "higher order thinking" and those that do not, neuroscientists examine "higher order association areas" in brains of monkeys and rats. Clearly, activities other than writing can induce the transformation of knowledge we understand as higher-order thinking. My informants' questions about my questions slowly began to erode my faith in my categories: When I talked about writing to learn, for example, they asked, exactly what kind of learning did I mean? Listening day after day to the terms they used to discuss learning, I began to consider a broader framework for learning, and a narrower one for writing. In the past few decades, neuroscience has worked to specify the reach and limits of different cognitive activities through studies that could inform WTL. Recent research in neuroscience, for example, has tantalizingly identified writing's uniqueness from other composing processes; studies of subjects with brain injuries that impair writing, but not drawing or speech, for example, have shown writing to be an activity that engages very specific parts of the brain (Bormann, Wallesch, and Blanken; Flaherty). For the purpose of unbundling writing and learning, I began to ask: What can you learn by trying to isolate a neuron six days a week for two months that you can't learn by writing?

Ultimately my aim in taking an emic rather than etic approach was to highlight forms of disciplinary difference that might make a difference in how writing and learning are understood by participants. I believe there is viability in exercising both emic and etic frameworks in our research, and that neither should supplant the other. I would offer, however, that it is important from the standpoint of our roles as composition and literacy scholars working in the interdisciplinary environment of the university to phrase our findings in terms our institutional partners would find meaningful. To that end, I asked several of my informants to read a draft of this article in preparation and incorporated their comments into the revisions.

"THE MOST BORING JOB ON EARTH": THE PARADOX OF THE LAB

One paradox emerging from my interviews was that many of my informants told me how exciting science was at the same time as they told me how boring it was. They felt the way science was presented in traditional educational settings (those unlike the Lab) often failed to capture the imagination. My informants were nearly driven out of science by previous experiences in classroom "cookbook" labs where the answer was already known, or could be Googled, where no new knowledge was created, and where nothing rested on the result beyond the grade. Professor John Rudek observed of the rote memorization approach taken in the lower grades: "We just beat it out of them, it's so boring and there is no inquiry." Professor Allison Kent, a neurobiologist mentor, recalled even labs at an Ivy League college as stultifying "because I hated repeating someone else's experiments." A history major in college, she found instruction in her lab courses, compared with that in her humanities courses, "dry… disconnected from your own life, and from the world, and from humanity in a lot of ways." If an unengaging lab was a regurgitation of someone else's experience, the report of that research was a regurgitation of regurgitation. "There wasn't much variation in what you could do or say; it was sort of, everybody had to do the same thing," Kent remembered of college lab reports. Minimal learning was attributed to classroom labs. In contrast, students and mentors alike characterized with enthusiasm what was going on at the Lab as "real science." "Real" science meant pursuing a question that no one had answered. The excitement was in not knowing what was going to happen. The results of real science mattered.

Mentor and undergraduate descriptions of the process of "real" science nonetheless invoked boredom as often as did their recollections of "cookbook" science. One mentor observed of a vital component of data collection in his lab, "It's not the most entertaining thing to be watching small particles move across the screen." Another mentor explained that the progress of science depends upon scientists doing repetitive physical work such as running DNA samples—"the most boring job on earth," as he put it: "There's a lot of boredom in doing research. And we also tell all the undergrads that when they first get here. We say, 'Look, there are certain tasks that you have to do, and that I have to do, every day that are just repetition, tedium' . . . . It's just things you have to do. And that, to me, is all part of it." This mentor's observation reveals that students who have difficulty doing the disciplined work of repeating tasks have, in fact, difficulty "doing" science. "Doing" science according to Rudek also demands a sense of expanded time as well as the patience to pursue repetitious tasks through the months, or even years, required to achieve publishable results. He remarked to me that few people appreciate how many years of lab work are necessary to produce any given "fact" in a textbook: "Because it seems that it is all worked out, you pick up a biochemistry textbook and they have this nice picture of a cell and here's the nucleus and here is how it all works. Gosh, you think of the thousands and thousands of person hours that went into understanding that." Rudek observed that when students first grasped the slow progress of science, the Lab would "lose people for the right reasons": "I had a student who after about a month said, 'This just isn't for me.' He said, 'I just

thought it would move a little faster.' He's now an air traffic controller at London's Heathrow airport." My informants collectively expressed that repetitious tasks, conducted over long periods of time, were essential to achieve novel results. Paradoxical though it may seem, mentors had to test student capacity for boredom to see if they could be excited by science.

Professor Rudek's REU mentee was Madeline, an African-American rising sophomore from an Ivy League university, the youngest of the REU students. Madeline was extremely disciplined and had no problem with repetitive tasks: She ran cross-country for her college's track team. When she wasn't in the lab that summer, I would often spot her on the roads miles away, running to maintain her fitness. In our first interview she told me that she found the purpose of Professor Rudek's lab—examining the effects of arsenic on human beings—inspiring. In her second interview, however, she admitted that she found the actual activity of Rudek's lab "boring": "I'm not so sure if I want to keep working in cell cultures because that gets a little monotonous and boring when you're pipetting like 96 well plates of cells all day." The *questions* that motivated the research in her lab, with their potential to improve lives, she considered worthwhile. She enjoyed the *communication* challenge of conveying results to people unfamiliar with the research. However, the *physical activity* she associated with research on her model organism, the actual activity necessary to obtain and communicate those results, she found "monotonous and boring." Her time at the REU resulted in clarifying her career path. She concluded that she did love cell culture lab work, but imagined herself working some day on a project focused on a more dynamic model organism.

REU student Carol found her summer also clarified her career path, but her vision of her future took her out of the lab altogether. Her experience at the Lab bore witness to the wisdom of Professor Lauten's commitment to ask every undergraduate who approached him for advice about graduate school: "Do you want to work outside or inside?" Carol, a rising senior from a small liberal arts school, who quickly distinguished herself among peers as being both self-directed and comfortable knee-deep in marshes, would have answered that question, "outside." Although the daughter of a college biology professor, she described herself in her first interview as "not really a lab science person" and "the odd one out" at the REU.

Carol's interest before coming to the Lab was in field ecology. In college she had completed a research project on milkweed height; in another course she had been required to observe nature and then write field notes in the style of Thoreau. Most formative, however, were her experiences outside of the traditional curriculum: month long back-packing trips in Wyoming and Alaska during high school summers; field work in East Africa through college study abroad. At the Lab, Carol travelled once or twice a week to a remote site to change the batteries of cameras poised over tree canopies, and to take leaf samples. Yet the purpose of those trips, examining the effects of climate on chlorophyll levels, required more indoor laboratory work than she had imagined. By the ninth week of the program, she knew she was not a laboratory scientist, but still considered herself a researcher: "I wouldn't want to do this kind of lab work everyday forever . . . . I realized that there are so many other types of research that aren't [at the Lab] like animal behavior and population and wildlife things." She

revealed that over the summer she had developed an alternative curriculum for herself that allowed her to learn about animal behavior while doing the "super repetitive" leaf analyses required in her lab:

> I have been listening to a ton of stuff when I'm in the lab, because a lot of the chlorophyll readings are super repetitive, just like pipette this, and grind this, and put it over there. And so I listen to a lot of like radio or podcast things—a bunch of things about people studying apes, like bonobos and chimpanzees, so that stuff has been really exciting to me.

The cases of Madeline and Carol suggest that the experience of time spent in the lab doing manual tasks over and over vitally clarified what kind of scientist they would like to be. It's hard to know if one likes pipetting "96 well plates of cells all day" until one has the opportunity to do it, and hard to know what it's like to work inside if one has only ever worked outside. From the REU's point of view, both students' experiences were successful, as they resulted in learning students would not have been able to do at their home institutions.

Yet the students learned more than about their individual affinity for science through repetitive work. Repetition of manual tasks was essential for them to learn the practice of science, itself. Significantly, my informants noted that they learned laboratory techniques by watching and repeating them over time. Writing played a very limited role in learning, for example, how to make solutions, pipette, and take measurements. When they did mention the role of writing in learning these techniques, they invoked writing as memory aid. But mostly, they invoked practice. As Carol observed: "The spectrophotometer is one of the big procedures that I do and at first I was like, how am I going to remember these things? I don't know if I should be writing it down . . . . I think with practice it gets better." Some techniques were harder than others, however, such that ten weeks of practice provided insufficient time to master them. As I discuss below, learning through repetitive "doing" over time is not simply an alternative way to learn things that could otherwise have been learned through writing. It is a different kind of learning that engages different parts of the brain altogether.

"WITH PRACTICE, IT GETS BETTER"

"I'm never bored in my lab," Stefan told me. "If I'm not doing the solution, I'm doing the pipettes. I have different tasks at the same time." Stefan, a rising junior from a mid-tier university in Puerto Rico, was assigned an REU project that was daunting in its requirements for manual dexterity. His mentor, Professor Kent, told me that the experiment she had assigned Stefan was so difficult that pulling it off without assistance was "like sailing a boat by yourself."

Stefan rose to the challenge, finding excitement in the very activities that fellow multi-tasker Carol had found onerous:

> The solutions go like [snaps his fingers]. I make 500 ml and that goes in three days of work. That solution has to be made, pH'd, and you have to check the concentration with a machine. You have to be very meticulous about the solutions because if you make a sloppy

> solution, you're going to get sloppy results. It's trying to get the least amount of sources of error; it's very important.

Stefan perceived each step in the experiment as just as important as every other step. As Stefan noted, "it's very important" that the solution be made precisely. If the task isn't done correctly each and every time it is repeated, science itself doesn't happen.

Stefan had a naturally inquisitive mind. His lack of boredom at the Lab was a stark change from life at his home institution where he was, he told me, frequently bored. Although he achieved a perfect score on his college math boards and was admitted to the premier engineering college in Puerto Rico, poor high school guidance steered him toward a less challenging college closer to home. There, he could—and did—Google the results to his labs. He had majored in biology in part to satisfy family desire (his parents were dentists, pro-medical career, and, as he put it, "anti-research"), but also to escape his growing obsession with computers: "I was so into computers, I was turning into one." By seventh grade, he knew how to program in five languages. By ninth grade he was writing and selling games. By 12th grade, he realized he had to pick a college major other than computer science because his college would have no courses to offer him: "I knew how to program perfectly. It's like knowing you have a fluent accent." He also wanted a social life, and if he continued to program, he realized, he would never go out.

Despite his professed desire to get out more, Stefan's ability to sit indoors and stare at a screen for long hours was good preparation for the chief activity that consumed his days at the Lab: patch clamping, an electrophysiological technique to isolate, observe, and record the activity of ion channels in the neuron. Patch clamping for Stefan was similar to playing video games: "You have a TV and you have controls, like joysticks." However, the technique required far greater manual dexterity. Stefan derived the know-how to do the technique from several sources. He gleaned the most from shadowing and listening to Kent: "She's like blalalalalala and I try to remember everything." He visited several labs that also used the technique to observe their set-up (the position of tables, screen, and knobs). He read a manual but didn't find it helpful, because, as he put it, "the small details are what matter the most. Like how much pressure you should do on this, how fast you should go." During a meeting of the REU group, the co-directors gave him additional tips from their accumulated years of patch clamping experience. Stefan also read a textbook on the neuron. He took a few notes. His active search for advice on technique shows that he understood that patch clamping demanded a great deal of "physical knowledge," as Hanauer might say. It was like he was trying to improve a golf swing by asking pros for tips. Based on the advice he received, he changed elements of his set-up. He showed me a photo of his new set-up and explained, "You see that platform there? That platform I lifted one-fourth of an inch, and that made a huge difference."

Stefan rarely referred to his lab notebook, in which he had inconsistently recorded his own attempts at patch clamping: "It's sloppy and very fast and weird, so my notebooks are very incomprehensible to many people." Stefan was not underperforming by not writing a lab notebook diligently and neatly. Professor Kent confessed that even as she stressed the importance of keeping

a lab notebook to record an experiment that might be the basis of a publication, she had never been a steady note-taker: "My mentors were constantly annoyed with me because I wasn't really writing as well as I should have been. And that was a problem. Even now, I'm not—I'm pretty bad, I must say, about keeping a lab notebook." Professor Lauten averred, "I'm the worst example of keeping the lab notebook in the world." In my last interview with Stefan, I discovered that his real lab notebook was not kept on paper. If writing is the legacy record-keeping tool of the scientific laboratory, Stefan, whose relationship to verbal and written language was fraught due to a learning disability, had found a modern alternative. In the middle of recounting the process of going from whole rat to hippocampal slices, he reached for his phone: "I have a video. You want to see it? I have a video of everything." [Plays video from phone.] "That's the blade that cut me."

Stefan described his main method of learning as "trial and error." According to Stefan, it helped him to watch techniques performed, and then do them himself, again and again. He emphasized the importance of his daily routine to his learning: "I go to work at 10. I get my rat, dissect the brain out and then I do the slices. Then I cut the slices with a knife and get these pieces of brain, the hippocampal slices . . . . The first time that you see it, it looks easy, but it's actually hard. At first you're slow, but after a couple of times, you get faster. It's practice." Stefan, like Carol, had maintained that with "practice," their work at the Lab got better.

But on the scale of required manual dexterity, what Stefan had to do was a few notches of difficulty above what Carol had been assigned. Stefan, arguably, spent his summer performing brain surgery. As Mike Rose has observed, surgeons learn by feel as well as sight: "The surgeon's knowledge of anatomy has to be physical. He or she will be working in tissue, moving it, tugging on it, cutting into it . . . . One thinks one's way through an operation by feel and image as much as by proposition." A surgeon's visual acuity develops through prolonged and repeated immersion in activities that, as Rose explains, discipline perception. As one resident Rose interviewed explained, "'You develop an eye for what looks good and what doesn't . . . . You get to the point where you feel comfortable looking at something and evaluating it'" (151). Stefan's description of his learning process appeared to be similar. Describing the importance of visual acuity needed to assess usable samples for patch clamping, he said: "You actually see it when you're slicing the brain. If it comes out like ham slices, that's good. But if it's a dead brain, it just crumbles apart." Stefan had fewer than 60 seconds to harvest the slices before the brain would become ischemic. If he couldn't "see" the difference between a good and bad brain slice, his experiment would fail. He needed his eyes to guide the micromanipulator. And he needed all his fingers. Working alone in Kent's lab on a Saturday, Stefan injured his finger. The gash was deep enough that he could not operate the micromanipulator and was forced to get stitches. Not wanting to miss the data he collected, he finished the experiment before going to the emergency room, but he could not collect data for the next few days while the wound healed. Even one day of not practicing was a loss to him, for both data collection, and for the refinement of this skill. Because refinement of Stefan's sense of touch took more than even the ten weeks allotted by the REU, Kent offered him an additional semester of assistantship at her home institution.[4]

LEARNING WITHOUT WRITING

The field of composition has been interested in the brain's role in writing and learning since Janet Emig argued, "Writing involves the fullest possible functioning of the brain" (125). While Emig argued that writing involves both hemispheres of the brain, we know now (truly we knew even then) that the brain is far more complex than the bi-hemispheric model Emig drew upon. A failure to acknowledge the brain's complexity, its involvement in all forms of learning, could lead to over-estimating the importance of activities that involve primarily language centers of the brain to learning in all fields, as Emig did in articulating the value of WTL.

Watching the students of the REU, I began to consider what I had learned in life without writing. I recalled learning ballet for about thirteen years, during which time I never picked up a pen—was never asked to and never wanted to. More recently I picked up tennis, again taking lessons that never involved writing. Yet my forehand has improved. I shared my thoughts with Professor Kent who explained why learning physical skills does not prompt people to want to write; she articulated the difference between forms of memory that engage language centers in the brain, and those that engage mainly procedural brain regions:

> Kent: A lot of athletic activities don't make people want to write, because that would be associated with procedural brain regions.
>
> Catherine: Is that related to muscle memory?
>
> Kent: Yes, exactly. So even though you're working on learning how to ski or play tennis or something, you don't really feel like writing it down because that maybe doesn't interact so much with language centers of the brain.
>
> Catherine: [Nodding towards Stefan, patch clamping in the lab] How much of what he's doing is that?
>
> Kent: Oh a lot. A huge amount. So he has a huge amount of procedural memory going on.
>
> Catherine: That's different from episodic, and it activates different centers of the brain?
>
> Kent: Yes.
>
> Catherine: Because writing, you know, it is physical, too . . . . That's what makes it complex.
>
> Kent: That's true. But it's a kind of physical memory that is quite simple. It wouldn't be like learning to play the piano . . . . [Writing] is so subconscious that you don't even think about it, whereas *what* you're writing, you're thinking about more.

Several kinds of memory are currently recognized in neuroscience, notably episodic, semantic, procedural, and working (Eichenbaum). Of these four kinds of memory, procedural alone involves the basal ganglia as well as the cerebellum (Budson and Price). The basal ganglia are associated with the development of learning routines and habits. With the exception of research that acknowledges the significant cognitive effort handwriting requires when it is first learned (e.g., Connelly et al.), little research on cognition and writing discusses procedural memory. Beyond the stage of acquisition of handwriting and keyboarding, the procedural memory required for writing is, as Professor

Kent argued, minimal. What Stefan was doing at the Lab, however, involved "a huge amount" of procedural memory development. He was not simply gathering data in order to learn through a subsequent process of language-engaging analysis. By patch clamping, by physically disciplining his hands and eyes, he was learning something that took at least as much cognitive effort as writing a good thesis statement.

I do not seek here to provide a complete account of learning and the brain. The understanding of neuroscience that informs my discussion here is on a level analogous to high school reading knowledge of French. As a further caveat, my informants would be the quickest to acknowledge that neuroscience is far from understanding the brain in all its complexity. Stefan was working on improving that understanding by studying long-term potentiation, or the formation of memory. Because Stefan never did complete his experiment, his poster concentrated on his efforts to troubleshoot his set-up. The conclusion of his poster acknowledged that ten weeks had not been time enough to get results: "There was not sufficient data and time to be able to draw conclusions. Nevertheless, troubleshooting the technical aspects of the experiment was important for eventual data acquisition. The experimental results will enhance knowledge of the function of BCL-xL in the brain." Even with all these caveats, however, current basic neuroscience presents questions about the centrality of writing to laboratory science. Certainly, Stefan would have learned more had he been able to complete the experiment. However, even though Stefan did not have the opportunity to interpret results that summer (and the experiment remained uncompleted more than a year later because senior scientists and post-doctoral students are still trouble-shooting the set-up), he had, in fact, learned. The case of Stefan suggests a challenge to the conception of writing as the singular consolidator of learning. Though Michael Carter suggests that "it is primarily in writing the lab report that doing becomes knowing" (388), Stefan's procedural knowledge of how to isolate a neuron would be primarily refined through practice, not through writing. This knowledge would remain with him as long as he practiced it, even if he never wrote about it.

If it is possible to learn without significant writing, is it also possible to write without significant learning? My findings suggest that possibility. At the first meeting of the REU group, the co-directors had asked each student to describe their laboratory's research, insofar as they understood it after one week. Stefan's account of his research was halting: "It's so much information . . . . Let's see, what else about BCL-xL. It has to do with calcium concentration, too . . . . I'm still like a newbie related to BCL-xL, but I hope at the end I have a better grasp." Madeline had prepared a PowerPoint to describe her lab's research; however, in presenting it, she observed that she was still swimming in language. Describing the effect of an agent she was working with, she said, "It's an inhibitor at lower dosage and an enhancer at higher dosage. Sorry, I screwed that up, it's an enhancer at lower dosage and an inhibitor at higher dosage." She admitted to the other REU students that the material was "still a lot of jargon" to her after one week. Her lab, she explained, had not yet begun the experiments because they hadn't yet received their cell lines.

By the end of the summer, however, Madeline could describe the work of her lab fluently. I asked

her in our last interview to look over the PowerPoint she presented in her first week and to tell me what she might have done differently were she to present the material in future. She found her past performance easy to critique:

> I can tell from the second slide already. I said that it alters serine hormone receptor mediated gene regulation, which is something that I had read in a paper, but I didn't really understand how it did that . . . . So now I know it's actually doing something to the function of these receptors so they can't bind properly and start transcription and that's why we'll see an enhancement or inhibition.

Although she had presented nothing factually erroneous in that first week, Madeline said of her PowerPoint, "I think that's something that I wrote that I didn't fully understand . . . . It says it alters gene regulation, but I could have gone into more detail about how. Well, now I could."

Madeline's account reveals that as she composed her PowerPoint in the first week of the summer, she was writing, but not learning significantly. The learning happened later, weeks later, after significant time working in the lab. To prepare for her first report, Madeline had talked with the post-doctoral student in her lab and read the articles he had suggested. At the time, she remembered, she didn't understand what she was reading. After weeks of lab work, however, she returned to those articles and found the experience of reading completely different. Interestingly, she described the differences in her understanding in terms of "doing"—what she had recognized in the readings that her lab had done, or could have done: "After working in the lab I can actually understand the papers. Before I could not understand these papers at all. It talks about all these methods and cell lines. It was like a different language for me. And now I recognize these things. Oh, we did this, or oh, we could have done that." Madeline not only understood the terms in the articles she had read, she could see herself, as a scientist, engaging in the activities she described. She saw the human role in the progress of science.

WRITING: A VOICE IN THE CHOIR OF LEARNING

Describing exactly how the physical tasks of the lab translated into greater understanding of the concepts, language, and implications of science is beyond the scope of this article. But Professor Rudek, Madeline's mentor, had no doubt that his mentee Madeline and her cohort would not only learn techniques at the Lab, they would also learn biology: "After ten weeks, their level of biological knowledge has jumped quantum. She'll go back to [her home institution] and when she's sitting in class now, she'll be like, 'I know that, I know that.'" Because I interviewed students at the beginning and near the end of their program, I could see in many of them the transformation of knowledge Rudek described, where not only procedures were clearer, but also the terms of scientific inquiry. Not all students left understanding the full implications of their research. Three months of even embodied laboratory work is not a career; even senior scientists are still learning. As Rose's research on surgeons suggests, however, there is a link between physical activity and conceptual learning:

"The extended writing assignments students completed—their preliminary reports, their capstone posters, and symposium presentations—promoted different forms of learning (i.e., poster design, generic conventions), rather than duplicating the learning that resulted from repeating manual tasks. In short, writing is one activity that occurs in the lab—not necessarily the key activity. It is a voice in the choir of learning, not the soloist."

"Abstractions about physiology or pathology are useless unless embodied" (151). Future research, qualitative and neurological, could explore in greater depth the link between physical activity and conceptual understanding.

Much of what I saw at the Lab should lead us to reassess what activities enhance learning in a laboratory setting, particularly the place of writing in that learning. At the Lab, writing helped structure the various activities, coordinate various participants, serve as a record of what happened, and publicize (locally) the work of each lab. What actually did happen in each lab, however, was most often a form of doing that recruited and developed literacies other than language-based ones. Furthermore, the extended writing assignments students completed—their preliminary reports, their capstone posters, and symposium presentations—promoted different forms of learning (i.e., poster design, generic conventions), rather than duplicating the learning that resulted from repeating manual tasks. In short, writing is one activity that occurs in the lab—not necessarily the key activity. It is a voice in the choir of learning, not the soloist.

Interviews with my student informants suggest that learning for them resulted from a recursive process involving a feedback loop between several kinds of activity: They ran into a problem in data collection, they checked with their post-doc or mentor, they were given some advice, some things to read, a new set-up to look at, a new way to try the experiment. They questioned each other in their REU group meetings, they gave a "chalk talk," they attended a lecture, they applied to a national undergraduate conference, they discussed abstracts, they took photos and videos, they called home to their parents to talk about what kind of scientist they wanted to be. If we group these activities under the heading of "writing," we gloss over many distinct differences in those activities that might be significant to understanding learning across a range of disciplines. Just as significantly, we might fail to maximize collaborations with our colleagues across campus in the instructional programs in which they are the greatest stakeholders.

It should not threaten the progress of writing programs in universities nor the research program of WTL if, when faced with questions from scientists about the centrality of writing to scientific practice, we consider that "they" might be right: writing instruction might not be as necessary to the development of the next generation of scientists as time spent developing physical knowledge, or manual dexterity, or visual acuity in the lab. Indeed, I argue that it would strengthen WTL to understand learning in greater complexity. Writing scholars can take from the Lab's mentors, for

example, their appreciation of individual difference in student learning. As we work toward a multi-dimensional model of intelligence, we make more room for appreciating that individuals might learn in different ways, just as they have different habits, preferences, and motivations. One student may "write to learn." Another may not, even within the same discipline. Embracing a more nuanced notion of learning, we might better account for the complex relationships between writing and thinking, student and world.[5]

NOTES

[1] All research was conducted with Institutional Review Board approval. All names are pseudonyms.

[2] The co-director's view of papers and posters as problems echoed the findings of a 1990 National Science Foundation report on REU programs: Faculty mentors interviewed by the NSF felt a summer left no time for ancillary activities, such as working on a joint paper with students (NSF, "Report").

[3] From the Frequently Asked Questions page of the Lab's REU program website: "This program is designed for students that are considering a graduate career (i.e., PhD) in the life sciences. The vast majority of the seminars, training and curriculum are geared for this type of career. Students that are committed to medical school are usually not interested in this type of program and we suggest that you consider NIH sponsored research opportunities."

[4] On the advice of his parents, who wanted Stefan to go to medical school eventually, Stefan declined Kent's invitation.

[5] I would like to acknowledge the generous colleagues who read and gave feedback on earlier versions of this manuscript: Michael Burns, Michael Carter, Anne Haas Dyson, Eileen Lagman, Ligia Mihut, Mya Poe, Vanessa Rouillon and Kate Vieira.

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The Legibility of Literacy in Composition's Great Debate: Revisiting "Romantics on Writing" and the History of Composition

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ABSTRACT

This essay revisits two proposals for the abolition of compulsory freshman English: Thomas Lounsbury's "Compulsory Composition in Colleges" in 1911 and Oscar James Campbell's "The Failure of Freshman English" in 1939. It demonstrates how the New Literacy Studies provides a generative theoretical perspective from which to make more visible the assumptions, definitions, and attitudes about literacy that perpetuate the compulsory composition debate.

KEYWORDS

the abolition debate, literacy, literacy studies, the New Literacy Studies, freshman composition, compulsory composition, first-year writing, literacy myth, literacy crisis, Thomas Lounsbury, Oscar James Campbell

> Literacy is not the only problem, nor is it the only solution.
> —Harvey J. Graff, *The Labyrinths of Literacy*

> We want to believe that every American needs to know how to read and write. The result is that no academic topic seems quite so durable a legislative—and media and popular—concern as America's apparently chronic literacy crisis: the real or imagined breakdowns in the reading and writing that we consider so central to the successful operation of our democracy. With that sort of presence always looming over Composition, anything can happen.
> —Stephen North, *The Making of Knowledge in Composition*

Although no foundational text on the debate over compulsory composition exists, Robert Connors's article, "The New Abolitionism: Toward a Historical Background" comes closest. In it he suggests that complaints about freshman composition are symptoms of more general social, ideological, and cultural trends. In addition, Connors's account records the complex and sustained history of the debate, but questions remain, especially with respect to underlying attitudes about literacy: How do scholars advocating abolition of compulsory composition characterize literacy? To what extent do definitions of literacy vary across proposals to abolish and reform freshman English? In what ways do arguments on all sides of the debate depend on notions of literacy crisis and decline? How might this debate function as a site for exploring the actual and ostensible differences that grow out of the institutional contexts of literacy among students, teachers, and administrators?

David R. Russell's characterizations of literacy and its role in the debate over composition's abolition raise similar questions. "Romantics on Writing: Liberal Culture and the Abolition of Composition Courses" is less comprehensive than Connors's examination; it focuses on only two proposals for the abolition of compulsory composition: Thomas L. Lounsbury's in 1911 and Oscar James Campbell's in 1939. In his often-cited essay, Russell analyzes the arguments that the two abolitionists "used to attack" freshman composition and explores some of their underlying assumptions, specifically those assumptions supporting the rise of liberal culture. For Russell, these assumptions are tied to what James A. Berlin describes as "Brahminical romanticism," a culture opposed to the "democratic, vocational, and scientific orientation" of universities during the period of academic specialization between 1870 and 1920 (133). It is important, according to Russell, to explore liberal culture as an underlying assumption of opposition to freshman composition because these assumptions continue "to fuel the conflicts within English studies" between what he understands to be "teachers of literature and of literacy" (132). To be fair, it should not come as a surprise that concerns about literacy remain implicit orientations for Russell's and Connors's studies. Neither author sets out to address this aspect of the "Great Debate" specifically. Connors aspires to situate complaints about compulsory composition in historical, social, and economic contexts. Russell delineates the fundamental characteristics and origins of liberal culture, connecting consequences of this movement to attacks against compulsory composition. Thus, when literacy is addressed in these studies it is done so in anecdotal and figurative terms.

For example, in speculating about connections between reformist periods and attitudes about literacy, Connors notes that during reformist periods, freshman composition is seen as the "thin red line protecting the very life of literacy" (3). Connors's propositions are compelling, but the implications of such statements remain unclear because literacy itself remains uncomplicated in Connors's inquiry. Connors and Russell do not associate varied attitudes about the uses, abuses, and functions of literacy with proposals for composition's abolition. As such, the appeal—or lure—of compulsory composition abolition and reform is exclusively linked to literary and educational movements like Romanticism, the rise of liberal culture, and the politics of English studies, rather than the overriding

influence of both English instructors' and students' abiding belief in literacy acquisition to realize the aims of higher education more generally. Furthermore, existing accounts of the "Great Debate" do not explore how different conceptualizations of literacy, specifically those understandings that exaggerate the powers of literacy, have informed attempts to reform and change freshman composition on both theoretical and practical levels.

More recently, however, David Fleming's *From Form to Meaning: Freshman Composition and the Long Sixties, 1957-1974* establishes promising links between attitudes about literacy and the history of freshman composition, especially complaints about the course's effectiveness. *From Form to Meaning* is primarily concerned with the events surrounding the remedialization of English 101 and subsequent abolition of English 102 at the University of Wisconsin-Madison in 1968. In his introduction, Fleming discusses how the general public's anxiety "about the ability of young people to write correctly and well" (4) has regularly manifested itself in the form of literacy crises. Fleming rightly connects these crises to a host of cultural and economic pressures, arguing that "anxiety about adolescent writing" is persistent (even "perpetual") and that "changes in the economy, society, and culture do appear to exacerbate that anxiety" (8). In the end, however, even though Fleming speaks to the ways that literacy crises provoke educational reforms (4) and unnecessarily burden young writers (8-9), his interest in literacy seems restricted to noting that literacy crises are ever-present. I do not dispute this fact, and I believe Fleming's study to be an invaluable resource for understanding the circumstances behind the events that occurred at the University of Wisconsin in the late 1960s. That said, I also believe an examination of latent attitudes and definitions of literacy in specific proposals for composition's abolition and reform can offer teacher-researchers even more, especially in terms of understanding why the debate over composition has persisted for so long.

> ***"It is by locating, naming, and connecting latent definitions and attitudes about literacy that inform these proposals to theories from the New Literacy Studies that we better understand why literacy remains composition's most pressing problem and solution."***

Thus, in this study, I re-read two proposals for the abolition of compulsory freshman English: Thomas Lounsbury's "Compulsory Composition in Colleges" in 1911 and Oscar James Campbell's "The Failure of Freshman English" in 1939. As I mentioned, in "Romantics on Writing," David Russell examines both Lounsbury and Campbell; he argues that Romanticism and liberal culture are the driving forces behind these studies. I take up the same studies in this article because I wish to show how the New Literacy Studies (NLS) provides a generative theoretical lens and different perspective from which to consider the compulsory composition debate. In this way, my inquiry challenges teacher-researchers who assume that the thematic commitment of literacy is "well-traveled" ground in composition studies. Although many have participated in and examined the

debate over compulsory composition—while this ground is in fact "well traveled"—as a field, because we have not acknowledged the role of the "myths" and "legacies of literacy" (Graff, *Labyrinths*) in the debate, we know little about why the ground we have traveled looks the way that it does. At stake in making assumptions, definitions, and attitudes about literacy more visible in proposals to abolish compulsory composition is finding a way out of an unproductive and cyclical debate that returns us time and time again to the same starting point: criticizing composition instructors and students for not achieving the impossible and pursuing the ostensible problem of illiteracy with mismatched pedagogical solutions. My approach in this inquiry differs from Connors's, Russell's, and Fleming's studies because it features more prominently the vague characterizations and assumptions about literacy that make critiques of compulsory composition possible. In most cases, these assumptions are based on frail and ambiguous conceptualizations of the nature of literacy. These conceptions, as I will show, often emphasize the "strong, uniform, universal, unitary, unwavering nature and impact" of literacy (Graff, "Literacy, Myth, and Legacies" 19). Furthermore, regardless of what position participants take in the debate, I argue they share much in common when it comes to confiding in conceptions, or as Graff terms them, the "continuities and contradictions" of literacy (Graff, *Legacies*). It is by locating, naming, and connecting latent definitions and attitudes about literacy that inform these proposals to theories from the New Literacy Studies that we better understand why literacy remains composition's most pressing problem *and* solution. With this in mind, I begin by reviewing principal contributors and tenets of the New Literacy Studies, a field that is most certainly familiar to English studies, but perhaps not as well traveled as it should be, especially when it comes to considering critiques of compulsory composition.

LITERACY STUDIES AND THE ABOLITION DEBATE

Little doubt exists that debates over the differences and similarities between oral and literate cultures have, in part, helped to shape scholars' attitudes about literacy in English studies more generally. At the center of this debate is Goody and Watt's "The Consequences of Literacy." In this often-cited study, the authors argue that the invention of the Greek alphabet led to specific consequences: most notably, transformations on the cognitive level that are symptomatic of a shift from mythical to logical thought. The authors also claim that this cognitive shift produced a host of other social developments, including the rise of democratic systems of government, the development of various forms of social and political organizations, and the capacity for technological progress. For Goody and Watt, cognitive capacities in oral societies are best described as lacking objectivity and relying on formulaic and associative systems of meaning making. When describing how oral societies transmit a "cultural repertoire," they write: "In the first place, it makes for a directness of relationship between symbol and referent. There can be no reference to 'dictionary definitions,' nor can words accumulate the successive layers of historically validated meanings which they acquire in a literate culture" (29). In other words, because oral cultures depend entirely on "vocal inflections and physical

gestures" to communicate, they are unable to obtain distance from words and their referents.

In this claim, we find the assumption (one of many) that supports the dichotomy that Goody and Watt construct between oral and literate cultures. Oral societies lack the cognitive capacity to gain the type of critical distance that allows for a conceptualization of the world that is represented as separate from the moment. Simply put, oral cultures are forever tied to the present. In arguing for the "general differences" between oral and literate cultures, the authors assert, "writing establishes a different kind of relationship between the word and its referent, a relationship that is more general and more abstract, and less closely connected with the particularities of person, place and time, than obtains in oral communication" (44). With this presumption, the perceived ability to represent cognition as something removed from the present—as being able to achieve more objective, critical, and analytical perspectives—becomes one of the defining qualities that distinguishes literate societies from oral ones.

One of the most instructive examples of how this debate from literacy studies informs composition comes from Mike Rose's "Narrowing the Mind and Page: Remedial Writers and Cognitive Reductionism." In this study, Rose attends specifically to the problems posed by "great divide" characterizations of literacy, as well as some of its myths and legacies. Rose's chief concerns are the "troubling consequences" (287) that stem from applying "strong" versions of literacy (like those relying on a "great divide" or "grand dichotomies") to the theory and practice of basic writing instruction. In so doing, "adolescents and adults are thought to bear cognitive resemblance to (ethnocentric notions of) primitive tribesmen in remote third-world cultures" (287). The tendency, Rose argues, is for composition instructors who subscribe to "great divide" theories to draw generalizations from exceptional cases. These generalizations lead to disturbing conclusions: basic writers lack the cognitive ability to think analytically; they lack critical distance from their own lives and are thus tied socially and philosophically to the present; they believe printed words are concrete things; they are not capable of thinking abstractly about the world they live in (287). Interestingly, and as I will demonstrate, these conclusions are similar to the critiques of freshman composition that have served as the rationales for many calls for the abolition of the first-year requirement.

In addition to attending to the orality/literacy debate, Rose's essay also delineates a recurring undercurrent that traverses both literacy studies and composition. When "strong theories" of literacy form the theoretical framework for writing pedagogy, such approaches are often symptomatic of a teaching disposition that is asking too much of literacy. In *National Literacy Campaigns and Movements: Historical and Comparative Perspectives,* Robert F. Arnove and Harvey J. Graff write: "To ask of literacy that it overcome gender discrimination, integrate a society, eliminate inequalities, and contribute to political and social stability is certainly too much" (27). In a similar fashion, Rose is cautious in his treatment of literacy, noting that he does not "mean to deny the profound effects literacy can have on society" (287). Rather, he aspires to question the extent to which "great divide" theories of literacy can evaluate and describe those effects. As Rose suggests, the most pressing danger for writing instructors teaching with simplistic conceptualizations of literacy and its consequences is the tendency to assume

that merely possessing textbooks, classrooms, technology, and a "trained" instructor is, as Graff writes, "fully sufficient for further development of an individual's literacy and subsequent education, and, of course, for the advancement of that individual" (*Literacy and Historical* 27).

Many scholars in the New Literacy Studies take issue with "great divide" characterizations on both theoretical and methodological levels. For example, Sylvia Scribner and Michael Cole's exploration of the social practices of the Vai people of Liberia, detailed in "Unpackaging Literacy," questions many of the epistemological assumptions that define "great divide" positions. The authors argue that, rather than assume universal consequences of literacy, one must investigate the specific social contexts in which literacy is used. As such, Scribner and Cole's methodological approach is significantly different from Goody and Watt's. By combining anthropological fieldwork with psychological research methods, the authors conclude that "literacy-without-schooling is associated with improved performance on certain cognitive tasks" (136) and that many of the cognitive consequences posited by Goody and Watt are symptomatic of the formal institution of schooling rather than the acquisition of literacy alone. In short, Scribner and Cole question characterizations of literacy that position it as a monolithic symptom of social and psychological change. In so doing, they confront accumulated assumptions about literacy—Harvey Graff calls these the "legacies" of literacy—that inform many of the tenets that support "great divide" characterizations of literacy.

"Relying on the accumulation of many assumptions about the aims and uses of literacy and inextricably linked with perennial complaints of the 'decline' and 'crisis' of literacy, the 'literacy myth' is a powerful and complex force."

The implications of Graff's work for the abolition debate are most clear in his discussion of the literacy myth. In *The Labyrinths of Literacy,* Graff writes that "[c]onstituting much of what I call literacy's central contradictions, these legacies taken together constitute 'the literacy myth'" (324). Relying on the accumulation of many assumptions about the aims and uses of literacy and inextricably linked with perennial complaints of the "decline" and "crisis" of literacy, the "literacy myth" is a powerful and complex force. Defined broadly, the literacy myth is the abiding belief that merely acquiring literacy guarantees economic prosperity as well as "access to and participation in mainstream institutions" (Cushman et al. 12). In *The Literacy Myth: Cultural Integration and Social Structure in the Nineteenth Century*, Graff defines it more specifically: "Primary schooling and literacy are necessary, it is so often repeated, for economic and social development, establishment and maintenance of democratic institutions, individual advancement, and so on. All this, regardless of its veracity, has come to constitute a 'literacy myth'" (xxxviii). Using a comparative and socio-historical research methodology (examining, among other things, Canadian census data from the nineteenth century), Graff demonstrates that despite institutionally sponsored efforts to legitimize the myths and legacies of literacy, societies have taken different "paths" toward achieving literacy. Furthermore,

they have done so for reasons other than improving their economic and material situations.

Much is at stake for English studies in rethinking literacy along the historical and theoretical lines posited by the New Literacy Studies, especially Graff's research on the perceived "crisis" and "decline" of literacy as well as the myths that make those perceptions possible. One way of rethinking literacy along these lines is by revisiting calls to abolish compulsory English. Doing so emphasizes the complexity and contradictory nature of the relationship of attitudes about literacy to proposals for abolishing compulsory composition. In a sense, proposals to abolish compulsory composition have been dismissed by scholars in composition because, in many cases, their arguments are perceived as merely elitist. Although this may be a valid assessment of the following studies, I hope to show how these elitist sentiments are inseparably intertwined with what the NLS terms as autonomous and strong theories of literacy. Histories by Connors and Russell overlook this aspect of these essays and represent abolitionists as resolute in their commitment to the abolition of freshman English. However, this next section works toward a new understanding of these proposals as highly ambivalent and contradictory. They are far from resolute, and the elitist sensibilities associated with them are less significant than the vague and contradictory attitudes about literacy as well as the exaggerated expectations about the consequences of possessing literacy that underlie their polemics.

THOMAS LOUNSBURY "COMPULSORY COMPOSITION IN COLLEGES"

Nineteen eleven is a significant year for English studies and the abolition debate. By the time Thomas Lounsbury made the first call for the abolition of composition in that year, first-year English as a university subject was over a century old (Bartholomae 1950). Robert Connors marks this time as a threshold moment, suggesting that by 1910 "most issues in composition methodology were decided, one way or another" (*Composition-Rhetoric* 13). James Berlin also sees this period as key, noting in *Rhetoric and Reality*: *Writing Instruction in American Colleges, 1900-1985* that although the establishment of the Modern Language Association (MLA) in 1883 secured a place for English studies in the curriculum of higher education, it was the development of the National Council of Teachers of English (NCTE) in 1911 that signaled a commitment to theorizing and researching the teaching of writing for high school students. However, in the same year that pedagogical methodologies were coalescing around the development of professional organizations and some continuity and agreement in methodology in composition, one of the first indications of disagreement and dissatisfaction emerged: *Harper's Monthly Magazine* published Thomas Lounsbury's article "Compulsory Composition in Colleges."

An Emeritus Professor of English at Yale University, Lounsbury worked in philology and linguistics and was one of the first (along with Edward A. Allen, William Mathews, and George Krapp) to question English instructors' "total acceptance of traditional rigid grammar" (Connors, *Composition-Rhetoric* 150). In *The Standard of Usage in English*, he opposes absolute conceptualizations of grammatical propriety and the writing handbooks that impose such rules on students, arguing that

"in order to have a language become fixed, it is first necessary that those who speak it should become dead" (150). Indeed, Lounsbury's work on grammar, in part, helped to infuse a "descriptive spirit" into philological and pedagogical practices during the early 1900s (150). Such a disposition places Lounsbury in the company of specialists who questioned notions of grammar prescriptivism and also sought to reform teaching practices towards an end that conceptualized linguistics and language in a way that foreshadows modern attitudes about grammar and language. This orientation makes Lounsbury's proposal for abolishing composition worthy of closer consideration.

Lounsbury begins his proposal by suggesting that the problems of freshman composition cannot be conceived fully without empathy. "There is nothing so certain," he writes, "to warp the conclusions of the pure intellect working on this subject as actual experience" (866). Unfortunately, his thesis, which appears well into the article, is little help in determining his principal objections to compulsory composition. In what appears to be an attempt to consolidate his doubts about the course, he notes,

> Still, none the less am I thoroughly convinced that altogether undue importance is attached to exercises in English composition, especially compulsory exercises; that the benefits to be derived from the general practice in schools is vastly overrated; that the criticism of themes, even when it is fully competent, is in the majority of cases of little value to the recipient; that in a large number of instances the criticism is and must ever be more or less incompetent; and that when the corrections which are made are made inefficiently and unintelligently, as is too often the case, the results reached are distinctly more harmful than helpful. (869)

Although we appear to have, here, Lounsbury's reasons for a proposal to abolish compulsory composition, this line of reasoning is, in fact, only tangentially related to the themes, evidence, claims, and rationales marshaled on behalf of his position throughout his study. That is, the scope of Lounsbury's complaints about freshman English is so broad that it is not clear if abolishing compulsory composition is actually something that he sees as a solution or the problem. His position seems inconsistent, at times, even equivocal, and his ambivalence, I believe, is indicative of only a vague understanding of the purpose and value of literacy in compulsory composition.

For instance, we may find one source of Lounsbury's ambivalence in the attitudes he expresses about the value of literacy, its relationship to rhetoric, and its role in composition instruction and institutions of learning in general. In disputing the "delusive notion" that "institutions of learning have any monopoly of training in composition," Lounsbury responds with a question: "Why do men who have never had the advantage of any school training in composition so often express themselves with clearness, directness, and force?" For Lounsbury, the tribulations and successes of Ulysses Grant hold some answers to this question. "It is not probable that General Grant ever had much practice in writing in his youth," he notes; "What little he did have, it is more than probable he did not profit by. But participation in a mighty struggle, the ceaseless pressure of arduous duties and wearing responsibilities furnished him an intellectual training which it was not in the power of the schools to impart. Hence when he came to write his autobiography, he wrote it with a simplicity and consequent effectiveness which no mere drill in English could have wrought" (875).

This passage from Lounsbury is remarkable for several reasons. First, it is perhaps one of the clearest statements of what he finds to be inadequate about freshman English, namely, the drills and other repetitive exercises aimed toward teaching students to write themes. Clearly, Lounsbury finds such assignments to be inefficient and impractical. Second, Lounsbury's anecdote introduces and bolsters a claim that runs throughout his argument: that pain and misery felt through "participation in a mighty struggle" bring about the desired attributes that formal composition instruction only aspires to provide. We see this idea crop up throughout his study, but most notably in yet another reference to a famous American figure: Abraham Lincoln. Lounsbury notes:

> It is not likely that the direct instruction in composition he ever received took up much of his time, if indeed it took up any of it. But in his profession he found imposed upon him as a condition of success the necessity of clear thinking, with its usual accompaniment of clearness of expression. But the further education which produced the matchless simplicity and majesty of the brief Gettysburg oration was the outcome of the discipline of anxious days and sleepless nights, the never-ceasing pressure of the burden of care which waited upon the long agony of the Civil War. As a matter of fact, indeed, there is nothing like misery to improve the style. (875)

Here Lounsbury presents a tendency akin to what Brian Street, Mike Rose, and others from the NLS refer to as a "strong" theory of literacy. Lounsbury's claim is that misery, pain, anguish, and struggle bring about the acquisition of particular cognitive traits and the successful demonstration of "clearness of expression." For Lounsbury, Grant and Lincoln possessed clear thinking, style, and other desirable traits because they struggled through seemingly insurmountable experiences and achieved a "condition of success" in those situations. As such, they possessed the tenacity and willingness to endure various forms of "misery," and in doing so they gained style and clarity of thought and expression. Lounsbury's assertions are reminiscent of how some basic writers are sometimes misunderstood by institutions of learning and composition instructors more specifically. That is, composition students are sometimes seen as lacking the ability to think analytically and clearly about complex philosophical relationships. Because they are unable to demonstrate successfully these traits in academic conventions or other writing assignments, they are sometimes viewed as lazy or similar to cultures lacking literacy. Such understandings misrepresent the cognitive potential and capacities of basic writers as well as non-literate cultures, perpetuating "great divide" conceptions of literacy. The presence of such thinking in this proposal to abolish English is significant because it demonstrates a notable consequence of possessing a "strong" conception of literacy or exaggerated understandings of literacy's powers.

Some might argue that Lounsbury is not talking about literacy at all. Instead, Lounsbury simply wants students to gain experience, endure hard work, and achieve clarity in thought and expression. After all, by invoking abstractions like "clearness of expression," "matchless simplicity," and "style" he is actually (and perhaps unknowingly) discussing tenets of nineteenth-century Scottish rhetoric. Lounsbury, however, is very clear about how he feels about rhetoric specifically, noting, "[i]t has

a value of its own; but it has not the kind of value which is often mistakenly claimed for it. For as grammar is nothing but the generalization of the facts of utterance, so rhetoric is nothing but the generalization of the facts of style" (875). On the one hand, the distinction between rhetoric and grammar that Lounsbury draws is clearly a move intended to anticipate rebuttals to his proposal. Given his complaints about freshman English, a reasonable response to Lounsbury would simply propose an alternative to theme-based writing pedagogy, perhaps something grounded specifically in rhetoric (and in many cases this is what happened in universities). On the other hand, when we examine his attacks on rhetoric more closely, we find that literacy and the ostensible consequences of possessing it are very much at play in his diatribe. He writes: "I call to mind a young man who before beginning his Commencement oration went carefully through the whole of Whately's treatise on rhetoric as a preparatory exercise, and was much astounded to discover, after finishing it, that he could write no better than he did before" (875).

Lounsbury's proposal is indicative of an overly simplistic conception of human cognition. This perspective, coupled with recurrent distinctions between rhetoric and grammar, oratory and writing, and the importance of pain and pleasure in the process of literacy acquisition, demonstrates a quintessential characteristic of being caught in the literacy myth: "The point is that we are in the grips of the 'literacy myth.' We do not know precisely what we mean by literacy or what we expect individuals to achieve from their instruction in and possession of literacy" (Graff, *The Literacy Myth* 323). When we examine more closely the ways that Lounsbury articulates the aims and problems of freshman English in 1911, we find inconsistent understandings and definitions of literacy as well as unrealistic consequences of possessing it. When we treat these strong conceptualizations of literacy as evidence used to argue for the abolition of compulsory composition, it becomes clear that Lounsbury does not know precisely what he expects individuals to achieve from composition instruction.

It is easy to dismiss many of Lounsbury's claims, especially since so many of his musings on freshman composition are, on the level of tone, quite cynical and ironic. However, it is precisely Lounsbury's disposition that caught the attention of Thomas Percival Beyer in 1912 when he published his response to Lounsbury in *Educational Review*. Appearing in the "Discussion" section and titling his response "Anent Compulsory Composition in Colleges," Beyer is clearly conflicted about Lounsbury's proposal. On the one hand, he finds it "the most readable essay on a technical and polemic theme that I have seen in a long while" (77). Furthermore, Beyer is "grateful to Professor Lounsbury" for putting the "classic argument against English in the most cogent way possible" (84). Yet, he objects to the central assumptions driving the essay and the position in which those assumptions put teachers of composition. It is important to examine Beyer's response to Lounsbury because even though he takes issue with most of Lounsbury's assertions, the two scholars share much in common when it comes to the assumptions they make about the powers and place of literacy in compulsory composition.

Beyer is suspicious of theme-based pedagogies, agreeing with Lounsbury that drills in compulsory composition fail in their aims of creating literary geniuses—he calls such assignments "illogical and absurd" (84). However, he questions Lounsbury's assumption that colleges of the

time "retain freshman composition in the required list because they still see the vision of Utopia populated by a nation of Carlyles, Goethes, and Tolstois" (78). He asserts that he has never "heard of a college that set out to produce a race of literary artists." On the contrary, he knows "of a few, at all events, that are striving to send out men—just men, and perhaps, a leaven of women" (78). Indeed, Beyer's statement points to divergent attitudes about the aims of freshman English as well as opposing understandings of the purposes of universities at this time. However, what he proposes as a solution to the dilemma presented by freshman English is not so different from the ambivalence and assumptions driving Lounsbury's proposal.

In the end, Beyer seems dismayed by Lounsbury's critiques and resents the implications of his article. "Since no honest man could continue to draw a salary for wasteful work," he writes, "the dilemma presents itself that I am either a knave or a fool. I am a fool if I believe in my work; I am a knave if I do not, in which case I think I am a greater fool than ever for not getting out of it" (84). Despite such feelings he concludes that "composition taught in a sensible normal way does not bore the average freshman, and does contribute to the art of living" (84). For Beyer, a "sensible" and "normal" approach to composition instruction is less systematic, opposed to the "state of extreme mental busy-ness" imposed by theme writing:

> Start with description. Teach observation a few weeks, hammer home just about three principles: fidelity to nature, selection of detail, and the value of verbs and words denoting action as well as specific instead of generic terms. Then send him out to describe the people on the street-cars, a football scrimmage, a scene in a play, the chatter of blackbirds in the wild rice, or how it feels to swim or row or race, and I defy the dullest teacher in Christendom to prevent a freshman from sitting up and taking notice. Later he can find delight in narrating some of his own thrilling experiences, or constructing a complication about a young man, his duty, and his sweetheart; and, finally, he can even be induced to tell what he thinks about "College spirit" or "Eligibility rules in athletics." (83)

Although this approach, according to Beyer, realizes one aim of freshman English—to teach students "to describe a person, a picture, a view, with a fair degree of accuracy, and even present a coherent reason for the particular faith that may be within him" (83)—this alone is not enough. What college students need "more than anything else" are "Between-Times" (86)—the "occasional half-hour of real loafing, and inviting the soul." However, according to Beyer, there are limits to this loafing. If students write nothing, "the soul that he gets glimmerings of will remain a spiritual embryo. It will never be fixed, and he will never gain confidence in it" (86). Thus, in one sense, freshman English and the requisite drills and tasks that

> ***"Their exchange highlights the ways in which ambiguous definitions of literacy and exaggerated expectations of possessing it motivate proposals both for and against compulsory composition."***

constitute the course are the problem: "With a daily theme prodding him, he can never wait for an idea, but writes drivel and grows cynical" (86). On the other hand, freshman English is the solution because without the course students remain intellectually and spiritually undeveloped.

Even though Lounsbury and Beyer are on opposite sides of the abolition debate—Lounsbury opposes the requirement and Beyer seems to desire reforming the teaching of composition—both of their arguments are sustained by an abiding belief in the power of literacy to bring about profound cognitive and spiritual transformations. Their exchange highlights the ways in which ambiguous definitions of literacy and exaggerated expectations of possessing it motivate proposals both for and against compulsory composition. Taken together, these essays are an early example of how the debate over compulsory composition involves much more than disagreements over pedagogy or the aptitude of students and instructors. From the perspective of the NLS, we may understand the attitudes about literacy that underlie these studies as linked to a tradition of characterizing literacy in a way that exaggerates its powers. This move is based on simplistic assumptions not only of human cognition but also of the role of cognition in the relationship of literacy to teaching, learning, and educational reforms.

OSCAR JAMES CAMPBELL THE FAILURE OF FRESHMAN ENGLISH

According to Connors, unlike Lounsbury's "Compulsory College Composition," which was published in *Harper's Magazine* and taken seriously enough to spark a rebuttal from Beyer in *Educational Review* in 1912, Oscar James Campbell's proposal was met only with reformist arguments and dissent. Despite such criticism, Campbell's "The Failure of Freshman English" is one of the few proposals discussed by all existing histories of the abolition debate, as well as by most respected histories of composition. In this section, I discuss aspects of Campbell's study that have been overlooked by historians of writing instruction. In particular, I show how Campbell's essay depends on what Jack Goody refers to as a "Great Dichotomy" and Ruth Finnegan calls the "Great Divide" conception of literacy. As I discussed in the first part of this article, "great divide" conceptions of literacy are indicative of a theoretical assumption about learning that inaccurately elevates those possessing literacy to positions of dominance over those that do not. By attending to the role of Campbell's attitude about literacy, we understand better how the rhetoric of abolitionism depends on generalizations that accompany the literacy myth.

Campbell is a compelling figure for historians of composition and the abolition debate because of his use of metaphor and the hostility of his rhetoric. He begins his tirade on freshman English by comparing compulsory composition to a monster, specifically a "Frankenstein" which was created by a former colleague, Barrett Wendell, and has gone awry. He chides the course for forcing "teachers of English to attempt what they know is impossible and [building] up false ideas and false hopes of the educational process which vitiates undergraduate work in almost the entire curriculum" (178). As contemporary as his assessment might sound to us, such sentiments should not be confused with

progressive understandings of literacy; in fact, more than any other proposal to abolish freshman English, Campbell's study is marked by inconsistent and contradictory conceptions of literacy. For example, Campbell asserts, "Only through the books of ages remote from his own can an individual completely emancipate himself from the provinciality of time and place" (183). Which is to say, without "works of literature" in the tradition of liberal culture, students are like primitive creatures, unable to gain the critical distance and cognitive skills to objectively understand their position in time and space. In this same vein, Campbell is convinced that literature—not compulsory composition (and the sophisticated levels of literacy that literature makes possible)—leads to extraordinary consequences. "Without some modicum of thinking," he explains, "one cannot write at all, and it is emphatically true that one cannot ever write any better than he can think" (179). To be sure, Campbell's statement is indicative of a "great divide" conception of literacy in which reductive epistemological assumptions related to the perceived consequences of being literate inform his position on compulsory composition. However, even more important to note are the ways Campbell's claims about the relationship between thinking and writing are symptomatic of a model of language acquisition and production, a model that situates literacy as an independent variable in that process. After all, Campbell is not only suggesting that freshman English students are illiterate—or "without letters" (Rose, "The Language of Exclusion" 597); in his view, they are also without minds.

However, unlike Lounsbury, Campbell's opposition to the requirement is not completely supported by strong theories of literacy that subscribe to the autonomous model. In fact, at times, Campbell seems to question specifically the pedagogical effectiveness of instruction based on autonomous conceptions of literacy. For instance, in discussing the methods employed by composition courses of the time he notes, "The existence of the course and the methods it habitually employs are based on the fallacious notion that good writing is a *Ding an Sich*, a separate independent technique. That is, that it can be engendered and grown in a kind of intellectual vacuum" (178). In a way, Campbell sees the aims of composition courses as varying from moment to moment; they cannot be defined and achieved in a vacuum or apart from other contexts. He supports this position further by drawing on an analogy intended to demonstrate the flawed thinking behind prevailing approaches to composition at the time. "If the proponents of this course have any philosophy," he writes, "it is that one learns to write sentences as one learns to play scales on the piano and for the same purpose" (178). What Campbell means by this is that it is assumed if a piano student masters particular skills in both the major and minor scales, s/he may successfully and equally apply such skills to "the successful rendition of a Beethoven sonata or of a Franz Liszt rhapsody" (178). Campbell concedes that his "music analogy is very imperfect" (178) but believes that this thinking is behind compulsory composition instruction at the time. More specifically, Campbell senses that composition instructors treat "words, phrases, and sentences" as if they are notes on a scale that correspond to a keyboard, as if language itself is "external to the process of playing anything and independent of it" (178). Although Campbell fails to offer solutions to this problem specifically, he does speculate as to why such instruction continues, and he lays blame not on composition instructors or students, but

on administrators and professors in other departments.

This assertion marks a curious shift in tone in Campbell's essay. Up to this point, Campbell's complaints about compulsory composition are not directed at any person in particular. Instead, he seems only interested in aspects of the course that support his claims regarding its ineffectiveness and inefficiency. However, when he speculates about how and why universities have allowed the situation with compulsory composition to continue so inefficiently and for so long, he explains,

> Our students, then, do not take seriously our pedagogic pretensions, but the administrators of the universities and the professors in other departments than our own most emphatically do. Presidents and deans continue to say by word of mouth, and by word of pen, that the principal business of an English department is to teach all the students in a university how to write well. Universities spend vast sums of money on that service; in fact, so much that the budget of the English department is commonly about twice as large as that of any other department in the undergraduate college. It is natural then that the administration believes that it is entitled to much more positive results than it is obtaining. We should not be surprised that it keeps insisting that the English department must discover new and better methods of doing its main job. (180)

Unlike Lounsbury's proposal, in which institutional pressures are latent and tangentially related to his argument, Campbell responds directly to pressures from the administrative order of universities. This passage highlights specifically the ways that assumptions about the purpose and powers of literacy overlap with administrative pressures. Campbell's proposal is motivated largely by exaggerated understandings of literacy's powers, and he perceives that such attitudes prevail in administrative circles as well. However, and most importantly, he objects to these attitudes if they originate from deans and university presidents. What lies at the heart of the debate over compulsory composition in Campbell's argument is not the compulsory nature of the course or its pedagogical methods. Instead, competing attitudes about literacy are actually motivating this conflict, and the confusion surrounding these definitions, attitudes, and characterizations grows out of competing visions of the purposes of universities altogether.

"What lies at the heart of the debate over compulsory composition in Campbell's argument is not the compulsory nature of the course or its pedagogical methods. Instead, competing attitudes about literacy are actually motivating this conflict, and the confusion surrounding these definitions, attitudes, and characterizations grows out of competing visions of the purposes of universities altogether."

Many scholars, like David R. Russell, would argue that Campbell's latent attitudes about literacy and the institutional contexts complicating his position are less relevant than his romantic

commitments to liberal culture. In "Romantics on Writing: Liberal Culture and the Abolition of Composition Courses," Russell contends that "arguments used to attack" (132) compulsory composition are consistent with the guiding precepts of liberal culture specifically. Although I concede that Campbell's investment in the Arnoldian ideal of the "well-rounded man" informs his position on compulsory composition, I believe that his explicit statement about and irritation with the expectations of "the administration" and "professors in other departments" hold important implications for understanding how the debate over compulsory composition is perpetuated.

Campbell shows us that the engine of this debate is yet another myth. Mike Rose calls this the "myth of transience," or the persistent belief "in the American university that if we can just do x or y, the problem will be solved—in five years, ten years, or a generation—and higher education will be able to return to its real work" ("The Language of Exclusion" 599). Rose claims the myth is a complete fiction, but a potentially useful one with significant implications. In one sense, the myth of transience provides hope, as every generation of scholars' problems are new to those who tangle with them, and when faced with problems, people must believe that a solution exists (600). On the other hand, the myth of transience—much like Graff's understanding of the literacy myth—tends to obscure history, especially those aspects of the history of higher education that are complex, dynamic in nature, and not easily defined or understood (600). Yet, despite its tendency to blind scholars to "historical reality," the myth of transience persists. "Like any golden age or utopian myth," Rose writes, "the myth of transience assures its believers that the past was better or that the future will be" (600). When considered in the context of Campbell's situation, where ongoing debates between scholars and administrators seem defined by differences over the effectiveness of composition, we find the myth of transience both obfuscating the actual problems prolonging the debate—competing definitions of literacy—and also temporarily reconciling these seemingly incompatible positions. In other words, this myth simultaneously elides attitudes about literacy *and* temporarily resolves the confusion that stems from competing visions for compulsory composition. From this perspective we may understand the Great Debate as sustained not by arguments over composition's effectiveness (nor quibbles over which pedagogical approach is the best) but by competing attitudes about the nature of literacy—characterizations and attitudes that, as I have shown in my discussion of Campbell, are made latent by confiding simultaneously in Rose's myth of transience and Graff's literacy myth.

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It should not come as a surprise, then, that like Lounsbury, Campbell never articulates specifically how he defines literacy. However, when we examine more closely what Campbell believes is ultimately at stake in the mission of universities, a more precise definition of the incentives of literacy becomes evident. "It is undoubtedly trite," he asserts, "to say that the success of a democratic state depends upon the sort of life that is lived by the individuals who compose it" (183). Furthermore, these individuals must be "self-reliant" yet "sensitive to the needs of other individuals," especially when it comes to assessing "the impact of their own personalities" on others. For Campbell, only one type of literacy possesses the power to cultivate the kind of citizens that can sustain his vision of a successful democracy. David Barton calls this "the literary view of literacy" (168). Of its powers Campbell notes, "Literature cultivates and sharpens this sensitivity by enabling the individual to share, and thus to understand, a great variety of human experiences" (183). According to Campbell, "every work of literature" is an "essential part of the living tissue of the life of every age." And only through this type of literacy or "the books of the ages remote from his own can an individual completely emancipate himself from the provinciality of time and place" (183).

Although Campbell occasionally expresses notions that question autonomous conceptions of literacy, his literary view of literacy clearly subscribes to great divide conceptions. Without great books, students remain tied to the present, unable to gain the cognitive faculties to distance themselves from the moment; according to this theory of literacy, they forever lack the interpretive skills and perspective necessary to deal with abstract ideals and philosophical problems in sophisticated ways. Thus—and despite Campbell's many complaints directed toward the shortcomings of theme-based pedagogies—the problems of compulsory composition may be boiled down to a course that is not cultivating the tastes and behaviors that literature provides. In this way, Campbell's literary view of literacy was, on the one hand, a solution to the ostensible shortcomings of compulsory composition. Yet, because this view of literacy was not translating into the type of classroom practices that would meet administrators' expectations, it was also the problem.

Other significant contradictions are apparent in this scenario. Campbell's essay also shows how incongruent great divide and literary views of literacy can be with the exaggerated, generalized, and universalized expectations of myths of literacy that often inform institutional and administrative pressures. Certainly, as my reading of Campbell demonstrates, competing and contradictory characterizations of literacy complicate efforts to evaluate the aims and effectiveness of freshman English. However, it is also important to remember that structures of authority and power relations among faculty and administrators are also at stake in the rhetoric of abolitionism. We get some sense of these pressures when we examine further Campbell's tone and his concerns about the working conditions of composition instructors.

David Russell contends that even though the "rhetorical contexts differ" between Lounsbury and Campbell, the "rhetorical strategies" of the proposals are essentially the same. According to Russell, Campbell, like Lounsbury, uses irony as a trope to rally his audience around the "cardinal principle of Romanticism" and liberal culture (135). Certainly, Campbell's article contains moments of

sarcasm. But irony and sarcasm are not the predominant traits of this proposal to abolish freshman English. On the contrary, Campbell's proposal is remarkable for another, equally compelling response: namely, his concerns over the teaching conditions for instructors of freshman English:

> But, for all that, crowds of young men and women have been lured into the teaching of English by the great numbers of positions annually open at the bottom of the heap, and there they stick, contaminating one another with their discouragement and rebellion. No wonder they are now organizing, as other proletariats the world over are organizing, to assert and foster their class interests. In almost every institution in which there is a chapter of the teacher's union, instructors in English form its central core. (181-182)

Campbell's proposal is interesting because it is a spirited polemic and occasionally sarcastic, but here, he is also speaking candidly about the challenges of composition instruction at a particular moment. In this passage, Campbell remarks on the exploitative working conditions that many composition instructors experienced leading up to this period. Campbell would have been especially attuned to such conditions and feedback because, just four years earlier, he held a position of influence during a time in which the profession was experiencing a "proliferation of debates" (Roemer et al. 380). In "Reframing the Great Debate on First-Year Writing," Marjorie Roemer, Lucille M. Schultz, and Russel K. Durst report that because of "strong divisions among college English instructors" in the 1930s, the NCTE formed a committee to issue a report on the state of college English. Campbell presided over that committee, and according to the authors, "he [Campbell] argued strongly against the first-year course in a way that is very consistent with previous abolitionist arguments" (380). This may be true, but more interesting is that Campbell specifically articulates in the report the constraints and demands of his cultural moment, and he does so in a way that never happens in his proposal to abolish freshman English. This is important to note because contemporary receptions of Campbell's abolitionist proposal cast him as a literary elitist frustrated by the way that composition attenuates the "usefulness of literary education" (Connors, "Abolition Debate" 285). And yet, a closer look at the perspective emerging in the following report indicates that Campbell's position was much more complex. In *The Teaching of College English* he notes:

Adequate mastery of the English language, however, should mean much more than the attainment of mere correctness and literate respectability. It should imply effective communication of ideas. Many cooperative enterprises essential to the existence of a sound social organization are dependent on a fairly wide diffusion of this ability, particularly among our social and political leaders. President Roosevelt's skill in explaining to the entire nation the policies and actions of the government, particularly in the banking crisis of 1933, created overnight a new attitude toward our entire economic structure. This, in turn, has contributed largely to its safety and to the revival of its orderly operation. (7)

Certainly, when we proceed beyond the introduction, we find the reductive reasoning and elitist rationales that typify criticisms of compulsory composition during this time (and perhaps even

today). However, in this passage, for a brief moment, Campbell's framing of how he understands pressures brought on by the Great Depression and other social developments give us reason to look beyond existing assessments of his role in the debate. Considering these social and economic contexts alongside the latent attitudes about literacy in his proposal to abolish composition lends perspective and provides greater understanding of the complex pressures that have helped to shape the abolition debate more generally.

For instance, let us return to Campbell's "The Failure of Freshman English," where he predicts that teachers of composition would continue to organize and protest the unfair working conditions and drudgery of freshman English as, he writes, "other proletariats the world over are organizing" (182). As problematic as his comparison is, in noting that such dissatisfaction and pressure is coming from all over the world, not simply from English departments or universities, Campbell underscores the ways in which many pro-abolitionist proposals are responding to and using to their advantage various cultural, social, and economic pressures. In Campbell's case, he seems to suggest that if composition is not abolished, the "crowds of young men and women" who have been "lured into the teaching of English" will organize and revolt with the intention of overthrowing the "Freshman English machine" (181) . . . or so he seems to hope.

It would be easy, I think, to dismiss such statements as hyperbolic—which may be one reason scholars have ignored this aspect of Campbell's study—but from the perspective of the New Literacy Studies, we may read Campbell's predictions and concerns with the material conditions of composition in a new light. Above all, Campbell's statements indicate that his position, like Lounsbury's, is significantly more complex than once thought, and as I argue, this added dimension and nuance may be traced to Campbell's latent attitudes about and characterizations of literacy specifically. In a sense, Campbell's hopes for literacy span the spectrum of "expectations of what it means to read and write, and what might follow from those practices attitudinally, cognitively, individually, and collectively" (Graff, "The Literacy Myth at Thirty" 639). Such expectations, as Graff reminds us, are intimately connected to "imprecise, yet progressively grander conceptions" (639) of what literacy means to us. For Campbell, it is precisely grand conceptions that have lured English teachers to the "Freshman English machine." "They (composition instructors) want to be raised out of the drudgery," Campbell writes, "of marking futilely conceived and futilely executed exercises in words, words, words. Their work, they realize, has no relation whatever to the subject to which, in hopeful youth, they resolved to dedicate their lives" (182). In the end, then, Campbell's position on compulsory composition is motivated by the imprecise, and to be sure, highly varied hopes of instructors, aspirations which have been dashed by the drudgery of teaching composition—hopes that remain inextricably linked with the expectations they associate with attaining literacy. Ultimately, Campbell's suggestion is to abolish compulsory composition in order to embrace the "legitimate duties and prized opportunities" (185) that accompany a curriculum devoted to "English literature" (182). More "words, words, words," indeed, but only the kind that adhere to his great divide conception of literacy. More words that demonstrate a one-to-one relationship between conception and execution. More words that support

a strong theory of literacy that situates the act of reading and writing as a solitary activity—as an independent variable in the composing process of freshman students.

MAKING LITERACY LEGIBLE IN COMPOSITION'S HISTORY

As I have shown, early critiques of composition from the likes of Thomas Lounsbury and Oscar James Campbell should be rhetorically situated with an eye toward latent characterizations of literacy specifically. Throughout this study I have taken an historical perspective, revealing how relative pressures to both abolish and maintain the requirement of freshman English are based on, among other things, exaggerated understandings of literacy's powers. Despite its historical and thematic commitments, this study does not offer history as the sole justification for discussing literacy and its role in the Great Debate over compulsory composition. Ultimately, my purpose is to make more legible persistent and tenacious assumptions about literacy in early abolitionist studies not simply for the sake of doing so, but because these assumptions and attitudes underlie all the work that we do.

"Literacy is similar to other critical terms like 'narrative,' 'communication,' and 'ethics' in the sense that it is simultaneously at home and without a home, always traversing the many fields and disciplines that attempt to pin it down, characterize it, and give it value."

That said, one reason why English scholars might shy away from explicit engagement with underlying attitudes about literacy in the history of composition is because, despite prevailing wisdom, literacy does not *belong* to English studies nor to any of its subfields. Literacy is similar to other critical terms like "narrative," "communication," and "ethics" in the sense that it is simultaneously at home and without a home, always traversing the many fields and disciplines that attempt to pin it down, characterize it, and give it value. However, what makes literacy different from these expressions is that more often than not, teacher-researchers characterize, employ, and understand literacy in terms of the perceived consequences of possessing it. Nowhere are the implications of this assumption more evident than in Stephen North's *The Making of Knowledge in Composition: Portrait of an Emerging Field*. In the conclusion of his study, North laments the consequences of unacknowledged assumptions about literacy, noting,

> We want to believe that every American needs to know how to read and write. The result is that no academic topic seems quite so durable a legislative—and media and popular—concern as America's apparently chronic literacy crisis: the real or imagined breakdowns in the reading and writing that we consider so central to the successful operation of our democracy. With that sort of presence always looming over Composition, anything can happen. (375).

What is implied in North's passage, which functions as an epigraph to my study, is that

although literacy is one of the principal ends of composition theory and application, attitudes about literacy's powers, purposes, and position in the field and society at large remain unacknowledged and misunderstood. My study demonstrates that such confusion with respect to literacy was the case when Lounsbury published his article in *Harper's Magazine* in 1911, when Campbell levied his critiques against composition in 1939, and when North published his now seminal examination of the field in 1987. Not surprisingly, little has changed, especially with respect to our understanding of the fundamental nature of literacy and its relationship to education.

As recently as June 2013, the American Academy of Arts and Sciences published a report entitled, *The Heart of the Matter*. In it they call for a recommitment to a "broad, comprehensive, and balanced" educational approach, one that they describe as "distinctly American." The authors point to several reasons for renewed interest in the liberal arts and the humanities more generally. Chief among these is "[p]arents are not reading to their children as frequently as they once did." According to the Commission on Humanities and Social Sciences, asked to compile the report on behalf of the AAAS, this fact, coupled with declining training for K-12 teachers and reduced funding for international training programs, holds "grave, long-term consequences for the nation" (Commission 9).

As my examination of Lounsbury's and Campbell's studies reveals, perennial notions of crisis and decline go hand in hand with imprecise definitions of literacy, exaggerated claims about the powers of literacy, and the tendency to invest in literacy myths. Such tendencies underlie the logic of proposed solutions in the AAAS's report as well. The commission's most prominent solution to problems facing the humanities is to "[s]upport full literacy as the foundation for all learning" (10). Despite the commission's intention to rearticulate the relevance of the humanities, the report actually invokes an ambiguously defined and empty call for "full literacy," a proposition that, in the end, seems mismatched to the problems at hand. The NLS, specifically Harvey J. Graff's work on the literacy myth, teaches us that empty calls for educational reform often function as red herrings for matters that are more deserving of our concern. The AAAS's call for "full literacy" is ostensibly effective because it resonates with the general public's desire for easy answers to educational challenges; however, it does little to attenuate or explain the disturbing consequences of shrinking state budgets, which strike more directly and effectively at the heart of the matter.

Grandiose educational reforms linked to vaguely defined terms and exaggerated expectations about literacy should remind us of why examining the history of composition from the perspective of the New Literacy Studies is so important. The debate over compulsory composition—indeed, the history of composition itself—can function as a sort of laboratory to examine, test, and explore how definitions of literacy emerge from, overlap with, and contest institutional, cultural, and economic contexts. Rereading Lounsbury's and Campbell's polemics from the perspective of the NLS not only opens up new lines of thinking about the authors' historical contexts, but it also reminds us to sharpen our understanding, attitudes, and, most importantly, the definitions of literacy that we rely on to face the challenges of composition instruction in our current moment.

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Understanding Computer Programming as a Literacy

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ABSTRACT

Since the 1960s, computer scientists and enthusiasts have paralleled computer programming to literacy, arguing it is a generalizable skill that should be more widely taught and held. Launching from that premise, this article leverages historical and social findings from literacy studies to frame computer programming as "computational literacy." I argue that programming and writing have followed similar historical trajectories as material technologies and explain how they are intertwined in contemporary composition environments. A concept of "computational literacy" helps us to better understand the social, technical and cultural dynamics of programming, but it also enriches our vision of twenty-first century composition.

KEYWORDS

literacy, computers, computer programming, history, code, multimodal composition, digital media

> We compare mass ability to read and write software with mass literacy, and predict equally pervasive changes to society. Hardware is now sufficiently fast and cheap to make mass computer education possible: the next big change will happen when most computer users have the knowledge and power to create and modify software.
> - Guido van Rossum, from a 1999 DARPA grant application to support the teaching of computer programming.

In his DARPA grant application, Guido van Rossum, the designer of the Python programming language,[1] almost certainly hoped to tap into the positive cultural associations of literacy in order to secure funding for his project. While invoking "literacy" is rhetorically opportunistic because it is a trigger for funding, says Cynthia Selfe, the comparison between programming and literacy has been echoed so frequently that it is more than just rhetorical flourish. This parallel between programming and literacy began almost as soon as programmable computers were invented. Since the 1960s, computer enthusiasts have employed the concept of "literacy" to underscore the importance, flexibility, and power of writing for and with computers. Computer scientist Alan Perlis argued in 1961 that all undergraduates should be taught programming, just as they are taught writing in first year composition courses. At Dartmouth University in the 1960s, mathematicians John Kemeny and Thomas Kurtz designed the Basic programming language for students and non-specialists. Later, Kemeny wrote: "Someday computer literacy will be a condition for employment, possibly for survival, because the computer illiterate will be cut off from most sources of information" (216).

The parallel between programming and literacy has now made its way into popular commentary: Douglas Rushkoff says that learning programming gives people "access to the control panel of civilization" (1) and Marc Prensky argues "[a]s programming becomes more important, it will leave the back room and become a key skill and attribute of our top intellectual and social classes, just as reading and writing did in the past." Code.org, a non-profit started up in 2013 and supported by Mark Zuckerberg and Bill Gates, showcases on their website a litany of quotes from educators, technologists and public figures claiming that learning to code is a issue of "civil rights," the "4th literacy," and a way to "[c]ontrol your destiny, help your family, your community, and your country."

The promotion of computer programming as a type of writing appropriate for the masses is present in many more places than I have listed here.[2] But, unfortunately, when "literacy" is connected to programming, it is often in unsophisticated ways: literacy as limited to reading and writing text; literacy divorced from social or historical context; literacy as an unmitigated form of progress. Despite these anemic uses of the concept of literacy, however, I argue that these computer specialists are on to something. What does this persistent linking of programming to writing mean for literacy specialists?

Computer programming has a lot in common with textual literacy—historical trajectory, social shaping, affordances for communication, and connections to civic discourse. In this article, I argue that the refrain of "literacy" in reference to computer programming is not only apt because of these parallels, but that our definitions of literacy must shift to accommodate this new form of digital writing. Whether or not computer programming will be a mass literacy remains to be seen. But as code and computers have become central to our daily lives, programming has certainly become a powerful mode of written communication. Literacy studies may help us to better understand the social, technical and cultural dynamics of this important composition technology.

My approach to the link between programming and literacy moves beyond these brief, comparative gestures and leverages these historical and social findings from literacy studies:

- Historically, literacy became important when text became important to governance (Clanchy) and literacy became infrastructural when everyday life depended on it (Gilmore).
- Literacy is not simply the technical processes of reading and writing but is also shaped by social factors and ideologies (Street; diSessa).
- Which kinds of literate identities are available to people can shape how they learn literacy (Heath; Purcell-Gates; Banks).

These tenets of contemporary literacy studies provide useful perspectives on the ways that computer programming has become central to our communication practices over the last 60 years, and what that might mean for 21st century writing.

I first define and review claims about "computational literacy" and outline some salient features of code, including how it became a kind of writing. I then draw on precedents in the history of literacy in order to help us consider the future of literacy as intersecting with the writing of code. Next, I provide an overview of some of the social contexts of computer programming that bear a resemblance to the social contexts of literacy. Finally, I argue that literacy educators might want to help shape the values and approaches to programming because of programming's central role in our contemporary writing environments. Values espoused in computer science, while productive in professional contexts, are too narrow for a future where programming might become a generalized rather than specialized practice—a *literacy*. Given these stakes, I contend that literacy scholars must cultivate a deeper understanding of the complex relationship between textual and computational literacy.

COMPUTATIONAL LITERACY

Arguments for what we should consider a "literacy" have proliferated over the last two decades. Beyond the literacy of reading and writing text, scholars have proposed visual literacy (Kress and van Leeuwen), design literacy (Cope and Kalantzis), quantitative literacy (Wolfe), and video game literacy (Squire), among many other kinds of "literacies." Frameworks offer to help teachers manage the demand of integrating these new literacies into composition classes (Selber; Cope and Kalantzis; DeVoss, McKee and Selfe). This raft of new literacies and pedagogical approaches suggests the power of "literacy" as a descriptive term that implies urgency, but it also gestures toward the increasing complexity of contemporary information representation and communication. Fearing a dilution of literacy's explanatory power, Anne Frances Wysocki and Johndan Johnson-Eilola warned us against using the term to describe any and all systems of skills. Consequently, I want to be cautious about overusing the term *literacy* as well as piling on yet another skill considered essential to 21st century composition. So, what exactly is literacy? And why might it be useful to stretch its conceptual apparatus to describe computer programming?

Defining "computational literacy"

I define "literacy" as a human facility with a symbolic and infrastructural technology—such as a textual writing system—that can be used for creative, communicative and rhetorical purposes. Literacy enables people to represent their ideas in texts that can travel away from immediate, interpersonal contexts (to write) and also to interpret texts produced by others (to read).

The critical difference between a *literacy* and a system of technology-dependent communicative skills—what Andrea diSessa called a "material intelligence"—is in the positioning of the technologies that those skills employ: the technologies undergirding literacies are more central to life than those for material intelligences (5). While people *benefit* from material intelligences, they *need* literacies to negotiate their world. For a material intelligence to become a literacy, then, a material component or technology must first become central, or *infrastructural*, to a society's communication practices.[3] Next, the ability to interpret or compose with that technology must become central and widespread, which critically depends on the technology's ease of use (diSessa). In the case of textual literacy, the timing of these two events varies considerably with the society under discussion. In Britain, for instance, written texts became central to society centuries before the ability to read and write them did. And in more isolated societies, the ability to interpret texts may not yet be a literacy because it is not widespread or because texts are not important.

"Extending diSessa's schema, I propose that: a determination of whether or not a system of skills is a literacy depends on its societal context. One can be skilled at leveraging specific technologies to communicate, but a literacy leverages infrastructural symbolic technologies and is necessary for everyday life. Although many material intelligences are dubbed "literacies," this definition of literacy narrows its field and allows the term to retain its potency."

Extending diSessa's schema, I propose that: *a determination of whether or not a system of skills is a literacy depends on its societal context*. One can be skilled at leveraging specific technologies to communicate, but a *literacy* leverages *infrastructural* symbolic technologies and is necessary for everyday life. Although many material intelligences are dubbed "literacies," this definition of literacy narrows its field and allows the term to retain its potency.

Like textual literacy, computer programming is also a human facility with a symbolic technology—code—that allows people to represent and interpret ideas at a distance. Throughout much of the world, code is now infrastructural. Layered over and under the technology of writing, computer code now structures much of our contemporary communications, including word processing, email, the World Wide Web, social networking, digital video production, and mobile phone technology. Our

employment, health records, and citizenship status—once recorded solely in text—are catalogued in computer code databases. But while the technology of code is now infrastructural to our society, the ability to read and write it is not yet widespread. By the definition above, then, computer programming is a *material intelligence*, not yet a *literacy*. However, as code becomes more infrastructural and as more people learn to write it, computer programming is looking more and more like a literacy. As I describe in more detail below, programming is leaving the exclusive domain of computer science and becoming more central to professions like journalism, biology, design—and, through the digital humanities, even the study of literature and history.

The way that programming is flowing out of the specialized domain of computer science and into other fields suggests that it is becoming a literacy—that is, a widely held ability to compose and interpret symbolic and communicative texts in an infrastructural medium. Computer science and education scholars have used several terms to describe the form of literacy that programming might represent, including "procedural literacy" (Bogost; Mateas), "computational literacy" (diSessa), and "computational thinking" (Wing). In the field of rhetoric and composition, the terms "source literacy" (Stolley) and "proceduracy" (Vee) have also been employed. Here, I use the term "computational literacy" because it links the theoretical apparatus of literacy with the computation that is central to computer programming; however, I depart from these scholars in several key ways.

"Procedural literacy," for Ian Bogost, "entails the ability to reconfigure concepts and rules to understand processes, not just on the computer, but in general" (245). In this definition, Bogost equates literacy more with reading than writing—the "understand[ing]" of processes rather than the representation of them. He ascribes the "authoring [of] arguments through processes" to the concept of "procedural rhetoric" (29). For Bogost, understanding the procedures of digital artifacts or recombining blocks of meaning can be procedural literacy, too—not just the learning of programming (257). I differ from Bogost in my greater interest in writing as central to literacy practices, but also in my focus on social contexts and programming itself. While I agree that digital artifacts such as games can offer a window on the processes that underwrite software, I believe this turn away from programming sidesteps the powerful social and historical dynamics of composing code.

In another discussion of "procedural literacy," computer scientist Michael Mateas focuses on new media practitioners and attends to code-writing more specifically; however, his treatment of "literacy" is brief and leaves room for more exploration. Jeannette Wing focuses on her field of computer science (CS) rather than programming per se, arguing that "computational thinking … is a fundamental skill for everyone, not just for computer scientists" (33). She explicitly relates her concept of "computational thinking" to reading, writing and arithmetic. I differ from Wing in that I think CS is but one—albeit important—guide to thinking about this new form of potential literacy. As programming moves beyond CS, we must broaden the conceptual apparatus we use to understand its functions in the world.

Education scholar Andrea diSessa's model of the social, cognitive and material "pillars" that support literacy is compatible with my definition of computational literacy. His term and concept

of "computational literacy" acknowledges the computer as the material basis of the literacy, yet also breaks with the skills-based term "computer literacy" that limited educational theory in the 1980s and 1990s. Computation is, of course, the core function of the computer. But as computation becomes more deeply embedded in digital devices, programming is diversifying beyond what we might traditionally consider a "computer." This literacy will change as computing changes, just as textual literacy has changed with the affordances of new inscription technologies. Therefore, we need a concept of programming-as-literacy that abstracts it away from its current technologies. I favor diSessa's term "computational literacy" in this discussion because it points to the underlying mechanisms of the literacy of computer programming—computation—and yet also gestures beyond any specific instrument.

Influenced by Bogost, Mateas, Wing and diSessa, I define "computational literacy" as the constellation of abilities to break a complex process down into small procedures and then express—or "write"—those procedures using the technology of code that may be "read" by a non-human entity such as a computer. In order to write code, a person must be able to express a process in terms and procedures that can be evaluated by recourse to explicit rules. In order to read code, a person must be able to translate those hyper-explicit directions into a working model of what the computer is doing. My use of the term "literacy" here is strategic; by the definition of "literacy" above, this ability is still just a "material intelligence." However, "literacy" is suggestive of the role that this ability will take in the future, it evokes the frequent parallels made between programming and writing, and it opens up access to theories of literacy.

Computational literacy builds on textual literacy because it entails textual writing and reading, but it is also quite distinct from textual literacy. In programming, one must build structures out of explicitly defined components. As Wittgenstein argued, human language works differently: not through explicit definitions, but through use and exchange. This property of language-in-use facilitates literature and human communication as we know it. But it also makes language susceptible to failure: as JL Austin reminds us, a reader or listener can have too little information or may not want to be persuaded, which renders an action in speech "infelicitous." The explicitness required in programming is a source of critique from scholars in the humanities because it forces discrete definitions (e.g., Haefner). But code's discreteness also enables one to build complex and chained procedures with the confidence that the computer will interpret them as precisely as one writes them. Code can scale up and perform the same operation millions of times in a row—a perfect perlocutionary affordance that is impossible in human language. For these reasons, computational literacy is not simply a literacy *practice*—a subset of textual literacy. It is instead a (potential) literacy on its own, with a complex relationship to textual literacy.

The evolution of programming from engineering to writing

Programming has a complex relationship with writing; it *is* writing, but its connection to the

technology of code and computers[4] also distinguishes it from textual writing. At the same time, the writing system of code distinguishes computers from other infrastructural technologies, such as cars.[5] This merging of text and technology was not always the case for computers, however; the earliest mechanical and electrical computers relied on engineering rather than writing to program them. To name one example: Harvard's Mark I, completed in 1944, was programmed by switching circuits or physically plugging wires into vacuum tubes. Each new calculation required rewiring the machine, essentially making the computer a special purpose machine for each new situation. With the development in 1945 of the "stored program concept,"[6] the computer's program could be stored in memory in the same way that it stored its data. While simple in hindsight, this design was revelatory—it moved the concept of "programming" from physical engineering to symbolic representation. Programming became the manipulation of *code*, a symbolic text that was part of a writing system. In this way, computers became technologies of writing as well as engineering.

In subsequent years, control of the computer through code has continued to trend away from the materiality of the device and towards the abstraction of the processes that control it (Graham). To illustrate: each new revision of Digital Equipment Corporation's popular PDP computer in the 1960s required a new programming language because the hardware had changed, but by the 1990s, the Java programming language's "virtual machine" offered an effectively platform-independent programming environment. Over the last 60 years, many designers of programming languages have attempted to make more writer-friendly languages that increase the semantic value of code and release writers from needing to know details about the computer's hardware. Some important changes along this path in programming language design include: the use of words rather than numbers; automatic memory management; structured program organization; code comments; and the development of programming environments to enhance the legibility of code. As the syntax of computer code has grown to resemble human language (especially English), the requirements for precise expression in programming have been changed—but not eliminated.

These language developments have led many to believe that programming will soon be obsolete—that is, once the computer can respond to natural human language, there will be no need to write code. As early as 1961, Peter Elias claimed that training in programming languages would soon cease because "undergraduates will face the console with such a natural keyboard and such a natural language that there will be little left, if anything, to the teaching of programming. [At this point, we] should hope that it would have disappeared from the curricula of all but a moderate group of specialists" (qtd. in Perlis 203). At first glance, Elias's claim appears to be supported by modern interfaces such as the iPad's. Thousands of apps, menus, and interfaces promise to deliver the power of programming to those who do not know how to write code. Collectively, they suggest that we can drag and drop our way to problem solving in software.

Elias's argument is perhaps the most persuasive against the idea that programming will become a literacy: computer interfaces and languages will evolve to be so sophisticated that very few people will need to know how to compose code. But, at least so far, that hasn't happened. While programming

> ***As a technology supporting a "material intelligence" becomes easier to master, that ability becomes more important to the workplace and more integrated into everyday life; it becomes more like a literacy.***

languages have continued to evolve since 1961, they still have a long way to go to be "natural language." Highly-readable languages such as Python, Ruby and Javascript still require logical thinking and attention to explicit expressions of procedures. Stripped-down interfaces and templates such as the iPad's can accommodate only limited design choices. They are built for the consumption rather than production of software. This means that the programmers and software designers (or the companies they work for) still call the shots.

Thus, the historical trajectory of programming language development I've outlined here suggests that the central importance of programming is unlikely to dwindle with the increasing sophistication of computer languages. In fact, if the history of literacy is any model—and in the next section I argue it is—then the development of more accessible programming languages might *increase* rather than decrease pressures on computational literacy. More sophisticated and more widely distributed writing technologies actually seem to have put more pressure on individual literacy, ratcheting up the level of skill needed for one to be considered "literate" (diSessa; Brandt). As a technology supporting a "material intelligence" becomes easier to master, that ability becomes more important to the workplace and more integrated into everyday life; it becomes more like a *literacy*. In this same way, as computers have become more accessible and languages easier to learn and use, programming appears to be moving *away* from the domain of specialists—contrary to Elias's hope.

HISTORIES OF TEXTUAL AND COMPUTATIONAL LITERACY

As Guido van Rossum suggested in his application for funding from DARPA (quoted above), we may be able to understand some of the ways that programming will function in society by turning to the history of literacy. In this section, we visit two key transitional periods in the history of literacy: the first is *when texts became infrastructural* to people's everyday lives, and the second is *when literacy began*. During the first transition, which we visit medieval England to observe, texts became central to people's lives because they aided developing institutions—government bureaucracy, written contract law and the enterprise of publishing—to scale up and accommodate population and information growth. In the second transition—the long nineteenth century in the West—institutions such as the postal service, written tax bills, public signage and mass education were built on the assumption that a majority of citizens could read and write. Below, I provide a broad-brush comparative history of these transitions to illustrate what we might learn about the trajectory of computational literacy.

When texts became infrastructural

We can see a similar historical pattern in the ways that the literacy technologies of text and code have spread throughout society: first emerging from central government initiatives, they expanded to other large institutions and businesses, and finally rippled out to restructure domestic life. Although texts had been present for ages, during the 11th-13th centuries in England, texts became commonplace in government, social organization, and commerce, enacting a gradual but profound change in the everyday life of average people. Writing evolved from an occasional tool into a highly useful and infrastructural practice for the communication and recording of information. As historian Brian Stock writes, during this time "people began to live texts" (4). This transition put a premium on skills that were once possessed only by scribes and clerks, and those who could read and write began to acquire a special status apart from other craftspeople. In a similar way, American government initiatives in computational technology prefigured the use of computers in business and education and domestic life.

For both text and code, the shift into societal infrastructure began with the central government's struggle to manage a sharp increase in information. In 11th century England, the Norman invaders to England struggled to control a vast and strange land and, consequently, the new ruler ordered a census to be taken—what became known as the "Domesday Book." Although the Domesday Book never became a comprehensive census, it required local authorities to produce written text in response to the crown's request, which encouraged and forced the adoption of text to record information in the provinces (Clanchy). In the same way that the Domesday Book attempted to catalogue the newly conquered English population, the late eighteenth century American census helped to recruit soldiers and tax citizens of the new United States. But just as memory could no longer catalogue early medieval England, human-implemented writing and mathematics reached their limit in late nineteenth century America. As the United States grew in population and the census grew in ambition, a new way of tabulating information was required. Herman Hollerith, a Census Office mechanical engineer and statistician, devised an analog, electronic computer anticipating the 1890 census information. Variations of the "Hollerith machine" were used until the 1950 census, which was the first to use a digital computer—the UNIVAC I (U.S. Census Bureau). Once again, the census was an impetus for a more sophisticated literacy technology.

After these and other centralized initiatives, both text and code made their way into other large information management projects. The ENIAC computer, created to produce firing tables for Americans in World War II, was finished too late to help the war effort; however, this research paved the way for computers to be taken up by large-scale industries and institutions such as airlines and universities in the 1950s and 1960s (Campbell-Kelly and Aspray). In a similar way, the English government prompted the adoption of writing in the provinces through new laws and policies. By the late 13th century, land laws had begun to favor written contracts over personal witnesses. To participate in this new documentary society, individuals needed to be able to sign their names or

use seals to indicate their acquiescence to the contracts (Clanchy). The spread of the texts from the central government to the provinces is echoed in the way that the programmers who cut their teeth on major government-funded software projects then circulated out into smaller industries, disseminating their knowledge of code writing further. Computer historian Martin Campbell-Kelly suggests that American central government projects were essentially training grounds for programmers and incubators for computer technology, both of which soon became central to areas such as banking, airline travel, and office work. We might be reminded of what historian Michael Clanchy calls the shift "from memory to written record"—in the 1960s and 1970s, the United States experienced a shift from written to *computational* record.

Not until the 1980s did computers became cheap enough for most people to become familiar with them. At this point, the tipping point with computers was reached, "so that people of ordinary skill would be able to use them and want to use them" (Campbell-Kelly and Aspray 231). Here we see the final stage in the spread of text and code—its expansion from centralized government and commerce into domestic life. Prior to the 11th century, when writing was only occasional and not powerfully central to business or legal transactions, the ability to read and write was a craft not so different from the ability to carve wood or make pottery; the concept of "literacy" did not exist because knowing how to read and write were specialized skills, or "material intelligences" in diSessa's terms. But as the technology of writing became infrastructural, that is, when it became central to institutions such as government and commerce, the ability to manipulate that technology could no longer be relegated to a specialized class. Laypeople living in England in the 13th century became familiar with the ways texts could record actions, could make promises, and could define their place in society (Clanchy). At this time, those who could not read text began to be recast as "illiterate" and power began to shift towards those who could.

> ***"Although code is everywhere, few—too few—can read or write it. What if those few became many? What if we're not short programmers, but instead people who can program?"***

In the same way that the technology of text began to impinge on everyday life in early medieval England, people's lives are now being circumscribed by code. To borrow Brian Stock's phrase, we have begun to "live code." Many centers of commercial and economic power are connected to code—the founders of Google, Microsoft and Facebook are just several of the people who have restructured our work and personal lives through their ability to program computers. In smaller but aggregately profound ways, our course management systems, mobile phone apps and productivity software shape the way we now teach, communicate, and even understand ourselves. Behind all of this software are programmers—people who do this work as a profession. Since the beginning of software, there have never been enough programmers to satisfy society's need for them. We are in a perpetual "software crisis," as computer historian Nathan Ensmenger notes, and as the recent Code.org promotional

video reminds us. Although code is everywhere, few—too few—can read or write it. What if those few became many? What if we're not short *programmers*, but instead *people who can program*?

When literacy began

As computers and code become more central to how we are constructed as citizens and to our communication, education, and commercial practices, computer programming is moving from a specialized to a generalized skill, or from a "material intelligence" to a literacy. We can see parallels to this moment in the ways that reading and writing became central to employment and citizenship in the nineteenth and twentieth centuries.

Beginning in the late eighteenth century United States, the ability to write and especially to read grew more common as a result of mass literacy campaigns, the rhetoric of building the new republic, vigorous economic activity, and personal motivation. The dramatic rise in literacy levels in the nineteenth century was tied to the increased importance of texts—newspapers that catalogued both local and global events, almanacs that offered advice to farmers, letters circulated by the post, and accounts that kept track of debts. Texts became a central conduit for culture and knowledge among certain groups in nineteenth century rural Vermont, for example, such that "reading became a necessity of life," according to historian William Gilmore. The ubiquity of text also affected democratic governance as printed ballots and changes in contract law put pressure on literacy (Stevens). These shifts in governance helped to justify the campaigns for mass schooling in the nineteenth-century United States (Soltow and Stevens) and rhetorically framed the work of mothers to pass literacy on to their children as citizens of the new republic (Gilmore 49). In the nineteenth and twentieth centuries the need for literacy accelerated: as literacy became common, it became more necessary and therefore became even more prevalent. Historian Lawrence Cremin commented on this period: "in an expanding literacy environment, literacy tends to create a demand for more literacy" (493).

In this same way, as computer code and the ability to write it becomes more prevalent, it is becoming an essential skill in professions outside of computer science. Clay Shirky describes this general pressure of programming on employment as "downsourcing," or the generalizing of this formerly specialized practice: "though all the attention is going to outsourcing, there's also a lot of downsourcing going on, the movement of programming from a job description to a more widely practiced skill." Although the need to *use* software has permeated almost all job description lists, trailing behind it is the need to program computers. Currently, scientists, economists, statisticians, media producers or journalists who know something about programming can streamline or enrich their research and production.

The pressure of computational literacy on the field of journalism merits a more detailed sketch because it illustrates some of the most interesting ways that writing is permeated with programming. Composition for online journalism—whether on blogs or traditional news organizations' websites—now involves the integration of visual, audio and programmatic elements. Alongside traditional

writing, we see interactive graphics and information displays on websites such as the *New York Times*, *OK Cupid* and *Five-Thirty-Eight.* These ubiquitous multimodal compositions are leading the way toward a code-based approach to conveying the news. The press industry, anxiously experiencing as well as reporting on their own state of affairs, has picked up on this shift in information conveyance from alphabetic text to code-based digital media. A writer for the Web magazine *Gawker* describes the "Rise of the Journalist Programmer:"

> Your typical professional blogger might juggle tasks requiring functional knowledge of HTML, Photoshop, video recording, video editing, video capture, podcasting, and CSS, all to complete tasks that used to be other people's problems, if they existed at all […] Coding is the logical next step down this road […] You don't have to look far to see how programming can grow naturally out of writing. (Tate)

In other words, the tasks that once belonged to other people's job descriptions have now been "downsourced" into the daily routines of today's typical journalist. The compositions *Gawker* lists differ in their technical requirements (e.g., HTML is "mark-up language," rather than a full programming language) but they all press on computational skills in some way. Responding to this shift in the profession, journalism schools have focused attention on training a new crop of journalists to be writers of code as well as text. For example, Columbia University recently announced a new Master of Science Program in Computer Science and Journalism that would integrate their traditional journalism program with computer programming (van Buskirk) and Northwestern's Medill School of Journalism has been offering scholarships to master's students with computer science or programming backgrounds for several years (Medill).

Several recent examples of computational literacy leveraged for civic applications also illustrate how it is bumping into writing, as well as into the traditional concerns of literacy educators. In "crisis camps" set up in major world cities after the 2010 earthquake in Haiti, teams of programmers used geographical data available from Google maps and NASA to write a Craigslist-style database that would match donations with needs and help locate missing persons (American Public Media). Launched in 2009, the organization Code for America uses the Teach for America model to embed programmers within local city governments to help streamline some of their specific bureaucratic processes ("About," *Code for America*). At the community level, Michele Simmons and Jeff Grabill present a case study of a citizen action group's website and database that reveal the dangers of PCBs in a local water supply, which demonstrates how community groups can struggle and succeed with code-based technology to get their messages out. Because of its centrality to civic rhetoric, Simmons and Grabill claimed this kind of programmatic database manipulation can no longer be relegated to technical disciplines: "writing at and through complex computer interfaces is a required literacy for citizenship in the twenty-first century" (441). Most of these civic activities do not require extensive skills in programming, but still draw on basic concepts of database construction and code-based computation, what might be considered basic computational literacy. This knowledge allows a writer to know when and where programming is best integrated, even if the writer does not

compose the program herself.

In these civic spaces, programming supports writing that can make a difference in the world. Perhaps for these reasons, justifications for teaching programming as a generalized skill are often pronounced along civic lines, rather than the moral and religious forces behind textual literacy campaigns in the nineteenth century. Bonnie Nardi argues that it is important for end users to know how to program "so that the many decisions a democratic society faces about the use of computers, including difficult issues of privacy, freedom of speech, and civil liberties, can be approached by ordinary citizens from a more knowledgeable standpoint" (3-4). In moments like the Congressional debates on anti-spam laws for email in the mid 1990s (Graham) and the proposed Stop Online Piracy Act (SOPA) of 2012, we saw what happens when United States public officials do not have the general knowledge Nardi argued for. In those cases, fundamental misunderstandings of computer programming obscured the terms of debate and nearly led to crippling or unenforceable laws.

In this burgeoning need for journalists, everyday citizens and public officials to know something about programming, we can see a layering of literacy technologies such as Deborah Brandt described in her ethnographic study of literacy practices in twentieth century America. Somewhat paradoxically, the increased importance of literacy accompanied an increased *complexity* of literacy. Brandt's interviewees saw their workplaces change to require more sophisticated written communication, extensive legal knowledge, and the ability to compose with computers. As new literacy technologies became more accessible and prevalent, they were folded into previously established communication practices, thereby ratcheting up the complexity of required literate practices. It appears that the increased ease of use of digital technologies has multiplied literacy again: programming is now in that complex workplace literacy mix.

COMPUTATIONAL LITERACY FROM THE PERSPECTIVE OF LITERACY STUDIES

The historical trajectory I outlined above suggests that literacy in the twenty-first century is an increasingly complex phenomenon that includes skills with both textual and computational technologies. Although apps and templates can help individuals and organizations pursue their interests in software without needing to know how to program, the specific information and communication requirements of businesses as well as governmental and social organizations are pushing software to be more customized. Consumer-focused services are often not flexible enough to accommodate local concerns, such as those that Simmons and Grabill describe. Additionally, leaving important decisions about software design up to the small (and relatively homogenous) population who can program disempowers those who only consume rather than produce software.

While Harvey Graff's historical findings indicate that the possession of literacy does not, independent of other factors, empower people or lift them out of lower incomes or social classes, *illiteracy* can be an impediment in a world where text and literacy is infrastructural to everyday life. In the same way, it appears that people who are not *computationally literate* must, in growing

numbers of cases, rely on others to help them navigate their professional, civic and personal lives. In computation as well as text, the illiterate person is "less the maker of his destiny than the literate person," as Edward Stevens observes about colonial New England (64). As more communication, social organization, government functions and commerce are being conducted through code—and as computational literacy becomes more infrastructural—the power balance is once again shifting toward those who are skilled in this new literacy technology.

This shifting power balance should alert socially attuned educators to the importance of integrating computational literacy practices into their writing and rhetoric courses. These courses are already overburdened by teaching the surfeit of literacies I mentioned at the beginning of this article. However, we can begin to think about how our writing classes might incorporate computational understanding and expression. A specific design for how this could work is beyond the scope of this article, but web design and programming in composition classes is a good start. To be clear, teaching some aspects of computational literacy in composition classes does not mean that English departments should be teaching computer science. Just as computer scientists often stress that programming is just one aspect of their discipline (Wing; Denning), we can think of computer science as an important but incomplete perspective on computational literacy. Below, I offer some perspectives on computational literacy as a social phenomenon *outside* of computer science and argue that literacy educators can provide valuable pedagogical perspectives on programming.

Social aspects of computational literacy

Emphasizing the social factors of literacy that intersect with and exceed its technological affordances, Brian Street writes: "literacy, of course, is more than just the 'technology' in which it is manifest. No one material feature serves to define literacy itself. It is a social process, in which particular socially constructed technologies are used within particular institutional frameworks for specific social purposes" (97). Street's "ideological model" synthesizes the technological and social aspects of literacy and reminds us of their complex interactions. This techno-social lens from literacy studies can help us understand the material affordances of code and computers as well as the ways that programming's social values, contexts and communities shape practices of computational literacy and the identities associated with those practices.

Because the computer is a technological object and because programming requires explicitness in a way that human communication generally does not, computer programming is often portrayed as asocial, or purely technological. As work in the history of technology has demonstrated, however, computers are social technologies in their design and deployment (Ensmenger; Campbell-Kelly and Aspray). Programming languages are written by people, and programmers write code not only for computers but also for other programmers. Although code is *often* written *primarily* for its function (as read by the computer) rather than its aesthetic value (as read by other programmers), the dual audiences for code introduce a tension in values surrounding its composition. The computer requires

precise expression, but human programmers need legibility and want aesthetically pleasing code. Emphasizing the aesthetic value of code for human audiences, the influential computer scientist Donald Knuth famously conceived of "literate programming," arguing "[l]iterature of the program genre is performable by machines, but that is not its main purpose. The computer programs that are truly beautiful, useful and profitable must be readable by people" (ix). Knuth's concept of "literate programming" is only possible because programming is done in social spaces with human audiences.

To understand some of these social influences on programming, we must disentangle them from the real and technical demands of the computer. Strictures such as how to control the program flow, how to name variables, how long functions should be, and how much code to write per line are established socially to help programmers work together, especially in very large teams, but they matter little to the computer. In other words, there are ways of organizing code that the computer understands perfectly well, but that are eschewed by certain human value systems in programming. Denigrated aspects of code are sometimes described with the affective term "code smells" (Atwood, "Code Smells"), which highlights the tension between code's human and computer audiences.[7]

We might think of the fallacy of right-or-wrong code as similar to that of literacy's mechanistic misrepresentation—that reading and writing are simply a matter of proper grammar and accurate decoding. Indeed, textual writing generally requires some adherence to standards in order to facilitate its reading. While concision, clear transitions and active verbs may constitute good style in certain contexts for writing, these values are socially shaped (Prendergast). They depend greatly on genre, audience and context, and a description of writing as *merely* adherence to standards ignores the complex social spaces in which it is produced and interpreted. Programming requires adherence to more explicit standards than textual writing, but also cannot be reduced to them or removed from its social contexts. For example, a programmer working by himself on a smallscale app need not attend to "proper" commenting, code formatting and variable naming, just as Strunk and White-defined "proper grammar" is often inappropriate for non-academic or creative contexts. In other words, value systems for code can fail when applied outside of the social contexts in which they developed.

As programming becomes more relevant to fields outside of computer science and software engineering, we can see the unfolding of this tension between the values for code written in those traditional contexts and values for code written outside of them. In the sciences, where code and algorithms have enabled researchers to process massive and complex datasets, this tension of what is "proper code" is quite marked. For example, a recent *Scientific American* story reported that code is not being released along with the rest of the methods used in scientific experiments, in part because scientists may be "embarrassed by the 'ugly' code they write for their own research" (Hsu). A discussion of the article on *Hacker News*, a popular online forum for programmers, encapsulates some of the key tensions in applying software engineering values to scientific code. As one commenter argued, the context for which code is written matters: "There's a huge difference between the disposable one-off code produced by a scientist trying to test a hypothesis, and production code produced by an engineer to serve in a commercial capacity" (jordanb, *Hacker News*). Code that might be fine for

a one-off experiment—that contains, say, some overly-long functions, duplication, or other kinds of "code smells"—might not be appropriate for commercial software that is, say, composed by a large team of programmers or maintained for decades across multiple operating systems. Although dominant values of programming may denigrate it, it could be just fine for a scientific context..

The practice of "obfuscating" code—rendering code illegible to humans while still parsable to the computer—also highlights the values that different contexts bring to bear on programming. Programmers will obfuscate code when they want to release working software but do not want people to read (and potentially copy or modify) its code. Obfuscation can also be used in playful ways, such as in the "Underhanded C Contest," where people write code that is deliberately deceptive—it appears (to humans) to perform one function, but actually (to the computer) performs another (Mateas and Montfort). Underhanded C contests have asked programmers to write code that misroutes luggage or mis-tallies votes while appearing to verify them. Another context for obfuscated code is in "weird languages," which are often meant to comment ironically on language design and implementation. Although they could technically be used to write software, these languages are intended more for play than use. For example, the aptly named Brainfuck language plays with obfuscation of code by taking away white space and using only a few symbolic characters rather than letters (Mateas and Montfort). If we think about code as written in social contexts and for other programmers, it makes sense that code can be creative, even playful, for the benefit of that human audience. Obfuscated code and weird languages suggest that the aesthetic value of programming varies with its context—just as it does for writing.

The specific forms and history of programming language technologies shape the value and uses of computational literacy, just as Street claims they do for textual literacy (96). Indeed, as Mateas and Montfort argue regarding obfuscated and weird languages, their inherent "play refutes the idea that the programmer's task is automatic, value-neutral, and disconnected from the meanings of words in the world." This connection of code to "words in the world" suggests that its attendant literacy is imbricated in the world where programmers learn and practice their craft. Put another way, computational literacy encompasses not only the technical skills of reading and writing code, but is best understood as coupled with its social contexts.

Literate identities

Because reading is an interpretive act that draws on knowledge acquired in specific social contexts, Street argues, "the acquisition of literacy is, in fact, a socialisation process rather than a technical process" (180). In Street's ideological model of literacy, someone who has acquired literacy in one context may not be functionally literate in another context because literacy cannot be extricated from its ideology. According to Shirley Brice Heath's canonical ethnographic study of literacy, who literacy-learners see using and valuing literacy can impact the way they take it up, or if they take it up. Children growing up in environments where text is absent and literacy is marginalized have few

ways to assimilate literacy into their lives, as suggested by Victoria Purcell-Gates's work with cycles of low literacy.

The impact of available identities on the development of literacy practices also appears to hold true for computational literacy. As demonstrated in the examples above about scientific and creative programming, the identities that computer science makes available for programming are too limited if it is to become computational literacy—a generalized rather than specialized skill. Problematically, historically disadvantaged groups in the domain of textual literacy are also finding themselves disadvantaged in computational literacy. For instance, in the 2011 account from the Bureau of Labor Statistics, only 20.8% of computer programmers were women.[8] Although programming was initially a female dominated field, it tipped toward male domination when it became more powerful and complex (Ensmenger), and has resisted a more general trend of increased participation rates of women evidenced in previously male-dominated fields such as law and medicine. Because programming is a potentially generalizable and powerful form of writing, who programs and who is computationally literate should be a concern of literacy educators.

Stereotypes for programmers appear to have been baked into the profession early on: Ensmenger notes that personality profiling was used in the 1960s to select for "anti-social, mathematically inclined male" programmers (79). Although it is no longer practiced explicitly, this personality profiling still influences the perception of programmers as stereotypically white, male, and socially awkward (Ensmenger). Even recent publications by professional organizations such as the ACM (Association for Computing Machinery) feature sexist images: a stylized illustration accompanying Peter Denning's 2008 article about the many facets of computer science (CS) shows five (seemingly white) males representing programming, engineering, math, etc. alongside one (seemingly white) female representing a computer *user*. High-profile sexism exhibited at tech conferences and fast-paced start-ups now appears to be compounding the problem—although countless men and women in tech have spoken out against it (Raja). The recent use of the term "brogrammer," associated with start-up culture only partially in jest, suggests a new kind of identity for programmers—as "bros," or, young, male, highly social and risk-taking fratboys (Raja). The so-called "rise of the brogrammer" suggests that programming *can* accommodate a broader set of identities, but these identities are still severely limited.

In addition to the narrow and lingering stereotypes of computer programmers, confining programming to its profession can constrain the styles and contexts of "acceptable" programming and discourage new learners. We can see this in the discussion about "ugly" scientific code above. The conflation of professional programming with the more generalized skill of programming is also evident in such recent critiques of the "learn to code" movement as Jeff Atwood's. Atwood, the co-founder of the popular online programming forum *Stack Overflow* and a prominent blogger, claimed we do not need a new crop of people who think they can code professional software —people such as New York City Mayor Bloomberg, who pledged in 2012 to participate in Codecademy's weekly learn-to-code emails: "To those who argue programming is an essential skill we should be

teaching our children, right up there with reading, writing, and arithmetic: **can you explain to me how Michael Bloomberg would be better at his day to day job of leading the largest city in the USA if he woke up one morning as a crack Java coder?"** ("Please Don't," emphasis in original)[9]. As several of Atwood's commenters pointed out, his argument presents programming as a tool only for the profession, and discounts the potential benefits of knowing aspects of programming in other professions or activities. In paradigms such as Atwood's, programming would be necessarily and problematically limited to the types of people already welcome in a professional context.

In contrast to these narrow perceptions of who should program, a concept of computational literacy teaches us that just as writing can be useful to those who are not professional writers, programming can be useful and enriching to many different groups of people. We can think about what Adam Banks calls "transformative access" to computational literacy—the access that allows people "*to both* change the interfaces of that system *and* fundamentally change the codes that determine how the system works" (45, emphasis in original). Changing the "interface" of programming might entail more widespread education of programming, perhaps even in our composition classes.

But changing "how the system works" would move beyond material access to education and into a critical examination of the ideologies embedded in that education. Programming as defined by computer science or software engineering is bound to echo the ideologies of those contexts. Peeling programming away from these ideologies reveals that the webmaster, gamemaker, tinkerer, scientist and citizen activist can also benefit from programming as a means to achieve their goals. Countless recent initiatives at colleges such as Harvey Mudd (Alvarado and Dodds), websites such as Codecademy.com and Code.org, and local organizations like Girl Develop It aim to teach programming in new contexts, as a more generalized skill than CS courses normally encourage. We might say they are all working toward "transformative access" (Banks) to programming. One major payoff of a concept of computational literacy is that it frames programming as a literacy practice with diverse applications rather than as a profession defined by a limited set of values.

CONCLUSION

Just as writing gradually worked its way into government and social infrastructures in the West, programming is moving into many of the domains previously dominated by writing. Similar patterns in these trajectories suggest that programming could eventually become the foundation of a new, computational literacy. But regardless of programming's future path, it is already a material intelligence and a powerful form of composition. Because of code's central role in governance, education, business and citizenship—because code is infrastructural—its writing practices concern literacy educators. This is the reactionary argument for paying attention to computational literacy—as Douglas

> ***"Programming is not replacing writing, but is rather interlacing with it, augmenting it."***

Rushkoff says, "program or be programmed." This is also the logic behind some of the calls to teach programming to elementary school kids: my learning the Logo programming language in the United States in the 1980s was supposed to help us beat those Russians, just as programmer training in the 1960s had successfully done.

But a concept of computational literacy offers us more than Cold War technology training strategies. It also helps us to understand the ways in which composition is changing. Programming is not replacing writing, but is rather interlacing with it, augmenting it. Programming plays a supportive role in traditional writing (including for this essay, composed on a computer with word processing software), and facilitates new forms of written communication such as tweets, texts, Facebook posts, emails and instant messages. Examples I have named above from journalism, literary work and civic applications demonstrate some of the changes this new hybrid writing technology has brought. Looking at the writing of code through a concept of computational literacy allows us to focus on the writing practices that undergird our complex, contemporary composition environments. It enables us to more critically engage with our software because it highlights the people who write it as well as the historical patterns that precede it.

Finally, understanding computer programming as computational literacy leads the way forward towards a more comprehensive and inclusive writing pedagogy. It is important to widen access to programming because of its power and diversity of applications, which means that programming cannot be relegated to the exclusive domain of computer science. It is also important to open up our concepts of writing to include programming. Together, images, sound and other modes of composition have already shifted the way we communicate and how we can express and process information. Consequently, literacy scholars have added these modes of writing to our concept of literacy, and have debated how to incorporate them in composition classrooms. But programming enables *all* forms of digital composition. We must now shift our models of literacy to account for it.[10]

NOTES

[1] Python is a popular language engineered to be broadly accessible and used often in education.

[2] For a more comprehensive list, see my annotated bibliography, available here: http://www.scribd.com/doc/96309313/Computer-Programming-and-Literacy-An-Annotated-Bibliography

[3] Here, I am drawing on Susan Leigh Star's framework, which describes infrastructure as embedded, transparent until it breaks down, has broad reach, is shaped by standards, and is difficult to change (381-2).

[4] When I write "computers," I mean the general class of machines that can perform computations, not simply mainframes, laptops, etc.

[5] Most modern cars contain computers, so, in some ways, I have artificially separated these two technologies. However, the car seems to be the most commonly invoked infrastructural technology to refute the unique importance of computers, and so it is the technology I choose to engage with here.

[6] This is sometimes referred to as "von Neumann architecture," after John von Neumann, a member of the ENIAC team at the University of Pennsylvania, and the named author of the groundbreaking "First Draft of a Report on the EDVAC." Because the origin of this design was collaborative and complicated, I do not refer to it as "von Neumann architecture" here.

[7] Another example of commonly denigrated code is the *goto* statement, famously derided and "considered harmful" by computer scientist Edsger Dijkstra because it allows programs to jump out of sequence ad hoc and therefore violates rules of clean program flow. Although few modern languages still technically support the *goto* statement's ability to circumvent formal program structure, it remains a touchstone for this clash in values.

[8] In software development and applications, 19% were women, and in web development, 38.6% were women.

[9] Atwood's invocation of Java—the language that dominates professional software contexts—is another indication of his assumptions that the "'everyone should learn programming' meme," as he calls it, is referring to professional and not casual programming contexts.

[10] I would like to thank Tim Laquintano, Kate Vieira, Deborah Brandt, Steve Carr, Don Bialostosky, Michael Bernard-Donals and the anonymous peer reviewers for helpful comments on drafts of this article.

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SYMPOSIUM

Let's Not Forget Ecological Literacy

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The contributors to the first issue of *Literacy in Composition Studies* (*LiCS*) begin to do the important work of historicizing and contextualizing literacy studies in relation to composition-rhetoric; however, missing from the inaugural issue is any explicit discussion of *ecological literacy*. By ecological literacy, I am referring to the ways in which humans understand their interconnectedness to biotic and abiotic communities. More specifically, ecological literacy means understanding material and discursive relationships, and how these relationships are created, maintained, modified, solidified, and radically changed by acts of language. That acts of language have direct impact on physical environments and can have significant consequences for life on the planet—ours as well as the multitude of other species with which we share this place—anchors my definition of ecological literacy by connecting the discursive and the material, natural world. The inauguration of this new journal offers an opportunity to reconsider the importance of ecological literacy and ecological thought, and how these concepts might bear upon the field of composition-rhetoric.

Above, I say no *explicit* discussion because there are indirect references to ecological literacy woven throughout the inaugural issue. There is an implicit *social* ecological literacy, or socioecological understanding, evident in the first issue as illustrated in the *LiCS* mission statement. The *LiCS* mission statement recognizes literacy as "a fluid and contextual term," which "can name a range of activities from fundamental knowledge about how to decode text to interpretative and communicative acts" (v). The mission statement also asserts that literacies "are linked to know-how, to insider knowledge, and literacy is often a metaphor for the ability to navigate systems, cultures, and situations," and that "[a]t its heart, literacy is linked to interpretation—to reading the social environment and engaging and remaking that environment through communication" (v). The specific mention of the "social environment" mutes the importance of a material dimension of ecological literacy, a dimension to which we must attend.

There are further indirect references to ecological literacy beyond the mission statement. Donna Qualley, for example, suggests that through "volition, will, and desire," human beings have at least some ability to navigate "the multitude of forces—political, institutional, economic, cultural, and social—that surround them" (50). For Qualley, human agents are subjected to a web of interrelated

forces—institutional, cultural, social, and economic forces that we understand as connected in an abundance of ways, and it is through will and desire, and I would add everyday rhetorical abilities and sensitivities, that human agents manage to take some control of their lives. Eli Goldblatt admittedly "can't get over [his] own penchant for seeing literacy as human behavior always nested within relationships" (54). Ecology is the science of relationships. Consider the first definition offered by German biologist Ernst Haeckel in 1870. He wrote:

> By ecology we mean the body of knowledge concerning the economy of nature—the investigation of the total relations of the animal both to its inorganic and to its organic environment including above all, its friendly and inimical relations with those animals and plants with which it comes directly or indirectly into contact—in a word, ecology is the study of all those complex interrelations referred to by Darwin as the conditions of the struggle for existence. (qtd. in McIntosh 7–8)

Both Goldblatt and Qualley recognize the ecological character of human existence, an existence based on networks and relationships of words, symbols, and material realities.

It is Robert Yagelski who most strongly invokes the ontological relationship between symbols and the material, natural world. He writes:

> Lately, prompted by the need to reconcile my embrace of Freire's transformative vision with my own growing uneasiness about the role that western literacy seems to play in the ongoing destruction of our planet […] I have come to see that in addition to its social consequences, literacy—more specifically, *writing*—also has *ontological* consequences. Indeed, the social consequences of literacy might well arise from its ontological implications. (emphases in the original, 58)

Yagelski, like Kate Vieira—to whom he is responding in his essay in the inaugural issue—is concerned with the consequences of literacy, particularly the possible ontological consequences felt in the material world. Yagelski points to the fact that Freire's pedagogy is a literacy of liberation designed to help peasants overcome political and economic oppression (56). Interestingly, in her discussion of a place-based writing pedagogy, Arlene Plevin also invokes Freire's pedagogy of liberation to prevent the oppression of the natural world, as she extends Freire's idea of being "fully human" to include "awareness, respect, and consciousness for nonhuman" (153). Both Yagelski and Plevin recognize the relationship between literacies and oppressive acts that adversely affect human agents and their ecological communities, the very communities we depend upon for wellness and survival.

Arguably, Kenneth Burke is the first in rhetorical studies to raise the idea of ecological literacy when he suggests in *Attitudes Toward History* that ecology is one science to which we will need to pay more attention in the future. Burke's ecological perspective on language has long been a topic for rhetorical scholars. Randall Roorda refers to Burke as a "critical ecologist" who employs adaptive terminologies in the study of symbol use ("KB in Green" 173). Marika Seigel points out that during the time Burke was writing *Attitudes Toward History*, the science of ecology was well established and "increasingly coming to the forefront of public consciousness and debate" (389). Burke certainly

would have been well aware of the ecological devastation that led to the Dust Bowl and the ecological conversation surrounding it (389). As the 1930s was a decade when ecology as a science was growing in scope, and when ecological communities, particularly in the Midwest, were experiencing catastrophic change, Burke would not have been a stranger to the theories and terministic screens of ecology. Despite its rise, ecology at the time Burke penned *Attitudes Toward History* was still a fairly young science, and that Burke drew from ecology to formulate his theories, as many scholars contend, is quite remarkable and marks the beginning of ecological thought in rhetorical studies.

Since Burke, the field of composition-rhetoric has developed a bit of a duality in the way it engages with ecological thought. Some scholars adopt ecological concepts in very broad ways, often wholly metaphorical. Others hold more closely to the actual goals and concerns of the discipline of ecology, i.e., the preservation, protection, and health of our physical environment. Following some half-century after Burke, Marilynn Cooper postulates an "ecology of writing" using the metaphor of a web to demonstrate the interconnectedness of writers and their environments. Margaret Syverson theorizes writing emerging from complex systems where writers engage agents and structures within social, physical, and embodied environments. Jenny Edbauer's distributed rhetorical ecologies expand beyond discrete rhetorical situations toward the fluidity of rhetorical exchanges. And for Dyehouse, Pennell, and Shamoon ecology, along with "writing environments," is a generative concept-metaphor; however, they settle finally on "environmental literacy" as a way to better understand and teach students to navigate the material and digital environments in which they write. Dyehouse, Pennell, and Shamoon connect information ecologies, which "highlight humans' interaction with technologies" and digital literacy, but, admittedly, they invoke ecology largely as metaphor, despite their interest in the materiality of literacy.

Scholars working in the subfield of environmental rhetoric draw a more direct connection to ecological degradation and have been interested in the scientific discourse of ecology for some time. For instance, Jimmie Killingsworth and Jacqueline Palmer suggest that "the environmental dilemma is a problem generated by the way people think and act in cultural units" (3) and analysis of environmental issues can identify "various discourses on the environment before they are galvanized by dichotomous political rhetoric" (10). Sharon McKenzie Stevens works with the concept of "socioecology" and defines it as "the creation of [a] dialogic space and the material practices that accompany that dialogue" (65). Stevens uses socioecology as a means for examining land-use dialogue between ranchers and environmentalists in Arizona. These scholars, along with Derek Owens, Mark Long, and Paul Lindholdt, among others, have stressed the need for an environmentally-sensitive composition, or have argued that composition studies is a prime location to begin to address the exigency of environmental degradation.

The duality in the way scholars of composition-rhetoric treat the concept of ecology has been very productive, but ecological thought devoid of a material, natural dimension is potentially problematic, and scholars and teachers need to be exceedingly cautious when using ecology metaphorically without its connection to real, natural places. Although the social and ecological are often treated as

separate, as geographer Bruce Braun points out in his meta-analysis of urban geography scholarship, they are not (642). All human activities have an ecological component to them.

Attempting to straddle this duality of ecological thought in composition-rhetoric, Dobrin and Weisser, in their formulation of ecocomposition, offer an environmentally-sensitive, "green" model of composition while also calling for ecological models of discourse so as to understand its interrelated and networked systems. Dobrin and Weisser define ecocomposition as "the study of the relationship between environments (and by that we mean natural, constructed, and even imagined places) and discourse (speaking, writing, and thinking)" (*Natural* 6). Separately, Dobrin suggests that ecocomposition "is the investigation of the total relations of discourse both to its organic and inorganic environment and to the study of all the complex interrelationships between the human activity of writing and all of the conditions of the struggle for existence" (13). For Dobrin and Weisser, humans inhabit two spheres: the biosphere, which is the physical environment and skin that sustains all life on the planet; and the semiosphere, which consists of discourse and our symbolic action that shapes our existence and allows us to make sense of our world ("Breaking" 574). For Dobrin and Weisser, the relationship between these two spheres (environment and discourse) is reciprocal and dialogic ("Breaking" 574). Dobrin and Weisser's formulation of ecocomposition, then, connects acts of textual composition with the myriad of environments human agents inhabit.

According to Dobrin and Weisser, however, the scope of ecocomposition expands beyond material environments to imagined, social, and cyber environments as well and, as theorized, not always in a manner concerned with the material, natural world. Indeed, ecocomposition, depending on how it is enacted, can treat ecological concepts in a manner consistent with Haeckel's original and still widely accepted definition of ecology, or it can treat ecology as a metaphor with no real connection to the natural world, again creating a duality in the way ecology is enacted. Ecocomposition is a generative concept and can result in critical practice; however, its broad treatment and bifurcated nature can remove it from the ecological exigence currently affecting all levels of the biosphere, micro and macro. As a result, the focus on the human habitation of the biosphere is lost, as is the connection between the semiosphere and the biosphere originally suggested by Dobrin and Weisser. Ecocomposition is and will remain an important and productive concept in composition-rhetoric; however, ecological literacy is, perhaps, a more powerful tool for framing issues of ecological and environmental concern. Ecological literacy can also serve as the foundation for literate acts that seek to address the human relationship to the natural world and allow for a deep and critical understanding of the relationship between the two spheres.

Dobrin and Weisser credit Randall Roorda and his 1998 Conference on College Composition and Communication (CCCC) panel presentation for first using the term *ecocomposition* and, perhaps more importantly, for calling for the move toward ecological literacy. This move from "literature to literacy" gets its fullest treatment in Roorda's *Dramas of Solitude: Narratives of Retreat in American Nature Writing*, where questions of literacy and literacy studies are woven through the entire text. Roorda studies key narratives of retreat—including those of Muir, Thoreau, Van Dyke, and Berry—

but moves beyond representations of nature or ecocritical analysis. Roorda asks questions concerning the ethical implications of these texts, what purpose they serve, how writers form identities around places, and how places are socially constructed. In Christopher Keller's formulation, Roorda also raises important questions concerning "how writing, or composing, differs in solitude and society" and "how rhetoric and composition as a discipline might be restructured by new examinations, definitions, and uses of these texts" (Keller 511). A key feature of Roorda's *Dramas of Solitude* is his desire to put these narratives of retreat into the service of developing students' ecological literacy. As he turns in the last chapter to student writing, Roorda writes:

> I want to raise issues relevant to my thesis in the realm of general education, where knowledge and attitudes transcending specialization are presumably formed. A key issue concerns the significance of generically constituted personal experience of nature for writing and literature instruction, environmental education, and the cultivation of an "ecological literacy" that would comprehend both. (206)

Hence, Roorda's ecological literacy would connect the discursive sphere of writing and literature with our environment, our biosphere. Roorda also sees the potential for ecological literacy to serve as a bridge between orality and writing, one of the "foundational dichotomies" with which, according to Graff, literacy studies still struggles (16).

Roorda's ecological literacy also includes what he calls "participatory reading," which is as much about the intent of the use of the text by the author as it is about the way the text is consumed. A participatory reading can be anticipated by an author (Roorda uses Henry David Thoreau's *Katahdin* as an example) and is written for those who may "engage in or contemplate such a trip […] for the purpose of emulating, comparing notes with, vicariously participating in the journey narrated" (32). Such a text, according to Roorda, may well find its way into the backpack of a traveler and serve as a companion on the trip. Such a text reorients a reader and "presumes their ability to replicate the experience upon some terms or others, and many of the book's readers are out to do just that" (32). A participatory reading connects writer, reader, text, and the material world, often through direct experience, and can make connections between the types of texts students consume and the types of texts they produce (Keller 516).

It is important to note that Roorda's notion of ecological literacy progresses from David Orr's definition of the concept. Orr champions an ecological literacy that directly addresses the exigency of environmental degradation, and his work in the area of environmental studies has influenced several disciplines, including composition-rhetoric. Orr's definition of ecological literacy is not necessarily rooted in theories of language, but rather an understanding of Earth's systems, and a sense of wonder that comes from direct experience with the natural world. Still, Orr hints at important characteristics of ecological literacy that smack of the type of literacies that are often associated with composition studies, such as the ability and desire to read critically and understand how the "domination of nature found in the writings of Bacon, Descartes, and Galileo" or as portrayed in *Frankenstein* or *Moby Dick* has helped construct a culture that is indifferent to environmental destruction (93). Orr, however,

is concerned with the overhaul of the entire education system, including liberal arts education, and does not address the deeper socially-constructed relationship between humans and their ecological communities, a relationship based in symbolic action that Roorda and others address. Importantly, then, Roorda extends Orr's definition of ecological literacy by getting to its roots in acts of language, thus adding an important and neglected aspect of such literacy.

As I hope I have demonstrated, ecological literacy has long been a part of composition-rhetoric, albeit peripherally, and holds considerable promise as a critical practice for the field. What we must do now as teachers and scholars is focus on the impact our literacy practices have on our ecological communities and the consequences of ignoring such impact. As James Berlin suggests, "Ways of living and dying are finally negotiated through discourse" (89). Dobrin and Weisser argue that "one of ecocomposition's very reasons for being is to inquire into ways to bring about political, social, and/or environmental change—both practical, theoretical, and epistemological" (*Natural* 86). If literacy and composition studies are connected, as the very existence of this journal suggests, so too are ecocomposition and ecological literacy, and this relationship must be more fully explored and developed. If humans use language to construct cultures and societies, to create and affect places, to navigate the world around them, and to affect this materiality and all the dimensions of the non-human world, then ecological literacy is essential. If Vieira finds compelling the question, "What are the consequences of literacy?" and determines that "Composition Studies is an ideal disciplinary space from which to approach it," so too might ecological consequences be recognized through ecological literacy (26).

To have an ecologically literate populace is to have a populace that understands the way language is networked across dimensions of human activity, and also the way these networks of language affect the ecological communities to which we belong. The consequences are real: increased storm activity; the loss of biodiversity; poisons in our food, water, and air. As Vieira suggests, "Literacy can index race, culture, age, gender, class, capitalism, identity; it leeches the meanings that organize our lives" (26). All of these constructions have an ecological dimension. We must remember we only know the natural world through language, and all places are part natural. Human beings can no more step outside their ecological communities than they can their structures of language.

As the field considers the complexity and, I hope, the necessity of ecological literacy, the following questions may help guide us: How might ecological literacy connect with larger social issues, such as race, poverty, and class struggle? How might ecological literacy be informed by bioregionalism? How might local discourses affect local ecologies? How can ecological literacy help us move from anthropocentric to biocentric to ecocentric and finally to socially and environmentally just societies? By pursuing these questions and others, ecological literacy becomes a potential tool against structures of oppression and is put into the service of creating healthy, just, and democratic communities. After all, injustice often has a neglected ecological dimension. Ecological literacy will enable ecological thinking, which will in turn enable the ability to see networks—networks of discourse, networks of power, networks of oppression, and networks of degradation.

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Digital Literacies and Composition Studies

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In "Moving Beyond Place in Discussions of Literacy," Jennifer Trainor extends Bruce Horner's and Kathryn Flannery's discussions of the dichotomy between academic or school-based writing and everyday writing. While this dichotomy may have been productive for the field, it also may have created a fetishization of the everyday, leading to unproductive curricular happenings. In this sense, Trainor reiterates, the everyday or non-school composing is reified as more authentic and more representative of literacy in the lived experiences of our students. To combat this dichotomy, Trainor has "designed many a curricular intervention aimed at bringing the seeming energy and authenticity of my students' non-school writing to the classroom." As an example, Trainor introduces a classroom-based blog activity in which her students were given "freedom to determine the topic, the genre, the design, and the voice of their blogs." These interventions, such as the blog activity, seek to focus on the purpose and temporality of literacy practices rather than the place of composing. An activity involving the creation of a blog would seem an ideal way to bridge the academic/non-academic dichotomy. Yet, Trainor offers a sample blog from a student relating to "the importance of courtly, gentlemanly values" that failed to appease both Trainor and the student-writer's classmates. The blog was criticized for mimicking a men's magazine and for not addressing gender issues. Ultimately, by resorting to a compare/contrast essay form for two posts, following peer feedback, the writer was better able to harness the "tools of the academy" for successful writing.

In Trainor's depiction of her approach to and impetus for introducing the blog project, she shares her surprise and disappointment over the blog's lack of immediate impact on her students' work. But, the introduction of digital technologies, whether blogs, wikis, or iPads, used in any stage of the composing process, will not in and of itself make an impact. Digital and multimedia composing present a seemingly ideal opportunity to bridge the dichotomy of everyday and academic literacies. Like Horner, Flannery, and Trainor, I also seek a bridge through this divide by focusing on the purpose and time rather than place of composing. But, we cannot assume that technology, and digital composing spaces and tools, bridge that divide on their own. These tools, when used acontextually, will not in themselves bridge any divides and may ultimately lead to disappointment. We cannot expect to add digital technologies to our curricula or our classrooms and see improved, or even different, outcomes.

As many scholars have agreed, networked composing is empowering, exciting, and complicated. Yet, most of the composing tools and spaces that allow for and extend digital literacies require a writer's awareness of the rhetorical situation, or, in Stuart Selber's terms, rely on an awareness of the functional, critical, and rhetorical aspects of literacy. As someone who teaches regularly with and through digital composing environments and tools, including blogs, wikis, and social media, I can attest that tools alone will not bridge our dichotomy. In other words, there is nothing inherent in blogs that makes them more rhetorical than a five-paragraph essay. Tools alone will not shed light on the permeation happening between students' everyday and school literacies. Rather, as teachers and researchers of digital literacies, including school and non-school literacies, we must investigate how place, time, and purpose affect our students and curriculum. Asking students to create blogs, especially blogs with no predetermined context or purpose, leads to voice-less, inactive, and misdirected writing. In addition, this type of prompt fails to offer students a complete understanding of blogs vis-à-vis blogs, as well as blogs vis-à-vis other options. Successful blogs, like other successful media, show an attention to all aspects of the rhetorical situation. Why should we expect students to create successful blogs if we do not ask them to first consider that context? I wonder whether the student blogging on "gentlemanly values" had paid enough attention to rhetorical considerations before posting? Had the openness of the writing situation affected his blog's creation and reception? And, would a blog even be the appropriate for format for delivering such information?

This response serves as much as a reflection on Trainor and her approach to using blogs as a reminder to myself. As a regular teacher of a course titled "writing in electronic environments," I, along with other course instructors, am constantly reflecting on our goals in the course and how we utilize technology without making the course tool-driven. Rather than walking students through different technologies, we walk them through various composing situations that ask for, and push at, different digital literacies (for more on this course see Dyehouse, Pennell, and Shamoon). As we regularly remind ourselves, technologies and tools will come and go; cutting edge composing technologies today may be gone tomorrow. Yet, an attention to the rhetorical situation, to the functional, critical, and rhetorical literacies of composing with technology will not only sustain students, but will also bridge the academic/non-academic dichotomy. Just as we hope to avoid the fetishization of the everyday, we might also be wary of our tendency to fetishize the digital as we continue teaching and investigating literacy in all places.

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Literacies In/For Action: Prefigurative Pedagogies and Collective Knowledge Projects

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My copy of the first issue of *Literacy in Composition Studies* is thoroughly marked up. It engages issues, questions, and even anxieties I have carried with me over my roughly twenty years as a teacher and literacy researcher. In an effort to continue the conversation I am going to take up two themes that thread through many of the initial articles and their responses. The first theme regards the conceptual tropes we use to describe our work. The second relates to transformative potential and, equally as important, limitations of scholarship that is directed to providing access and opportunity to historically disenfranchised students and communities. This interest in equity is something I believe many share across the areas of Literacy Education and Composition and Rhetoric.

In his opening essay, Bruce Horner argues for a shift from spatial to temporal metaphors in the conceptualization of literacies. Spatial metaphors risk essentializing literacy practices—exoticizing or romanticizing them—and even reproducing the very autonomous ideologies the field has worked so hard to deconstruct. A methodological focus on temporality may help researchers work through some of these contradictions (Horner 4-5). In a similar vein, many of the subsequent authors invoke the terms "purpose," "labor," "intentionality," "process," "circulation," "work," and "movement," a historicizing direction that I for the most part endorse, and which seems to be in line with the empirical realities of global migrations and transnationalism. My qualification is because phrases like "emergent dynamism" shade into the discourse of neoliberal incursions into education, which valorize innovation, as there will always be new literacies, and literate identities, to market. A renewed emphasis on temporality may also exist in tension with another acknowledgement made by several of the contributors: that there is often, following Pierre Bourdieu, significant social inertia and reproduction in the field of education, even as we work within and against the system to try to expand what constitutes academic knowledge and practice. This tension can induce some self-reflection and soul searching for scholars who try to balance an analytical disposition, the pressures to generate new terms and ideas for the academic market, and the desire to make a difference in students' lives.

My own contribution engages these themes from the vantage point of having taught and conducted research with elementary school students and their families in predominantly under-

resourced but robustly diverse contexts of learning. I briefly sketch two examples of what might be thought of as literacies in/for action, one from my dissertation work as a fifth-grade teacher researcher and another from my current project at a multilingual and multiethnic faith-based organization. My interpretation of these examples is informed by much of the work cited thus far in the conversation, but also by two other intellectual traditions which sponsored my own development as a literacy scholar: the practitioner research movement (e.g. Cochran-Smith and Lytle) and realist theories of experience and identity (e.g. Alcoff; Mohanty; Moya). Both traditions, in their own ways and disciplinary contexts, share a commitment to democratizing knowledge, raising questions about who is positioned as knowing in teaching and research and "taking seriously" (Mohanty 230) the epistemic privilege of subordinated social locations. These theoretical and methodological orientations inform how I navigate the themes and contradictions described in the opening issue of *Literacy in Composition Studies.*

As a teacher researcher in California, I worked in a neighborhood that spatially had remained one of the most economically segregated in the state, yet from a temporal standpoint, was dynamic in the language and literacy practices of its youth. This dynamism was reflected in a performance arts and literacy group my fifth graders called Dancing Across Borders (DAB), formed under the guidance of Angelica, a talented instructor who was part of a program for college students from migrant backgrounds who were interested in becoming teachers (Campano 90-103). The troupe recited spoken-word poetry, danced, shared their essays, and scripted and produced plays, including one about the braided history of Filipino and Mexican farmworkers in California's Central Valley. They even took their work on tour, performing for community-based organizations, local colleges, and a Stanford University course on Chicana Literature and Cultural Criticism. At one point I was invited to conduct a professional development workshop on classroom "management" for our district, and I recruited the DAB troupe to help. They decided to write about times of miscommunication between teachers and students, which evolved into a performance art piece entitled "What the Teacher Didn't Know," a fictional account informed by their own experiences and observations. The performance staged a bustling but tense classroom and a series of power struggles between the teacher, Mr. Sid, whom the children told me was modeled after Dickens's Mr. M'Choakumchild, and individual students. After each conflict, all the actors would freeze, and then the character reprimanded by Mr. Sid recited a soliloquy—a device the class embraced from our studies of Shakespeare—about "what the teacher didn't know." The performance was both humorous and poignant, as each soliloquy raised to critical consciousness inequities related to class, culture, and language difference that often lurk beneath the surface of classroom "management" struggles. In an act of empathy and generosity, the DAB troupe reserved the final soliloquy for Mr. Sid himself who, a one-dimensional villain throughout most of the performance, became humanized as he recounted the challenges of being a teacher in a severely under-resourced school district.

The writings of the Dancing Across Borders troupe exemplified many of the characteristics of the academic "essayist" tradition, meeting and surpassing any codified fifth-grade standard. The

plays may also be considered hybrid texts, written in several languages, including English, Spanish and Illocano, various literary, comic, and conversational registers and, resonant with the current valorization of multiple modalities, dramatically conveyed through gesture and voice. A New Literacy Studies methodological lens (e.g., Barton and Hamilton; Street) also helped me understand the practices of Angelica and my students contextually beyond the fact that their texts and performances were multilingual and genre b(l)ending. The creative labor of DAB enacted alternative ways of knowing and being, a phrase that calls for specification. Following Allan Luke's caveat on the need to challenge the assumption "that there are generalizable and universal ways of teaching writing" (71), what I found pedagogically interesting about DAB was how their composing processes transgressed the ideology of individual authorship that underpins so much of schooling and the high-stakes testing paradigm in the United States.

It was only after some time spent with Angelica and the students that I realized their creative labor was informed by El Teatro Campesino, an activist and artistic legacy that grew out of the local intellectual soil of the migrant labor camps in the area. Similar to El Teatro, the plays of DAB were collectively produced living texts that were revised and improvised in the process of performance, sometimes in response to audience feedback (Broyles-González). Often there was no single author to their plays; all the students would contribute to the collaborative process of authoring in unique and, ideally, complementary ways. Many children who were positioned as struggling in the mandated, standardized literacy curriculum of the school blossomed in DAB, which cultivated an ethos of interdependence rather than competition and the individuation of learners as conforming to or deviating from a norm.

In "What the Teacher Didn't Know" the students also expressed some of their own critiques of schooling and employed political theatre as a vehicle to educate educators. Their insights were in part derived from inquiry into their own minoritized experiences and identities, what realist theorists conceptualize as epistemic privilege (Moya 479). The students wanted their audiences to take seriously their claims about schooling, particularly the ways in which the institution can exclude and perpetuate inequality. The work of Angelica and the students prompted me to conjoin the word prefigurative, which circulates in many activist communities, with pedagogy. Through the prefigurative pedagogy of teatro the students were at once critiquing the more dehumanizing aspects of their schooling while simultaneously prefiguring and enacting an alternative literacy curriculum: one that fosters cooperation and celebrates human variance, including the multifarious literate and intercultural resources which fertilized their creative and intellectual imaginations.

The second example comes from my current research in a multilingual and multiethnic faith-based organization, St. Cabrini (a pseudonym) that advocates for its immigrant, migrant, and refugee communities. St. Cabrini has regular mass in four different languages and recently opened a community center on its premises that serves the larger neighborhood. I became involved with St. Cabrini three years ago when I attended a "know your rights" workshop about undocumented status sponsored by a local grassroots interfaith immigrant rights organization. One of my

interests as a literacy scholar is in how various advocacy discourses, emanating from the diverse and overlapping social locations of community members and activists, interanimate one another. These discourses, evident in both texts, parish meetings, and public events, include the following: a religious one of universal humanity (e.g., "We are all God's children" and "We are all citizens of Heaven"); the testimonial tradition, where individuals narrate injustices, such as the separation from family members; the legal terminology of attorneys who volunteer their expertise; academic analysis; and activist linguistic interventions into commonsense media language that scapegoats groups. What my research team and I are learning is that the various discourses are rhetorically and epistemically stronger together than they are on their own: the sum is greater than the individual parts. The discourses exist in a synergistic relationship with one another, resonating with Steve Parks's call for "new collaborative literacy strategies designed to foster a greater collective good" (43) and what we have termed elsewhere as coalitional literacy practices (Campano, Ghiso, Gee, and Pantoja 315). What binds the various discourses together is a larger vision of social justice, not just for immigrants but for all humans.

With these two examples in mind, I'd like to return to some of the anxieties provoked in me by the first issue of *Literacy in Composition*, if only to raise additional questions and conceptual orientations for research and teaching. One metaphor used by Mary Soliday that might help reconcile the spatial with the temporal dimensions of literacy is that of the "bridge," as in bridging "everyday" with "academic" literacy practices (49). A bridge certainly suggests movement and the possibility of "permeability" (49) between boundaries. It also potentially re-inscribes the two locations on either side of the bridge as relatively autonomous, and too often the movement is uni-directional: educators build off students' everyday literacy practices in order for them to gain access to academic literacies, which are assumed to be an unqualified good, as the "literacy myth" (Graff) reminds us. Many students may not have the resources to make that journey but others may not be that interested either, especially if it entails compromising their cultural identities or values.

The bridge metaphor feels like it has explanatory power in my own family story. There was some intergenerational crossing between the literate world of my grandfather, a multilingual migrant from a subaltern community in the Mindanao region of the Philippines, and my own monolingual life as a teacher and scholar of literacy here in the United States. My schooling growing up was assimilationist and my family, perhaps not unlike many immigrant families, maintained a fetishistic belief in the transformative power of education as a vehicle for upward mobility and personal growth. I didn't have teachers who explicitly challenged the ideology of the autonomous model of literacy or raised issues of coloniality in education. Through my own teaching and research over the years with communities like DAB and St. Cabrini, I have gravitated toward the borderland, border-thinking, "world"-travelling metaphors of scholars such as Gloria Anzaldúa, Walter Mignolo, and María Lugones over bridges because of how they unsettle hierarchical binaries.

In this spirit María Paula Ghiso and I (Campano and Ghiso) have argued for the pedagogical and theoretical ideal of viewing all students as cosmopolitan intellectuals who have the capacities to

draw from a range of cultural resources and legacies in the literacy curriculum in order to critically engage the world. We specifically advocate for a cosmopolitanism from below (Anderson); it is not just that schools ought to make students global citizens, but rather they may acknowledge how many students in our 21st century communities already are cosmopolitan intellectuals by virtue of their diasporic identities, firsthand experiences negotiating the underside of neoliberalism, and exposure to diverse literary and activist legacies. The purposes of a literacy curriculum might in part be to nurture their critical cosmopolitan impulses and create an environment where all members of a learning community learn from one another's epistemic privilege.

I don't believe an orientation toward border-thinking and cosmopolitanism will automatically transcend the dilemmas presented by the symposium contributors, who have astutely invoked Bourdieu to remind us of the durability of social dispositions, including the essayist text, and the difficulty of change. I know that I still have deep professional and personal investments in the possibility of literacy as transformation, and that efforts to think about literacies more inclusively in teaching may invariably engender new hierarchies and exclusions. It is probably a healthy anxiety for our field to acknowledge that there may be a little Mr. Sid/ Mr. M'Choakumchild in all of us due to our affiliations with institutions of power and social reproduction and the fact we traffic in some of the very autonomous ideologies we critique. I do believe we might more explicitly address knowledge questions in literacy and composition, however framed, and put key terms such as epistemic privilege and historically subordinated knowledge in more circulation—concepts I expected several authors to take up given the direction of their pieces but from which they ultimately shied away.

The knowledge questions are important because a thoughtful redistribution of intellectual authority in our collaborative research and teaching might go some way in mitigating any tendency in literacy studies to pin down and examine various new and old literacies like exotic butterfly collectors. As educators we may be less interested in how literacy practices move about in insular ecologies—an impulse which would prompt the concern of relativism brought up in the articles—and more with how the participants in our local research contexts employ various literacies to generate knowledge about our shared world. In both examples of DAB and St. Cabrini, the pedagogies were not geared toward merely demystifying and providing access to the power codes, but fundamentally changing students' and community members' relationship to them. The participants in fact created their own power codes by drawing on multiple literate resources to both navigate the social world as well as make normative claims *about* this world and how it might be better. For example, the children in DAB had something important to say regarding classroom management and the conditions for a more humane learning environment. Members of the St. Cabrini community mobilized complementary discursive resources to reveal the biopolitics of bureaucratic immigration policies that create states of exception (Agamben), what Kate Vieira shrewdly names as the link between literacy and identification, as well as how these policies and practices ought to be revised, rescinded, or resisted. We might find, for example, that our students or research participants, especially if they are from a (post)colonial context, have their own critiques related to the arbitrary nature of

dominant and ostensibly autonomous literacy practices. They may also have important insights into how literacies, academic ones included, position some people as knowers and others, through a type of secular missionary ideology, as the benefactors of their knowledge.

It may be that understanding individuals and communities' literacies is the first step to learning from their own insights and inquiries, but my inclination is that the two go hand in hand. In her elegantly reasoned and incisive book *Epistemic Injustice: Power and the Ethics of Knowing*, the philosopher Miranda Fricker reminds us of how the credibility of an individual's knowledge claims may be arbitrarily deflated because of systematic identity prejudice, what she labels a testimonial injustice, and argues for the intellectual and ethical virtue of being a responsible hearer (27-28). This virtue concerning the epistemic value of relationships is one that scholars in the fields of literacy and composition studies are uniquely positioned to cultivate in our teaching and research methodologies, building on our own respective intellectual histories of working across social and cultural boundaries. By taking seriously others' knowledge as conveyed through their literacies and rhetorical traditions, we may also transfigure our own academic practices.

As an educator, I have taught first graders through doctoral students. Despite the many rewards of the profession, one of its more dispiriting aspects is when I hear from former students whose literate and intellectual identities are eventually devalued or denied in school. Even students who navigate their educational trajectories with some degree of self-determination and success often do so at considerable cost. Several months ago one of the leaders of Dancing Across Borders got in touch with me after many years. She had been waiting to contact me until she graduated from one of the institutions represented on this journal's Editorial Board (and I imagine may have been taught by at least one of our colleagues, a reminder that, at the very least, human lives may connect our academic silos and disparate institutional contexts). The student embodies a cosmopolitan intellectual orientation by any definition: in addition to excelling in academic literacies, she knows several languages, code switches between youth vernaculars, is an artist, and has transnational activist commitments and intellectual interests. Nevertheless, her college education became protracted, and at one point she almost dropped out altogether because of personal issues related to systemic inequities, including a family health emergency compounded by a lack of medical insurance and complications related to immigration: issues not unrelated, I believe, to the links Vieira is making in her ethnographic work between literacy, the regulating power of institutional texts, and who is and is not included in the nation state.

The stories of many of my former students are a sharp reminder of my own limitations as an educator. Still, the notion that any one researcher or teacher's practice substantively intervenes into what Bourdieu might characterize as the broader field of education, which itself might be located within a larger universe of hierarchically structured fields (Bourdieu and Wacquant), can reflect a liberal bourgeoisie ideology that individuals author change through a sheer exertion of will. One of the academic practices I am trying to amplify in my own work is its collaborative dimension. If literacy practices do not have ontological stability but instead are products of human history, then

the hope is that those naturalized literacies that have been employed to dehumanize and disqualify might be challenged through collective effort. It would be important for these efforts to be guided by a vision of social justice informed by the epistemic privilege of those whose perspectives have been devalued due to systematic identity prejudice. Groups such as El Teatro Campesino and members of St. Cabrini have taught me that change best occurs through collective knowledge projects, whether situated in communities of inquiry with our students or teachers, alongside our partners in their own sites of activism, or part of continuing conversations in journals such *Literacy in Composition Studies*, where scholars from diverse backgrounds are dancing across disciplinary boundaries in order to think through some of the most complex and demanding educational issues of our time.

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BOOK REVIEW

Book Review *Writing Home: A Literacy Autobiography*, by Eli Goldblatt

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Writing Home: A Literacy Autobiography, by Eli Goldblatt. Carbondale: Southern Illinois UP, 2012. 258 pp.

An interesting discussion took place recently on the Writing Program Administrators listserv (WPA-L) surrounding the question: "Is the literacy narrative dead?" As someone who assigns literacy narratives in first-year courses, I followed the discussion closely—perhaps hoping my own classroom practices would be vindicated. What surprised me most, however, was not the general consensus of those who responded (a resounding "No!"), but just how complex the question is in the first place. After all, what exactly *is* a literacy narrative and what do we mean when we reference it? As a provocation to reflect on one's literacy practices and the ways such practices shape our lives, literacy narratives can be expressed in any number of modes and genres—as a quick search through the Digital Archive of Literacy Narratives will attest—so, maybe the question needs to be asked a different way. Eli Goldblatt's recently published *Writing Home: A Literacy Autobiography* reframes the question in just such a way. *Writing Home* implicitly asks not what a literacy narrative *is*, but rather what it *can be* given enough space to move. As an autobiography detailing a thirty-year history of one man's literacy practices, *Writing Home* is a marathon. Premised on exploring "two competing and coinciding concepts in literacy: the individualist ideology of Western literary tradition in contrast with the broader social meaning of literacy that defines a group's identity or a nation's character" (3), *Writing Home* works to demonstrate the tensions between these relations in every chapter.

While the introduction and final chapter work to provide a theoretical frame, the bulk of *Writing Home* proceeds chronologically. Following Goldblatt's childhood experiences while stationed in Germany with a father who "identified himself more with medicine than with the military" (20), the first chapter, "Tour of Duty," begins to make a distinction between the private life of early reading—the *All About* book series, biographies, Hardy Boys, stories of young braves on vision quests—and the

public life of the classroom and base. The second chapter, "The Right to Mourn," follows Goldblatt's struggle with Jewish identity and the many "sacred but technological" literacies encountered in the aftermath of his father's death. As Goldblatt struggles to read the Mourner's Kaddish, for instance, his uncle offers him a way to access the prayer not by simply reading it in English, which seemed "distant and dry," but by gently prompting him to read it closely and think about the way the words are used in other moments in the service apart from the context of mourning. At the same time, his cousin teaches Goldblatt how to lay *tefillin* and begins to demystify the arcane lore of the Jewish tradition. From these experiences, Goldblatt observes: "one aspect of reading and writing—indeed, of all learning—involves just the brute work of maintaining routine" (42). This second chapter, perhaps more than any other chapter in *Writing Home*, is sufficiently self-contained and could be assigned in the classroom. Much like Richard Rodriguez's *Hunger of Memory* or Reginald Dwayne Betts's *A Question of Freedom*, this chapter works to describe the complicated relationship between identity and literacy in a way that is accessible and relatable.

Chapter three, "Into the Daedalean Dreamscape," follows Goldblatt through Beloit College where he begins to write poetry and immerse himself in the study of the Western tradition. It was at Beloit that Goldblatt began to read Martin Buber, whose influence is returned to again and again throughout *Writing Home*. The fourth chapter, "Following Williams," follows Goldblatt as he leaves Beloit, enrolls in Cornell University to make an earnest study of the classics, and—towards the end—decides to go into medicine as his own father and the American poet referenced in the title, William Carlos Williams, had done. At Cornell, Goldblatt is torn between his identity as a laboring poet and his ivy league surroundings: "I would be inside the great university but not a part of it, neither cheerleader nor activist nor athlete but a poet on the edge, reading my way into the tradition but bound to write outside of it" (78). It was also at Cornell that Goldblatt would first read his work publicly, begin to socialize with other writers, and decide that he "didn't have to be a monk for poetry" (94). The fifth chapter, "Dry Creek Road," discusses Goldblatt's various travels and jobs between Cornell and Case Western, where he was to enroll in medical school. Working with a Spanish-speaking Mexican population on vineyards in Northern California, Goldblatt realizes that literacy affects immediate social relations: "For the first time, I wanted to know a language not for poetry or religion but because other people were speaking and I wanted to join the conversation" (108). The sixth chapter, "White Coat," begins at Case Western Reserve University and ends with Goldblatt's move to Philadelphia the following year. While in medical school, Goldblatt found it difficult to reconcile his vocation as a poet and his future as a medical doctor. From the beginning, Goldblatt notes, he was overly critical of the very medical establishment he was trying to join.

Chapters seven through nine follow Goldblatt from Case Western and a career in medicine to a new career as a teacher, a marriage, and an eight-month stint in Mexico and Central America during the time of the *Revolución Nicaragüense*. Chapter seven, "Entering Philadelphia," discusses his first marriage and the beginnings of his teaching career in Philadelphia. The possibility of teaching comes to him after a reading and discussion at a Quaker retreat center. As Goldblatt notes, "standing before

this open-faced group in a small wooden classroom, I felt just a hint that I could teach as well as write," though teaching poetry at the time was out of the question as it was "too close to the bone" (155). Soon after, Goldblatt begins teaching science and math at the Neighborhood Journey School, an alternative school. Chapter eight, "Beyond the Fathers," continues to focus on Goldblatt's early teaching career, the end of his first marriage, and a looming trip south. The ninth chapter, "*Viajeros, Extranjeros*," begins with Goldblatt's first night in Mexico as a *viajeros*, a young international traveler. Much like the experience with the migrant workers in Northern California, during his travels south Goldblatt further realizes that language can be a "particular channel for immediate human interaction" rather than just an intellectual challenge or source for literary meaning (202). The final chapter, "High Five at Second Base," picks back up in Philadelphia and Goldblatt's teaching position at the Neighborhood Journey School (renamed the Neighborhood Academy).

One of the most poignant moments, for me, comes in the final chapter as Goldblatt discusses his own son's experiences in the university. His son's frustration and boredom with the institutions of higher learning reflect larger failures Goldblatt observes in the institution as a whole. Goldblatt is "haunted by the image of classes camped out in the ruins of an ancient Roman public forum, endlessly rehearsing information that makes no sense of the world students face in their personal lives" (253). Goldblatt's ambivalence towards the university's larger cultural role, and his own role in that institution, emerges from a unique view of literacy that loses its ability to effect change to the degree to which it remains anchored to the lecture halls and offices of higher education. From this anecdote, Goldblatt uses the rest of the chapter to theoretically situate his narrative in a way that would be familiar to scholars working within composition and literacy studies. Despite the—at times—jarring shift, the final chapter's move towards theory provides a much-needed frame and context for the preceding chapters and Goldblatt's varied life. Through the many roles and stations in Goldblatt's life, literacy is that constant element which binds the many relations—between individuals, cultures, and technologies—into a unified narrative. For Goldblatt, "Human conversation fostered by media such as print or symbol, moving image or sculptural form, envelopes us in relationships," though the challenge is always to "find a purpose more valuable than self-justification or solipsistic tautology in the metaphor of literacy as relationship" (239).

In an older article that still deserves much more attention than it gets, Jim Corder suggests that each of us is a fictive narrative produced by language. But, as Corder is quick to point out, this does not mean that such narratives are "limited, valueless, ignorant, despicable, or 'merely subjective'" (17). To the contrary, if emerging from a generative ethos, such narratives can broaden our private universe and foreclose closure itself. Such an ethos is to be found in Eli Goldblatt's *Writing Home* and its central vision of literacy as an ethical relation. As such, this book deserves a broad audience of writers and social activists outside of the academy, but literacy scholars and writing teachers would be particularly remiss in not attending to all that *Writing Home* has to offer. Far from being "dead," as was questioned on the WPA-L listserv, Goldblatt's work proves that we are just beginning to show what the literacy narrative is capable of.

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