



Valuing the Resources of *Infrastructure*: Beyond From-Scratch and Off-the-Shelf Technology Options for Electronic Portfolio Assessment in First-Year Writing

J.S. Dunn Jr. *, Carrie Luke, David Nassar

First-Year Writing Program; Department of English; Eastern Michigan University; 612 Pray-Harrold; Ypsilanti, MI 48197, United States

Abstract

Ongoing technology innovation holds obvious promise for college writing programs with resources to invest in high-end hardware and software. However, many campuses face resource limitations that preclude the adoption of cutting-edge material innovations. As an alternative, the concept of *infrastructure* (DeVoss, Cushman, & Grabill, 2005) offers a means by which seemingly under-resourced writing programs can recognize and draw upon the expertise and commitment of their faculty to develop in-house technology solutions adapted to specific program needs and institutional contexts while abiding by more obvious material limitations. To illustrate the value of infrastructure, this study reports the experience of one college writing program on a large, public, urban, access-oriented campus with limited material resources that nonetheless developed a system for supporting electronic portfolios by adapting the readily available platforms of Google Docs and Google Sites. After providing a rationale for adopting electronic portfolios grounded in a rhetorically based approach to assessment, the study details the development process for this customized system as well as the collaborative relationships between faculty of different ranks (tenure-track, adjunct, and graduate student) and expertise through which the project evolved. Based on this experience, the study considers some implications that infrastructure holds for writing program administration.

© 2012 Elsevier Inc. All rights reserved.

Keywords: Community of Practice; Electronic portfolio; First-year composition; Google Docs; Google Sites; Infrastructure; Writing program

1. Introduction

When we consider our presence in this special issue of *Computers and Composition*, our reaction brings to mind the old cliché, “what are nice folks like you doing in a place like this?” We’ve asked ourselves that question more than once—both while composing this piece as well as throughout our experiences with the larger initiative we describe here. At times, the question arose out of the frustrations all writers encounter in the composing process, combined with—in our case—the challenges of developing an electronic portfolio (eportfolio) system for a large university writing program on an urban, access-oriented, public campus facing resource issues typical of such institutions everywhere. Yet while experiencing the processes of writing and technology development in tandem, we have realized our answer has followed from an evolving sense of professional identity over the past several years—one that fits well, we believe, with this special issue of *Computers and Composition*.

* Corresponding author. Tel.: +1 734 487 3220; fax: +1 734 483 9744.
E-mail address: jdunnjr@emich.edu (J.S. Dunn Jr.).

The past two decades have seen the rise of portfolio-based models of assessing college-level writing, with early advocates (Yancey, 1992), followed by a growing array of scholars in rhetoric and composition studies (Black, Daiker, Sommers, & Stygall, 1994; Hamp-Lyons & Condon, 1999; Yancey & Weiser, 1997), noting how portfolio assessment can support literacy learning by, among other things, prompting students to write more, make informed self-assessment of writing quality, and reflect consciously about their composing processes and development as writers. In tandem with classroom practice, portfolio assessment has held promise for large-scale, program-level assessment, offering possibilities for documenting patterns across large, multi-section composition programs (O'Neill, Moore, & Huot, 2009), as well as fostering faculty development through collaborative reading practices among instructors (Broad, 2003; Roemer, Schultz, & Durst, 1991). However, early advocates acknowledged (Bishop, 1991; Yancey, 1994), a range of logistical challenges that accompany traditional, hardcopy-format portfolios in classroom settings, and how such considerations around storage, archiving, and retrieving student work from traditional portfolios only multiply at the program-wide level. As a result, current interest in the theoretical bases of *electronic* portfolios (Cambridge, 2001; Cambridge, Cambridge, & Yancey, 2009) seems fitting, but the practical considerations of implementing eportfolios in college writing programs remain in need of exploration.

Thus far, at least several eportfolio initiatives have developed within rhetoric and composition studies and American higher education more broadly. Composition scholars at Research I, flagship institutions have, as in the case of the University of Georgia's "emma" system (Desmet, Balthazor, Cummings, Hilton, Mitchell, & Hart, 2005; Desmet, Church Miller, Griffin, & Balthazor, 2008; Desmet, Griffin, Church Miller, Balthazor, & Cummings, 2009), worked directly with programmers to custom-build eportfolio platforms, drawing upon in-house technical expertise to support these unique systems and appropriately tailoring them to meet the assessment needs of their specific institution. Such innovations show great promise, but the resources necessary to build and maintain an in-house system would prove daunting at other institutions with fewer resources and less technical support. In contrast to these *from-scratch* options, a growing market of software vendors have begun offering proprietary tools and applications to support eportfolios on a range of campuses. While customizable to varying degrees, such *off-the-shelf* options promise institutions with limited resources functionality approaching that of eportfolio systems built from scratch on more highly resourced campuses. At the same time, however, off-the-shelf systems have licensing, customization, and other fee structures that can become prohibitive, particularly in complex or large-scale rollouts, and tailoring such systems to meet specific assessment needs may become too costly for under-resourced programs to sustain long-term (Reilly & Williams, 2006).

At this point, it is worth pausing momentarily to reflect on the observations of Ellen Barton (1994) about the dynamics of technology change in relation to current trends in eportfolio development. For Barton, understanding technology meant attending to innovations around both hardware and software but what she characterized as the "discourses of technology" that accompany them, which consist of "people discussing, authors describing, and scholars analyzing assumptions and attitudes about technology as expressed in casual conversations, advertising, newspaper articles and best-sellers, educational materials, and scholarly research" (p. 56). Barton's point leads us to consider the rhetorical positioning that current trends in eportfolio development afford college writing programs wishing to adopt such new technologies. For us, the prominent discourses of technology we identified above around eportfolios resemble patterns that Charles Moran (1999) as well as Jeffrey Grabill (2003) have documented in the rhetorical positioning of student writers concerning access to technology. As Moran emphasized, teachers, administrators, and policymakers found it easier to discuss examples of students using computers that assumed the technologies involved were, among other things, available, adequately maintained, and up-to-date. Considering a prominent discourse of technology at the time, Moran noted that college composition students are often rhetorically positioned as already having access to technology. Students whose economic, racial, or class backgrounds complicated assumptions of access, Moran found, got positioned on the margins of the discourse, if they appeared at all.

A similar risk, we argue, exists today for college writing programs considering eportfolio technology. That is, the option of building one's own eportfolio system from scratch has tremendous appeal but also involves assumptions of access to resources at the institutional level that fail to acknowledge what John Trimbur (1996) has characterized as "the unequal distribution of material resources in the political economy of writing instruction" faced by faculty on a variety of non-flagship campuses (p. 139). Moreover, discourses of technology favoring off-the-shelf solutions for eportfolios threaten to rhetorically position many non-elite college writing programs in ways similar to how Mina Shaughnessy (1977) described the positioning of basic writers in much academic and public discourse of the Open Admissions era, as those lacking the necessary expertise and agency to take on substantive intellectual work, and therefore capable of composing only in "remedial" genres.

By this point, readers will likely sense that we have set up two ends of a discursive continuum, leaving a less-defined conceptual space in between, one that, needless to say, our arguments in the remainder of this piece seek to occupy. As we do so, however, it is worth asking why this middle ground resists easy definition. Or, returning to the issue we raised at the outset: If we are not credentialed specialists with ready access to the material resources for building an eportfolio system from scratch (and we certainly are not), then what are we doing in a place like this special issue of *Computers and Composition*? Put differently, from the other end of our continuum: If resources are so tight (and they certainly are), then why didn't you nice folks just opt for an off-the-shelf eportfolio solution and be done with it? (All those sales representatives would have been so happy.)

As we have attempted to address such issues over the past several years, we have found ourselves returning to a concept that Dànienne DeVoss, Ellen Cushman, and Jeffrey Grabill (2005) introduced to the study of technology-enhanced classrooms and Grabill has subsequently applied to the outreach efforts of college writing programs (2010): *infrastructure*. Building upon their call to “use the notion of infrastructure as a heuristic for reading our local contexts” (2005, p. 23), we apply the concept, then, to address the following questions:

- 1) How did we justify venturing into an eportfolio initiative given our apparent resource limitations?
- 2) What tools exist for inventing an eportfolio system besides from-scratch and off-the-shelf options, and how did we choose among them?
- 3) How did we appeal to the various stakeholders for buy-in on our project?
- 4) What assumptions about faculty expertise and credibility follow from pursuing an approach to eportfolios that bypasses both from-scratch and off-the-shelf systems?

After unpacking the notion of infrastructure and describing the local infrastructure from which our eportfolio project has emerged, we explore the questions above through examples over the past several years in which our decision-making about eportfolios raised issues of infrastructure for us, and then finally conclude by reflecting on the implications that understanding infrastructure has had for our evolving sense of professional identity as literacy educators within the contemporary discourses of technology.

2. Infrastructure: Identifying our needs and constraints

Over the past 15 years, critiques of academic disciplinarity associated with Trimbur's perspective have become widely accepted in rhetoric and composition studies, and these insights allow us to at least partially make sense of the material conditions and institutional stratification out of which our eportfolio project has emerged. Our home institution, Eastern Michigan University (EMU), is a large, urban, public, access-oriented campus serving a student population of over 18,000 undergraduates and 5,000 graduate students drawn mostly from metropolitan Detroit and the Southeastern Michigan region. Our geographic reach means that students enter EMU both from some of the most affluent, highly-resourced, often suburban school districts and communities in the nation as well as from some of the country's most under-resourced, frequently urban neighborhoods where many elements of the social safety net beneath schools have faltered over the decades. Our mission and location also mean we attract a highly diverse student population, including students of color and first-generation college students. Indeed, as a result of the long-term economic and political climate in the state of Michigan, institutions like EMU have endured many years of budget reductions that were not as dramatic as those encountered by some public campuses in the West during the current economic recession, but these reductions have over time prevented the university from investing in the sorts of technology that some readers of this journal might take for granted in the New Millennium. Our First-Year Writing Program (FYWP), for instance, has never had any dedicated computer labs for teaching composition; to meet this need, instructors must make arrangements for lab time elsewhere on campus on an ad hoc basis. And while our department offers a long-standing and vibrant Master of Arts in Written Communication graduate program that includes several well-known colleagues who specialize in computers and writing, the teaching mission of EMU puts us in sharp contrast to our institutional neighbors at the University of Michigan, a world-renowned, Research I campus in the next town over.

Like many large university writing programs, the FYWP serves the vast majority of incoming students, in our case with three different composition courses, one of which—a general education requirement in research writing—enrolls approximately 1,650 students, for a total of approximately 3,200 students passing through the program's courses each year. With upwards of 140 sections of composition to staff, the FYWP depends on instructors of all ranks,

including several tenure-track faculty in the Written Communication program, a small group of full-time lecturers with semi-permanent status, over 20 graduate assistants drawn from the department's five different master's programs, as well as a fluctuating number of adjunct instructors—paid by the section and without benefits—including some recent M.A. graduates as well as others with longer, more complex career trajectories. Given this stratification in instructor ranks, such differences of institutional status mean that involving oneself in a new initiative like our eportfolio project has vastly different implications depending upon an instructor's status, so that the trade-offs will vary widely. Indeed, scholarly publication holds different significance and potential rewards for a tenure-track writing program administrator (John Dunn), a recent M.A. graduate who has worked in academic support services in various capacities at a neighboring institution for several years (Carrie Luke), and another recent M.A. graduate pursuing a career in professional communications (David Nassar). Moreover, our original proposal for this piece, in fact, featured five coauthors, two of whom—an experienced adjunct instructor (Sarah Karlis) and a recent graduate in Children's Literature (Jessica Kander)—had to withdraw from this publication opportunity, despite their significant contributions to the overall project. With all this said, against the potential ethical criticisms of our undertakings, we have responded by attempting to keep mindful at every turn of the benefits and costs each of us has entailed through our collaborations so that we might adapt our efforts accordingly. One consequence, among many, of this strategy for us has been growing recognition that our efforts do, in fact, seem worthwhile, even if they fall not quite within the motivations that guide traditional notions of academic disciplinary or departmental hierarchies.

At the outset of this piece, we called attention not just to the potential limitations of what we termed from-scratch and off-the-shelf options for developing eportfolio systems, but more importantly to what we see as a curious absence in between. A useful way to articulate what exists in this space we've found through DeVoss, Cushman, and Grabill's concept of infrastructure. Drawing upon the work of the late technology theorist Susan Leigh Star (Star & Ruhleder, 1996; Star, 1999), they used infrastructure to describe those elements of an environment that visible technologies take for granted in order to function, but which otherwise exist invisibly to most users under normal circumstances. In their work focusing on an individual technology-enhanced composition classroom, DeVoss et al. (2005) built on eight components of infrastructure identified by Star, finding examples of infrastructure that included the wiring and steady electricity supply that allowed for multimedia composing with particular software applications as well as other, less tangible factors such as institutional policies on use of server space by students. As their analysis emphasized, instructors and students at first attempted simply to learn the software but soon found themselves faced with issues of infrastructure, which constrained and afforded their learning. As we sought to understand the conceptual space in which our First-Year Writing Program and eportfolio initiative exists, we have found it helpful to elaborate further on the components of infrastructure to make visible what often gets taken for granted in college writing programs like ours. Rather than an absence, a college writing program represents, we believe, an infrastructure in the following ways:

Embeddedness. Infrastructures occur within other existing entities, technologies, or recognized units of organizational practice such that observers may not differentiate between them. As Trimbur (1996) noted about the narratives of professional history in contemporary rhetoric and composition studies, much recent effort has been made to distinguish “composition programs,” “composition,” and “writing studies” from “English departments” and “English” (Ede, 2004; Lynn, 2010; Rosner, Boehm, & Journet, 1999).

Built on an installed base. Rather than originating in a vacuum, infrastructures emerge out of preexisting systems and designs that give them partial shape as well as constraints and affordances that may alter only slowly over time, even as pragmatic needs change considerably. Star (1999) offered the example of the layout of contemporary fiber optic cables in some areas still following former railroad routes, and critiques by composition scholars (Connors, 1997; Crowley, 1990, 1998; Strickland, 2001; Young, 1978) of Current-Traditional Rhetoric and its continued popularity, despite its ideological roots in the nineteenth century, make analogous points.

Transparency. Infrastructures downplay the need for continuous, conscious reflection when participants perform tasks within their confines. Instead, activities appear as common routines, with solutions readily available. For writing programs, issues related to transparency occur around the adoption of required textbooks, some of which reinforce the installed base of Current-Traditional Rhetoric (Gale & Gale, 1999), as well as broader debates over the last twenty-five years about the appropriate place of *lore* in composition theory and practice (North, 1988; Massey & Gebhardt, 2011).

Reach or scope. The effects of infrastructures extend beyond individual events or a single environment. For instance, while writing programs may offer individual sections of a composition course in a given semester, perhaps the most important trend in contemporary writing program administration has been growing awareness of the influence that

composition courses can have over time for multiple stakeholders, including students, campus administrators, public policy makers, and everyday citizens (Adler-Kassner, 2008).

Learned as part of membership. Because infrastructures operate through transparency, successful participation depends as much on often-tacit, ongoing processes of enculturation as upon formal training alone. Here we see “the importance of communities of practice” (COP) to the workings of infrastructure that DeVoss, Cushman, and Grabill acknowledged (2005, p. 17) as well as the influence of COP scholars such as Jean Lave and Etienne Wenger (Lave & Wenger, 1991; Wenger, 2006). Writing programs unavoidably grapple with this aspect of infrastructure when they decide how to handle training of new composition instructors (Dobrin, 2005).

Links with conventions of practice. Infrastructures depend upon and influence the everyday practices of participants often in deep but tacit ways, with the implication that attempts to change practice must accommodate a wider array of established habits than are first apparent. Star (1999) offered the example of the QWERTY keyboard layout that has been embedded into a range of habits that contemporary office workers now take for granted, even though its inefficiencies would seem to make it an obvious candidate for change. With college writing programs, one great obstacle to all manner of reform efforts, as Bloom (1996) argued, has been the stubborn endurance of conventions and practices associated with a middle-class ideology that reinforce each other in unexpected ways.

Embodiment of standards. Infrastructures also owe part of their invisibility to the ways they borrow and reinforce the expectations and requirements of other systems. For writing programs, such issues arise most readily around matters of assessment, which, as DeVoss, Cushman, and Grabill emphasized, always hinge upon “what counts as writing, what is permissible in a writing class, and what makes for ‘good’ writing” (2005, p. 22). Growing calls for “accountability” in American higher education as well as recent alternative proposals by scholars in rhetoric and composition studies (Council of Writing Program Administrators, National Council of Teachers of English, & the National Writing Project, 2011) demonstrate more overtly how college writing programs as infrastructures embody standards based in other political and institutional systems.

Becomes visible upon breakdown. Given their default mode of invisibility, infrastructures call attention to themselves most readily when they fail. In the case of technology, the nation’s electrical grid gets noticed almost exclusively when the power goes out. Here, writing program administrators may sense our attraction to the analogy of college writing programs as infrastructures, since our efforts to document achievements, success, and potential of our students and our programs often receive less attention from key audiences than those often unfounded complaints that “my students can’t write” after having completed first-year composition.

3. Making a case for learning in first-year composition

Against those discourses of technology that reinforce from-scratch and off-the-shelf approaches, we have sought alternative ways to characterize the rhetorical space we occupy as a college writing program without abundant material resources, yet one whose everyday practices imply a wealth of knowledge, expertise, and social relations beyond mere deficits or absence. Instead, we find the concept of infrastructure helps address the paradox writing instructors and program administrators encounter daily, wherein our work matters in so many tangible ways, yet most often remains invisible to a range of stakeholders, and at times to ourselves. Seen as a type of infrastructure, the FYWP has had a longstanding commitment to the responsibilities of a writing program as an embodiment of standards. Beginning with the efforts of our former colleagues Linda Adler-Kassner and Heidi Estrem over a decade ago, instructors of all ranks in the FYWP have sought to collaboratively invent and assess an outcomes-based curriculum for first-year writing that addresses the unique needs of our students, institution, and broader community (Adler-Kassner & Estrem, 2009). More recently, our ongoing commitment to excellence (Conference on College Composition & Communication, 2006) has led us to a series of revisions to our student learning outcomes that have unintentionally led us to our work with eportfolios. Elsewhere (Dunn et al., 2012), we have elaborated on that process in detail; here we briefly characterize it in relation to key aspects of infrastructure we identified above.

Vital to our work with eportfolios has been the FYWP’s long-term assessment project, *Making the Case for Learning in First-Year Writing*, an ongoing initiative that, as the name suggests, conceives of writing assessment not as an act of measurement or accountability so much as one of *research* (Huot, 2002; Williamson, 1994), with the goals of gathering data to help answer questions motivated by genuine inquiry among stakeholders as well as rhetorically inventing such data as evidence to persuade a range of faculty, administrative, and public audiences about the contributions that college writing programs make to students as writers, learners, and citizens. Indeed, seeing writing assessment as the

process of documenting our contributions to students' learning framed from our interest in eportfolios from the outset, because it foregrounded the need to think broadly about the kinds of potential evidence that might help our students and us make a case for learning. That is, we took up eportfolios not because they represented a "new technology" that seemed inherently worthy of attention in itself. Over the previous decade the FYWP had already developed a system for hardcopy portfolios that served our needs for both internal and external assessment effectively (Adler-Kassner & Estrem, 2009). Instead, our move to the new technology of eportfolios came from taking seriously the implications of wanting to document student learning, for very early on we realized that the nature of the learning processes happening in our writing courses went beyond the ability of traditional hardcopy portfolios to capture.

As an initial phase in our assessment work, we asked writing instructors of all ranks across the program to talk to us about those moments when their writing classes and student writers seemed most successful. Rather than reinforcing deficit models of student literacy ("what's wrong with our students and their writing?") and writing program administration ("what's the writing program not doing about it?") that many well-meaning attempts at writing assessment have unwittingly perpetuated over the years, we instead began from the assumption, borne out by the daily efforts of students and instructors, that all manner of good things do in fact happen in our writing courses, if we learned where to look and how to pay attention. Responding to our prompts during informal focus groups, interviews, and casual conversations over a number of months, our instructors articulated a host of examples where they saw learning occur as well as vocabulary to label these contributions. Interestingly, as we worked to collect and analyze their responses, two main patterns soon emerged. In one category our instructors described considerations around text production and the processes of writing that closely resemble the priorities for first-year composition expressed in the Council of Writing Program Administrators' Outcomes Statement (Steering Committee of the Outcomes Group, 1999). In our version these Composing Process Outcomes (CPOs) include goals for Critical Reading & Analysis, Research Practices & Processes, Writing Processes & Representation, Use of Evidence, and Syntax & Mechanics, all of which hardcopy portfolios can to varying degrees accommodate.

Alongside these traditional concerns of college "writing" courses, however, our instructors also spoke, often passionately, about an array of other instances when their student writers and writing courses seemed successful: times during the semester when a student became more interested in her life by writing about it, times when a student began to take her own ideas seriously and see them as worthy of sharing, times when a student constructively acknowledged viewpoints that they had previously found threatening, times when a student persevered against challenging assignments or life circumstances, times when a student took initiative on his own to find resources for completing an assignment, times when a student reflected on her writing processes and what she had learned. Taken together, this second category, which we came to call Learning Process Outcomes (LPOs), resembles what the authors of the *Framework for Success in Post-Secondary Writing* (Council of Writing Program Administrators, National Council of Teachers of English, & the National Writing Project, 2011) would later describe as "habits of mind" that college helps develop. More important for our work with eportfolios, however, these Learning Process Outcomes around Investment & Engagement, Autonomy & Authority, Sense of Perspective, Competence & Confidence, Resource Use, and Reflection potentially draw upon forms of evidence that hardcopy portfolios would struggle to accommodate. As one instructor complained early on when discussing the Competence & Confidence outcome, how would you document the example of a recent teacher-student conference when her student realized he could in fact complete a long research paper assignment? Almost immediately, however, another instructor overhearing that complaint pulled out her smartphone and showed its audio recorder application, leading to fascinating exchange about the possibility of recreating the teacher-student dialogue on a sound file that the student could then upload as part of her eportfolio. Our commitment, then, to making a case for learning in first-year writing has informed our priorities for developing our eportfolio platform, as the examples below illustrate.

4. Rethinking the concept of an eportfolio platform

In acknowledging that we as a department were not able to absorb the cost of from-scratch or proprietary platforms, and that we could not justify passing those costs along to our students without first exploring the potential of freely-available tools, we were also establishing the first major criterion in selecting platforms to test: if nothing else, they needed to be free. This meant that our options for testing would be limited, but more importantly, it also meant that we would need to proceed from a position of having to reconceptualize what an eportfolio platform could look like. Because we were not considering off-the-shelf options, we then moved into the realm of software that was not expressly

designed for use as eportfolio development and assessment tools. Instead, we would need to repurpose tools that seemed to offer the capabilities we were looking for; specifically, ones that could collect and store large amounts of student writing.

Additionally, in selecting our platform, we were also selecting a major piece of the infrastructure—one that would influence almost all other aspects of the project. DeVoss et al. (2005) anchored their argument about infrastructure on the “when” of new media composing. Specifically, they argued that the tools we use are not pre-defined: that, indeed, a tool is “given meaning as a tool by specific users working on particular problems in specific situations” (p. 22). This act of meaning-giving is exactly what we were engaging in throughout the platform testing process. The influence of resource limitations; student-, administrator-, and instructor-stakeholders; and the culture of EMU’s FYWP (all highly “when”-dependent factors) influenced our vision and testing process in ways we will discuss in more detail later on.

The three instructors participating in the first phase of platform testing had all previously planned to incorporate new media writing into their courses prior to the crystallization of our eportfolio pilot. In fact, this project began less from a position of clear and well-defined expectations and criteria, and more from one of “Hey, you guys are already planning to do this. Let’s see how it might fit into a larger, program-wide assessment plan.” However, that is not meant to imply that we approached this project thoughtlessly or without a plan. Instead, we draw attention to this fact because it continues one of the major tenets of this discussion: that one does not need to be an expert in assessment or technology to develop an effective eportfolio system, nor does one need to develop an official, IRB-approved research study to achieve it. The most vital expertise we could draw on was that of being experienced literacy educators and reflective practitioners. In essence, we were building on the long-held tradition of Participatory Action Research in education established by scholars like Paulo Freire, Antonio Gramsci, and Walter J. Ong. Collaboratively, we could all draw on the power of our community of practice—our knowledge, understanding, and assumptions about literacy, teaching, and learning—to shape our goals and practices as researchers and developers, and more specifically, we could draw on our local, first-hand knowledge of the FYWP and the EMU community to think through and implement a solution to our assessment problem in ways an off-the-shelf solution could not.

Independently, each tester had already selected a platform to use in our first-year writing courses outside the context of the eportfolio project. Carrie, perhaps being the most interested in providing her students with opportunities to participate in new media and digital composing, selected Google Sites based on her own past experiences using the user-friendly, website-building platform. Similarly, David was interested in incorporating the use of student blogs in his course and planned to do so using the popular WordPress platform, one he had already been using for some time. Finally, Sarah had expressed a desire to harness digital media to move towards a “paperless” classroom: her desire being born largely of a motivation to not tote large stacks of student work around campus, she chose the Google Docs platform, a cloud-based storage service with built-in document- and presentation-creation software.

Each of these platforms had promise for facilitating portfolio assessment, even though none were built specifically with eportfolios in mind. Similarly, each platform offered unique affordances and constraints, and each was selected to meet the individual goals of the respective instructor; ultimately, though, we were able to test each platform with our respective students to see if it would meet our broader programmatic needs for assessment. Each instructor had an independent vision of what eportfolios would look like in the context of their course, and each saw the affordances of eportfolios in their own way. While it may seem problematic to suggest that we weren’t necessarily all on the same page in the beginning, it is these collective experiences (and those of the community of practice we were all a part of) that would shape the way we tested and evaluated our platforms, developed support materials and training, and imagined the future possibilities of eportfolios in a shared, program-wide context. Further, John also had unique goals for this project: from an administrative position, his interest in eportfolios stemmed largely from the possibility of large-scale collection and sampling of student work for future research and scholarship beyond the more immediate need for program-wide assessment. While this perspective may not have been as large of an initial consideration or motivation for the other instructors involved in this project, it would prove to be a decisive factor in selecting a final eportfolio platform.

As members of a community of first-year instructors at EMU, the way we conceptualized eportfolios in our classrooms was shaped by our past experiences. However, these experiences would also shape the way we envisioned and contributed to the infrastructure that would support future iterations of the eportfolio project long after we had all moved on from the institution. DeVoss et al. (2005) have argued “infrastructure both shapes and is shaped by the conventions of a community of practice” (p. 20). In the end, these sometimes contrasting, often overlapping visions of what eportfolios could be helped shape a major tenet of how we would approach buy-in from other faculty: namely,

that we were not creating a strict mold into which all instructors would need to fit. Instead, the possibility of individual customization of the system to meet the specific goals of individual instructors became an ever-present consideration. If we could give instructors a basic framework from which to begin, and the infrastructural support to feel comfortable customizing the system to meet their own goals and styles, they would be much more likely to buy in to the broader need for program assessment, especially given their varying ranks and expertise, as we described above.

Once we each selected a platform to test in our courses, we spent the winter semester of 2011 (15 weeks) pilot-testing them in our own classrooms. During this time, we each kept journals stored on a shared wiki to record our thoughts and reflect on our experiences throughout the semester. We reflected on our successes and the difficulties we faced in introducing our students to the platforms. We kept track of perceived “bumps in the road” and considered how this would need to shape not only our platform selection and implementation, but also our development of support materials and training. We also established a set of basic criteria for consideration to guide our reflections during testing. We considered how the introduction of each platform to our students influenced course outcomes and curriculum, student work, and teacher persona. We also considered the anticipated expenses (money, time, resources, etc.) and how each platform would align with program-wide data collection goals.

While each of the platforms showed promise, we initially decided to choose Google Docs as our eportfolio platform. Although it did have some limitations, ones we will soon discuss, it offered one main affordance with which the other platforms could not compete: the ability to easily store, archive, and sample student work. Each of the three platforms we tested performed similarly in terms of the other criteria we had established: maintaining or enhancing pedagogical outcomes; maintaining or enhancing student-engagement with assignments/lessons/projects; degree to which time spent by students was affected by the platform; and, degree to which teaching methods were altered or affected by the platform. However, because low-cost and archiving and sampling capabilities were priorities, we felt that Google Docs proved to be the best platform for our purposes.

5. Leveraging the possibilities of multimedia and online environments

Initially, Google Docs seemed as if it would meet our program-level assessment needs: it could collect student writing quickly with minimal technological infrastructure. However, we found that when used alone Google Docs enabled no more than a digital version of the hardcopy portfolios our students had been developing for years. From a program perspective, these digital portfolios were easier to collect, archive, sample, and analyze, but from a student perspective, they were just more work. Essentially, the eportfolio system we developed in Google Docs added more process without adding much value. If we implemented the eportfolio system solely for the purpose of assessment without providing instructors with ample support for how the eportfolio could enhance and potentially transform their teaching, or without making visible the ways in which eportfolios could increase student creativity, intentionality, and motivation, the initiative would quite likely fail.

This need for a broader pedagogical and cultural shift within the FYWP illustrates an additional element of infrastructure that Star (1999) added later, suggesting that infrastructure *is fixed in modular increments, not all at once or globally* (p. 382, emphasis in original): “Because infrastructure is big, layered, and complex, and because it means different things locally, [...] changes take time and negotiation, and adjustment with other aspects of the systems are involved. Nobody is really in charge of infrastructure” (p. 382). As we explained above, our initiative began with what Star would define as a “global” imperative from the top of the FYWP’s hierarchy (John, our Writing Program Administrator)—but, using a top-down model and implementing eportfolios globally would not work in our context, given the complexity of the program’s infrastructure and the many stakeholders involved. In this way, as Star suggests, no one is in charge of our infrastructure but everyone is involved in making it work, and this dynamic foregrounds the need to negotiate, remain flexible, and value more module kinds of change.

So, as we debriefed from the initial pilot phase, we considered the potential of the other two platforms we tested—Google Sites and WordPress—to add the value we needed to make the eportfolio system more viable: namely, to increase student and instructor buy-in. We also reviewed some of the literature on technology integration and found the work of Churchill and Churchill (2008) particularly helpful: “Understanding of educational affordances is important in the context of planning a suitable intervention to support pedagogically effective integration of [...] technology” (p. 1439). In considering the affordances of our respective tools, Google Docs would provide the structure we needed for program-level assessment while Google Sites or WordPress could enable other more visible benefits: students could incorporate representations of learning beyond traditional words-in-a-row writing—such as audio reflections,

multimedia compositions, and digital images—that would foreground learning differently than in the hardcopy portfolios; students could share their work with more authentic audiences beyond their writing instructor—such as classmates, friends, family, future instructors, and potential employers; and students could practice writing for the Web, developing a professional online identity, and doing the kind of research that would lend itself to more multimodal writing going forward. While both Google Sites and WordPress enabled these advantages, we found that students could almost seamlessly embed their Google Docs artifacts into their Google Sites eportfolios, and Google Sites better met our criteria for user-friendliness.

While Google Sites is relatively simple compared to many eportfolio platforms available today, we considered this simplicity an affordance, because the tool could serve users with a wide range of technical experience and know-how. Daniel Anderson (2008) advocated for creating “low bridges” to multimedia projects by utilizing free software with “simplified interfaces, limited feature sets, and broad availability [to] ease the way towards innovation, [so] instructors and students [can] develop a sense of control, creativity, and flow” (p. 43–44). Google Sites meets Anderson’s criteria for a “low bridge,” enabling instructors to focus more on the learning and teaching around the eportfolio and less on the technical skills necessary to create or facilitate one. Anderson also suggested that “when it comes to integrating multiliteracies into composition classrooms, those who create environments where writers can experience the personal engagement that will translate into motivation and rich convergences of literacies” are most effective (p. 58). We found that using Google Sites to present their writing increased student engagement and made the process of setting up the assessment structure in Google Docs more worthwhile, because students were motivated by their ability to intimately customize the look and feel of their eportfolio; similarly, developing the digital portfolio presentation enabled students to practice composing in multiple modes, which FYWP instructors generally found appealing.

Although the system we developed may not be as comprehensive or nearly as tailored as those built from scratch, it is arguably more customized than many of the current off-the-shelf eportfolio software packages—and with minimal front-end costs, it is much more sustainable. At the start of our initiative, we had envisioned selecting only one tool for our eportfolio system, but we came to realize the greater power of the tools when used in tandem: implementing an eportfolio system that used both a Google Sites frontend and a Google Docs backend enabled us to more fully leverage the benefits of the digital, online environment in ways we did not initially envision but ultimately made our assessment initiative stronger and students’ learning experiences richer.

Our experience testing and developing an eportfolio system is a good example of what Elliot Soloway—a professor and researcher of technology, education, and software development at the University of Michigan—has described as a problem of “little change versus big change” (2012). Initially when we saw Google Docs as the solution to our assessment problem, we had “little change” in mind: we were thinking through the old process of portfolio learning in a new context, which Soloway argued would have led to only incremental improvements in student engagement and learning. Broadly speaking, Soloway suggested that technology alone has not improved student learning—it is the pedagogy around the technology that has the potential to be transformative. As we look toward broad-program implementation of our eportfolio system, we will keep “big change” in mind: we will need to continue to consider the affordances of the new technology and revise our pedagogy accordingly in order to affect the positive, “disruptive” change that will enable us to achieve greater outcomes from our eportfolio system and truly bring our FYWP into the 21st century.

6. Infrastructure as organic technical support and new approaches to “expertise”

Despite the complexity of the infrastructure we are dealing with, we have been able to build in support structures to help integrate the eportfolio system in the FYWP more smoothly.

As explained above, our instructors did not have access to central technology support to help them pedagogically and technically implement the eportfolio process into their courses. As a result, we served as the instructional designers and technical support folks—services English departments at better-resourced institutions could provide through in-house technical staff or farm out to a central technical support department. Ours is an outcome-based program where we emphasize the ends and are flexible in the means: in other words, there is no standardized curriculum; instructors can make decisions about how they implement the curriculum and go about helping students achieve our writing and learning outcomes. Because we value shared ends and diverse means to achieving them, the instructional support materials we created needed to be general enough to be widely usable while still taking into account the specific contexts of different instructors were working in.

To support instructors who were incorporating the eportfolio component into their first-year writing courses, we began developing support documentation during fall 2011. We created several screencasts that illustrate the basic technical process of setting up the Google Docs backend as well as creating the frontend portfolio structure in Google Sites. The screencasts were geared toward instructors, but we also made the Google Sites screencasts general enough to be dual-purpose so students could also watch them. While these screencasts focused on the technical steps necessary to set up an effective portfolio, they also included a few “teachable moments,” providing advice for users about issues like online privacy and professionalism.

Because we were re-purposing Google Docs and Google Sites to work within our specific context, we also approached the development of support materials in a similar way. While Google has developed ample resources to support their users and while we provided links to such materials in our documentation, we understood that these generic resources would not be enough to adequately support our colleagues and students or provide the contextualized support that would show them how these two Google platforms would fit into both our vision of eportfolios and their teaching/learning of writing, as well as provide for potential independent customizations of the system to meet individual needs. For example, instructors in the FYWP often have their students conduct ethnographic research for one of the course projects. We wanted to emphasize the ways in which Google Sites could support many of the activities students perform while conducting their research. Students could create pages on their sites to document their field research and interviews using images, videos, and even podcasts. They could build virtual connections between platforms they already used regularly, such as Flickr or Facebook. Students could use Google Sites to represent and reflect on their research processes in a media-rich way that would otherwise be impossible with traditional, paper-based portfolios. While Google provides instructions for creating and editing pages on Google Sites, they still approach it from what Google Sites pages *are* and the perspective of building a website—not an eportfolio. In order for our support materials to be most useful to our colleagues and students, we would need to show them what Google Sites pages *could be* in terms of eportfolios and their composition courses. Again, we had to re-conceptualize the platform to meet our needs and add the necessary value to increase stakeholder buy-in.

We collected all of our help materials on a Google Site that could serve as one-stop-shop for instructors. This crowd-sourced website was initially structured around specific issues our partner instructors and we experienced during the pilot. As the site grew, however, this structure became unwieldy and required a redesign. Not only was the content of the site becoming cluttered and difficult to navigate, but we also realized that a “help site” of this nature foregrounded potential problems rather than potential affordances. We wanted the site to not only serve as a resource for instructors who would run into problems, but also as a vehicle for promoting instructor buy-in.

Drawing on the work of Steve Krug (2010), the redesign began with a basic usability testing of the site. Krug argued that usability testing does not need to be limited to the realm of usability professionals, nor does it need to be highly expensive or time-consuming—an approach that matched our “lo-fi” approach to developing an eportfolio system in the first place. As such, we designed our *Krugian*-style usability testing by focusing on a small number of the most important perceived problems—ease of navigation, quality of resources, and ethos of the site—and by testing with scenarios (or tasks) that would mimic common uses of the site. The results of this testing showed that our concerns were justified. While test subjects found the resources to be ample, they had trouble finding them and navigating the site. Many subjects also expressed a desire to see examples so that they could get a better picture of what eportfolios are or could be.

We started the website redesign by drawing on some basic principles of information architecture (IA) and instructional design (ID). Again, none of us were technically IA or ID experts, but we could draw on our background in rhetoric, teaching, and learning to develop effective support materials and training that would support our users. Dan Brown (2010) suggested eight guiding principles of effective IA that can guide the design of most websites. These principles focus on aspects of web design that most directly affect the user’s relationship with a site’s content. For example, he argued for “focused navigation. . . that doesn’t mix apples and oranges,” meaning that navigation is clear and “establishes a strategy for finding content” (p. 33). Our original design combined all content into a single, mixed navigation scheme that didn’t provide a strategy for the user to search for content. He also argued that a well-designed architecture “offers meaningful choices to users, keeping the range of choices available focused on a particular task” (p. 30). Brown suggests an understanding of content not as inanimate objects, but as “living, breathing thing[s] with a lifecycle, behaviors, and attributes” (p. 31), and argues for the importance of providing meaningful examples that can support this.

While the redesign resulted in a more useful site for instructors rather than just an information dump, it also enabled the continued development of the site in the future. Much as existing infrastructure has a significant influence on the

development of a project like this, we have to again remember that infrastructure is never static and is always evolving. The creation of a well-structured resource site not only serves us in the present, but it also provides an opportunity for continued development. As we are still in the early stages of eportfolio implementation, additional issues are sure to arise as adoption expands. Creating an effective support infrastructure depends not only on the addressing of current issues, but also on establishing a means for this evolution to continue in the future.

7. Conclusion

Throughout this piece, we have, intentionally, framed a hopeful interpretation of our work around eportfolio development based upon a fundamental choice to acknowledge and consciously value the resources of infrastructure embedded within an everyday community of practice that, we anticipate, resembles many other college writing programs across the country which remain for complex reasons somewhere toward the “outside” of the subfield of computers and composition. Indeed, following on the hope that DeVoss, Cushman, and Grabill expressed when they initially adapted the concept for rhetoric and composition studies, the contribution we see as most vital in the project we have described here lies less in the details of the technology (even during the preparation of this manuscript, Google introduced a series of changes to its Docs and Sites platforms that will have implications for how we approach these systems going forward) than in the possibilities for applying the notion of infrastructure as a heuristic to make sense of the available resources as well as the constraints that make up a college writing program. The benefits of doing so in our case have included the ability to reinvent rhetorically both our sense of professional identity—“nice folks like us do, in fact, belong in a place like this”—as well as the sense of agency that informs administrative decision-making in our writing program; that is, we can in practice define then occupy a space between the discourses of from-scratch and off-the-shelf solutions to eportfolio development that otherwise circulate in the profession around us.

Challenges remain, however, for the infrastructure of our writing program as we’ve chosen to define it, ones that deserve mention as we conclude. Not least, these include the still-unresolved, macro-level tensions within rhetoric and composition studies as well as higher education generally over just how “embedded” writing programs should remain within English departments and the related issue of exactly whose values, priorities, or agenda should contribute to the “embodiment of standards” that a college writing program as infrastructure represents. At an intermediate level, the aforementioned rapid rate of technology change even with widely available platforms such as those of Google will continue to stretch the resources and expertise of writing programs trying to keep pace. Finally, at the most local level, writing programs face the challenge embedded in COP scholar Etienne Wenger’s observation that “[m]embers of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction” (2006: n.p.). Such has certainly been the lesson of our collaborative efforts around eportfolios. At the same time, as our collaboration has also demonstrated, graduate students eventually graduate, adjunct instructors cycle in and out of the profession to accommodate an array of life responsibilities, and tenure-track writing program administrators often rotate into other institutional roles during their career. These typical dynamics of change hardly seem worth notice in our everyday professional lives. But if we take seriously the social relations that underlie the concept of infrastructure—those communities of practice that figure out how to adapt existing technologies to specific needs, teach students to write, and teach each other what both these processes entail—then college writing programs need to acknowledge and value the resources of expertise, commitment, and good will embodied by literacy professionals of all ranks as much as we often value the latest innovations of technology, whether from scratch or off the shelf. Understanding our writing programs as infrastructures represents, we believe, a first step in doing so.

J.S. Dunn, Jr., associate professor of English, directs the First-Year Writing Program at Eastern Michigan University, where he also teaches in the graduate and undergraduate programs in Written Communication. His scholarship focuses on applied rhetorical theory, writing assessment, public policy discourse, and writing program administration.

Carrie Luke is an instructional learning specialist at the University of Michigan Library specializing in electronic portfolios and a MA candidate in Eastern Michigan University’s Written Communication program. She holds a BA in English Language & Literature and Women’s Studies from UM and is also a graduate of UM’s Undergraduate Creative Writing Program and a Hopwood award winner. She grew up in Ypsilanti, Michigan, and currently lives in Ann Arbor with her cat Erma.

David Nassar is an information and technology professional at the University of Michigan. He holds a BA in English from Michigan State University and an MA in Written Communication from Eastern Michigan University. He has worked as a professional educator and writing instructor at the secondary and post-secondary levels.

References

- Adler-Kassner, Linda. (2008). *The activist wpa: Changing stories about writing and writers*. Logan: Utah State University Press.
- Adler-Kassner, Linda, & Estrem, Heidi. (2009). The journey is the destination: The place of assessment in an activist writing program—Eastern Michigan University. In Bob Broad, Linda Adler-Kassner, Barry Alford, Jane Detweiler, Heidi Estrem, Susanmarie Harrington, Maurine McBride, Eric Stalions, & Scott Weeden (Eds.), *Organic writing assessment: Dynamic criteria mapping in action* (pp. 14–36). Logan: Utah State University Press.
- Anderson, Daniel. (2008). The low bridge to high benefits: Entry-level multimedia, literacies, and motivation. *Computers and Composition*, 25, 40–60.
- Barton, Ellen. (1994). Interpreting the discourse of technology. In Cynthia Selfe, & Susan Hilligoss (Eds.), *Literacy and computers: The complications of teaching and learning with technology* (pp. 56–75). New York: Modern Language Association.
- Bishop, Wendy. (1991). Going up the creek without a canoe: Using portfolios to train new teachers of college writing. In Pat Belanoff, & Marcia Dickson (Eds.), *Portfolios: Product and process* (pp. 215–227). Portsmouth: Boynton/Cook.
- Black, Laurel, Daiker, Donald, Sommers, Jeffrey, & Stygall, Gail (Eds.). (1994). *New directions in portfolio assessment: Reflective practice, critical theory, and large-scale scoring*. Portsmouth: Boynton/Cook.
- Bloom, Lynn. (1996). Freshman composition as a middle-class enterprise. *College English*, 58, 654–675.
- Broad, Bob. (2003). *What we really value: Beyond rubrics in teaching and assessing writing*. Logan: Utah State University Press.
- Brown, Dan. (2010). Eight principles of information architecture. *Bulletin of the American Society of Information Science & Technology*, 36, 30–34.
- Cambridge, Barbara. (2001). *Electronic portfolios: Emerging practices in student, faculty, and institutional learning*. Washington: American Association for Higher Education.
- Cambridge, Darren, Cambridge, Barbara, & Yancey, Kathleen Blake (Eds.). (2009). *Electronic portfolios 2.0: Emergent research on implementation and impact*. Sterling: Stylus.
- Churchill, Daniel, & Churchill, Natalia. (2008). Educational affordances of PDAs: A study of a teacher's exploration of this technology. *Computers and Education*, 50, 1439–1450. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0360131507000139>
- Conference on College Composition and Communication. (2006). Certificate of Excellence in First-Year Writing: Eastern Michigan University.
- Connors, Robert. (1997). *Composition-rhetoric: Backgrounds, theory, and pedagogy*. Pittsburgh: University of Pittsburgh Press.
- Council of Writing Program Administrators, National Council of Teachers of English, and the National Writing Project. (2011). *Framework for Success in Postsecondary Writing*. Council of Writing Program Administrators.
- Crowley, Sharon. (1990). *The methodical memory: Invention in current-traditional rhetoric*. Carbondale: Southern Illinois University Press.
- Crowley, Sharon. (1998). *Composition in the university: Historical and polemical essays*. Pittsburgh: University of Pittsburgh Press.
- Desmet, Christy, Balthazor, Ron, Cummings, Robert, Hilton, Nelson, Mitchell, Angela, & Hart, Alexis. (2005). em>: Re-forming composition with xml. *Literary and Linguistic Computing*, 20, 25–46.
- Desmet, Christy, Church, Miller Deborah, Griffin, June, & Balthazor, Ron. (2008). Reflection, revision, and assessment in first-year composition eportfolios. *Journal of General Education*, 57, 15–30.
- Desmet, Christy, Griffin, June, Church, Miller Deborah, Balthazor, Ron, & Cummings, Ron. (2009). Re-vision revision with eportfolios in the University of Georgia first-year composition program. In Darren Cambridge, Barbara Cambridge, & Kathleen Blake Yancey (Eds.), *Electronic portfolios 2.0: Emergent research on implementation and impact* (pp. 155–163). Sterling: Stylus.
- DeVoss, Dánielle, Cushman, Ellen, & Grabill, Jeffrey. (2005). Infrastructure and composing: The when of new-media writing. *College Composition and Communication*, 57, 14–44.
- Dobrin, Sidney. (2005). *Don't call it that: The composition practicum*. Urbana: National Council of Teachers of English.
- Dunn, J. S., Fabian, Sarah, Gray, Suzanne, Pavlock, Kim, Levitt-Phillips, Hava, Soebbing, Sarah, Estrem, Heidi, & Adler-Kassner, Linda. (2012). Adoption, adaptation, revision: Waves of collaborative change around the wpa outcomes statement in a large university writing program. In Duane Roen, Gregory Glau, & Nicholas Behm (Eds.), *The writing program administrator's outcome statement: A decade later* (pp. 45–73). Clemson: Parlor Press.
- Ede, Lisa. (2004). *Situating composition: Composition studies and the politics of location*. Carbondale: Southern Illinois University Press.
- Gale, Xin Liu, & Gale, Fredric (Eds.). (1999). *(Re)visioning composition textbooks: Conflicts of culture, ideology, and pedagogy*. Albany: State University of New York Press.
- Grabill, Jeffrey. (2003). On divides and interfaces: Access, class, and computers. *Computers and Composition*, 20, 455–472.
- Grabill, Jeffrey. (2010). Infrastructure outreach and the engaged writing program. In S. Rose, & I. Weiser (Eds.), *Going public: What writing programs learn from engagement* (pp. 15–28). Logan: Utah State University Press.
- Hamp-Lyons, Liz, & Condon, William. (1999). *Assessing the portfolio: Principles for practice, theory, and research*. Cresskill: Hampton.
- Huot, Brian. (2002). *(Re) Articulating writing assessment for teaching and learning*. Logan: Utah State University Press.
- Krug, Steve. (2010). *Rocket surgery made easy: The do-it-yourself guide to finding and fixing usability problems*. Berkeley, CA: New Riders.
- Lave, Jean, & Wenger, Etienne. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.
- Lynn, Steven. (2010). *Rhetoric and composition: An introduction*. New York: Cambridge University Press.
- Massey, Lance, & Gebhardt, Richard. (2011). *The changing of knowledge in composition: Contemporary perspectives*. Logan: Utah State University Press.
- Moran, Charles. (1999). Access: The “a” word in technology studies. In Gail Hawisher, & Cynthia Selfe (Eds.), *Passions, pedagogies, and 21st century technologies* (pp. 205–220). Logan: Utah State University Press.
- North, Stephen. (1988). *The making of knowledge in composition: Portrait of an emerging field*. Portsmouth: Boynton/Cook.
- O'Neill, Peggy, Moore, Cindy, & Huot, Brian. (2009). *A guide to college writing assessment*. Logan: Utah State University Press.

- Reilly, Colleen, & Williams, Joseph. (2006). The price of free software: Labor, ethics, and context in distance education. *Computers and Composition*, 23, 68–90.
- Roemer, Marjorie, Schultz, Lucille, & Durst, Russel. (1991). Portfolios and the process of change. *College Composition and Communication*, 42, 455–469.
- Rosner, Mary, Boehm, Beth, & Journet, Debra (Eds.). (1999). *History, Reflection, and Narrative: The Professionalization of Composition, 1963–1983*. Stamford: Greenwood Press.
- Shaughnessy, Mina. (1977). *Errors and expectations: A guide for the teacher of basic writing*. New York: Oxford University Press.
- Soloway, Elliot., (2012). *Education in the age of mobilism: The inevitable transformation of the K–12 classroom*. Keynote presented at Enriching Scholarship, Ann Arbor, MI.
- Star, Susan. (1999). The ethnography of infrastructure. *American Behavioral Scientist*, 43, 377–391.
- Star, Susan, & Ruhleder, Karen. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research*, 7, 111–134.
- Steering Committee of the Outcomes Group. (1999). WPA outcomes statement for first-year composition. *College English*, 63, 321–325.
- Strickland, Donna. (2001). Taking dictation: The emergence of writing programs and the cultural contradictions of teaching composition. *College English*, 63, 457–479.
- Trimbur, John. (1996). Writing instruction and the politics of professionalization. In Lynn Bloom, Donald Daiker, & Edward White (Eds.), *Composition in the twenty-first century: Crisis and change* (pp. 133–145). Carbondale: Southern Illinois University Press.
- Wenger, Etienne. (2006). Communities of practice: A brief introduction. Retrieved from <http://www.ewenger.com/>
- Williamson, Michael. (1994). The worship of efficiency: Untangling theoretical and practical considerations in writing assessment. *Assessing Writing*, 1, 147–174.
- Yancey, Kathleen Blake. (1992). *Portfolios in the classroom: An introduction*. Urbana: National Council of Teachers of English.
- Yancey, Kathleen Blake., (1994). Make Haste Slowly: Graduate Teaching Assistants and Portfolios. In Laurel Black, Donald Daiker, Jeffrey Sommers, & Gail Stygall (Eds.), *New directions in portfolio assessment: Reflective practice, critical theory, and large-scale scoring*. (pp. 210–218).
- Yancey, Kathleen Blake, & Weiser, Irwin. (1997). *Situating portfolios: Four perspectives*. Logan: Utah State University Press.
- Young, Richard. (1978). Paradigms and problems: Needed research in rhetorical invention. In C. Cooper, & L. Odell (Eds.), *Research on composing: Points of Departure* (pp. 29–48). Urbana: National Council of Teachers of English.