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### Sharing an Assessment Ecology: Digital Media, Wikis, and the Social Work of Knowledge

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## Sharing an Assessment Ecology: Digital Media, Wikis, and the Social Work of Knowledge

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Through a retrospective examination of three case studies, this article argues for an open, contextualized approach to evaluating student learning using wikis. First, the project should be grounded in habits of thought appropriate for the field. Next, the class activity should give students the responsibility for putting these habits into practice. Finally, assessment should be distributed among a range of stakeholders and should be contextualized to give value to students’ work beyond the classroom.

Keywords: assessment, collaboration, student-centered teaching, wikis, writing across the curriculum

Wikis have generated a lot of excitement in the technical communication community because they seem to embody much of what composition theorists have long valued for writing instruction: collaboration, the possibilities in hypertextuality, and public engagement with knowledge production. However, as researchers have begun to study wikis in the classroom, their initial excitement has been tempered in trying to assess their effectiveness and finding mixed results. Fernheimer et al. (2009), looking to see how wikis might promote “deep collaboration” among students, discovered that not only did wikis not significantly support the collaboration for which they were hoping but also that students were frustrated because they saw the wiki and the project associated with it as interfering with their collaborative process. The central challenge that Fernheimer et al. and other researchers faced in assessing wikis was that, as they pursued their projects, they discovered that their methods could not keep up with the highly contextualized, emerging work that their students were doing. In studying wiki use in South African political science classrooms, Carr, Morrison, Cox, and Deacon (2007) showed how tensions arose between the collaborative learning fostered by wikis and the wider expectations of more conventional approaches to teaching and learning, especially in regard to assessment. Lundin (2008), as well, noted how thoroughly wikis challenge the prevailing approaches to new media composition, collaborative writing, critical interaction, and online authority in ways that ask us to reevaluate the “already-tangled relationships between teacher and student authority” (p. 445; see also Elfving & Menchen-Trevino, 2008; Garza & Hern, 2005; Navarre Cleary, Sanders-Betzold, Hoover, & St. John, 2009; Nelson, 2008). Fernheimer et al. described their insights as they came to grips with the challenges their research posed:

Organized as they are around the end product (the submitted document), instead of the writing process, typical assessment protocols are poorly matched to deeply engaged, iterative, recursive, and

collaborative writing . . . . If educators are committed to collaborative writing (or collaborative design generally), if they believe that learning is improved when peers provide feedback on one another's work at each iteration, then rethinking the overall assessment process might be more effective than merely identifying tools that help cope with the existing tension. (Conclusions para. 4)

If wikis depend on a complex, emergent context and an intentional, adaptive community of practice, then product-oriented and hierarchical approaches to instruction or assessment simply will not work. To put it another way, if the benefit of wikis depends on the fact that they develop in ways we or our students do not expect, how can we possibly assess them? We will suggest here that we need to radically rethink our assessment practices to better match the collaborative, adaptable nature of wikis. Because wikis can shift the social dynamics of the classroom, they represent an opportunity to examine approaches to assessment that help us think differently about how we teach and how we engage our students as they learn. The solution we suggest depends on three central points. The first is that wiki projects should be grounded in our values about knowledge: the habits of thought and practice we want our students to take up, as well as our understanding of how knowledge should be created, disseminated, and valued in the classroom and in the field. The second is that we design the workflow of our courses around these habits and values and, more importantly, turn over the responsibility for enacting this knowledge practice to our students. Furthermore, this work flow should be flexible and adaptable, open to whatever approaches students develop as they enact our values about knowledge. The third is that our approach to assessment should be distributed across a range of stakeholders and contextualized in ways that make work meaningful to students beyond just the classroom. In what follows, we point to several streams of thought in the literature on assessment that suggests the more flexible, open ecology of assessment we feel is necessary when asking students to compose, disseminate, and evaluate their digital media work. From there, we will examine three case studies that involved classroom projects using wikis, two from classrooms in the social sciences that stemmed from Chris Manion's writing across the curriculum (WAC) collaborations and the last taught by Dickie Selfe, who reflects on what those cases reveal about his and his students' work in a media-rich professional writing class.

Much of the recent research on assessment has pointed toward more decentralized, situated approaches to examine students' learning (see Neal, 2010). Scholars like Huot (2002) have argued that it is a mistake to separate the process of composing from the assessment practices we use to evaluate student work. The role of the teacher in assessment should be to guide students through the process of learning to assess their own work: to help them understand the contingencies of a given task; to anticipate the possible, varied responses from readers; and to choose from a range of rhetorical choices they might make in a particular context (see Weimer, 2002; Whithaus, 2005). Although wikis in and of themselves do not necessarily promote the student learning-oriented assessment practices that writing scholars promote, they certainly can facilitate those practices. When instructors carefully situate reflective and collaborative learning within an intentional, distributed social network and contextualized knowledge-building activity, wikis can be powerful aids. The second line of thinking that informs our approach is the idea that assessment is tied to wider systems of activity that reflect particular local, field-specific ways of thinking as well as the immediate contingencies of an always evolving context (see Broad, 2003, 2009; Carter, 2003; Kistler, Yancey, Takzak, & Szymanski, 2009; Selfe, 1997; Yancey, 1999). These approaches ask us to carefully uncover

what we value in the work that we and our students do in the classroom—something that is crucial when we are working with new media like wikis where our usual print-oriented expectations may not apply or may apply in ways we do not expect. Penrod (2005) noted how the emerging nature of online writing calls for assessment practices that push beyond standardized print-based assumptions about writing toward more contextualized approaches that help students evaluate their work within the composing process: “We are still learning the language of how to describe and define what [student] knowledge making and knowledge producing processes are in the networked classroom space” (p. xx; see also Huot & Borton, 2007; Whithaus, 2005).

Syverson (1999), looking for a descriptive model for the composing process that accounts for its complexities, turned to theories about ecological systems and cognitive science that get at unpredictably emergent and highly contextualized activity. The complexities of composing, she argued, might be better grasped if we see it as distributed among agents and other structures in the environment, emerging from local networks of organizing activity that is embodied in physical space and human action and enacted through contextualized practices unfolding over time. She noted that approaches to assessment that boil down the writing process in ways that shortcut this complexity tell us little about students’ composing practices. Syverson’s understanding of composition as part of a wider ecology of activity reflects the holistic approach to classroom practice and assessment that we saw in our colleagues’ work described below. Furthermore, her approach to assessment addresses the complex social contexts in which wikis develop and which they in turn transform. Although we do not adopt the learning records approach that she described, we adopt her careful examination of the interrelationships among actors, artifacts, and environments as they develop over time.

To get at the complexities of wiki use, as well as to suggest a flexible pedagogy and assessment strategy that accommodate this complexity, we will examine three cases of courses making use of wikis.<sup>1</sup> The first course was an upper-level anthropology course (with approximately 30 students) on foraging societies. In two different classes over 2 years, Mark Moritz, an assistant professor of anthropology, asked students to collaboratively gather accounts of a variety of hunting and gathering groups in different regions, summarizing the scholarship on these social groups for a public audience. During each iteration, Manion led a series of workshops that helped students explore their discipline’s approach to knowledge and writing, guiding them in thinking through how the discipline’s conventions for writing and inquiry might translate to their wiki project. The second course of approximately 100 students was an introduction to research methodology in which Ellen Furlong, a lecturer in the Department of Psychology, placed students in groups of four and asked them to prepare articles for an imagined journal called *Future Directions in Psychological Science*. After a workshop on developing rubrics led by WAC consultants, students developed the rubrics that they used in peer review, as if they were evaluating their classmates’ articles for publication in the journal. The third class we will discuss was taught by Selfe in the spring of 2009. This advanced professional writing course has components representative of many technical and professional communication courses across the country. The course is the last that students in the professional writing minor at Ohio State University must take before they apply for a writing internship with one of over 120 corporate, organizational, or university work partners in the Columbus, Ohio, area. The course is designed to help students become flexible alphabetic writers, practiced multimodal composers, and technology brokers, that is, people who manage complex information in new literacy environments and work with

colleagues to assess the value and functionality of those systems within that discipline or workplace. Selfe had students practice this work in an Ohio State wiki, “Exploring 21st Century Professions,” where each student would contribute a series of pages that represented the human, textual, and media resources gathered during the term on a profession of the student’s choice.<sup>2</sup>

Both instructors with whom Manion worked were satisfied with their students’ work and, after the projects were completed, he interviewed them and collected a range of course materials. We looked carefully at what we collected from the broad ecological perspective that Syverson promotes, and Selfe reflected on his own experience using wikis in his professional writing course in this light. As we developed a model for understanding why the instructors felt these projects were successful, we shared our perspectives, including several drafts of this article, with Furlong and Moritz to get their feedback, seeking to include in our analysis their perspective from as many stages of our research as possible. The overarching questions we have used to shape our analysis of these three course experiences examine how each of these wiki projects developed within these instructors’ classes and how each instructor approached assessment to deal with the evolving complexity of their students’ work:

- What were the habits of thought and what processes of inquiry did the instructors want their students to use?
- How did instructors design the course and assignments so that students were enacting that thinking and practice, and how did they prepare the students for that work?
- What surprised instructors about how students responded to the projects throughout the quarter?
- What kinds of adjustments did instructors make along the way?
- Throughout the quarter, how well did students enact those habits of thought and practice, and by what means did instructors know that students were on the right track?
- How were students involved with assessment, and how did they and their classmates know that they were on the right track?

Thus, our approach not only assesses the outcome of the student projects but also evaluates how assessment was interwoven throughout all the course activities, how it was distributed among stakeholders inside and outside the classroom, and how it affected the direction and shape of the projects. Assessment in each of these classes was continuous, shared, and recursive. Throughout the projects, instructors had many opportunities to evaluate students as they learned, and as unexpected challenges arose, they were able to work with students to reevaluate their work both individually and as a whole.

## HABITS OF THOUGHT AND PRACTICE

Carter (2007) described how particular forms of writing are tied to recurring ways of thinking and acting to address common goals or challenges in a discipline. Seeing this connection between writing and a discipline’s intellectual work, Carter insisted, allows teachers to more fully engage students in the social activity of the field while they consider the complexities of how this activity and the writing entwined within in it are shaped and reshaped in practice. Outcomes-based assessment advocates often discuss the importance of articulating learning

objectives in terms of cognitive processes—how students know as well as what they know (Anderson & Krathwohl, 2001). Carter (2003) outlined a local, situated approach to articulating disciplinary learning outcomes that emphasize the relationship between knowing, doing, and composing.<sup>3</sup> For our two instructors in anthropology and psychology, what was most important was that their students were acculturated to scientific practice in their field and as much as possible might see themselves as contributing to the wider scholarly conversation in the field. In an interview, Moritz put it this way:

When I teach students, I try to socialize them as anthropologists, so I want to give them a sense that they are part of the discipline and they need to learn the way of the discipline . . . I hope that in all of my assignments they get habits: not only habits of writing but habits of research—research and writing. (personal communication, December 6, 2007)

Moritz focused the inquiry of his class on the challenge of studying and representing foraging groups. The class critiqued popular perceptions of many hunting and gathering societies, which are often colored by romanticized stereotypes painting foragers as uncorrupted by modern development or as contemporary examples of early human society. The textbook for the class, Kelly's (2007) *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways*, laid out many of the habits of thought that Moritz wanted his students to practice. The text urged students to recognize and explain diversity among groups characterized as foragers; to carefully place current and past research in particular historical, social, political, and economic contexts; to acknowledge changes in these groups over time; and to deconstruct preconceived notions about foraging lifeways that have skewed research in the past. This means that rather than focusing on generalized common characteristics between societies, ethnographers try to describe variation among groups and explain that variation. Moritz made this method of studying foraging groups the foundation of the course wiki, encompassed in the wiki's motto: "Scientifically studying the diversity of forager societies without recreating myths." As we will see, the motto and the research method it represented shaped the project in crucial ways, guiding students' thinking and giving them a framework for developing the project together and for evaluating their work.

Furlong introduced her students to psychological research by spending time early in the quarter walking students through the process of research and modeling the attitudes that scientists in psychology take toward their work. In a series of introductory presentations, Furlong outlined what she saw as the scientific mode of thinking, exemplified by the character of Sherlock Holmes. After going through several popular misconceptions about psychology and noting which ones research has confirmed or debunked, she described the habits of mind that scientists use to outwit the criminal Moriarty's that work against scientific inquiry: systematic empiricism, skepticism, controlled research, falsifiability, and willingness to share research outcomes. A second presentation outlines the scientific process as if Holmes were searching his way through a maze, exploring the inquiry of cognitive science that is on the one hand systematic but on the other hand emerging and contingent: A promising path strewn with clues might be a dead end or might open new avenues of exploration. The research is always contextualized within a broader conversation of researchers—Holmes must always return to the central corridor of "literature," as research is defined by what has come before, is evaluated in relationship to its predecessors, and furthers its ends on top of previous studies. At the center of these presentations is the

expectation that students would be taking up these habits, putting the science into practice themselves. Furlong explained her approach for preparing students for the project:

I think spending all that time up front [talking about process] before we ever talk about an independent variable or a dependent variable [meant that] they were much better at not only their [own] writing projects but about talking about the research they read as well. . . . “Here’s how we do this [in professional psychological research]. Now you tell me how you are going to do this in class.” (personal communication, May 3, 2010).

Selfe did not have the luxury of socializing students into a single disciplinary way of knowing or communicating, nor do many teachers of technical and professional communication classes. Without listing individual professions, students in this one class hoped to find work in these areas: art and design, business and communication, education and learning, health and medicine, as well as law and politics. The foremost habit of mind or inquiry emphasized in this class, then, was a willingness to explore and discover details of the professional lives and working contexts of relevant communicators in corporate, organizational, and academic institutions. This included interviews and discussions with professionals, students, and faculty members who had advanced knowledge of a student’s chosen profession. A quick survey of students early in the term indicated that surprisingly few students had ever talked to professionals in their chosen field, and those who did frequently had contacted only family members and close family friends.

The course focused, in addition, on traditional experiences with client and audience-based applications of spelling, grammar, style, tone, and organization. A third habit of thought and practice came out of an observation made by the coordinator of the professional writing minor (PWM), Trish Houston. Over the past 3 years, Houston has noticed that PWM students in the field experiencing professional writing internships frequently collaborated on workplace projects that included designed graphic, audio, and video elements, all of which are often displayed or published within interactive systems. Students in this preinternship class, therefore, must also be able to navigate the rhetorical nature of media compositions and online spaces (a wiki in this case) in collaboration with more experienced workers. It was not enough to assess individual media use per se but to assess students’ ability to judge from their disciplinary or workplace perspective the value of many media as used in interactive systems, that is, their ability to act as technology brokers. The teachers of this upper-level professional communication class (including Selfe), however, come out of writing studies disciplines and bring with them highly detailed assessment criteria that tend to focus on the alphabetic. Therefore, the challenge for Selfe was to engage and assess students in at least three areas:

- a willing exploration of professional contexts
- a careful attention to all aspects of alphabetic writing
- a more practiced and nuanced understanding of media production in new literacy environments.

### PUTTING THESE HABITS INTO PRACTICE

We will further examine how these habits manifested themselves in student work below. But first, we want to illustrate how they also provide a common set of practices that the classroom



community shared as part of their collaborative inquiry, as well as how they laid the groundwork for a model of distributed assessment. The wiki both provided a space for the classes to put these values into practice and helped the classes to disseminate their work within a carefully situated context. Students had significant flexibility to pursue their work within this common practice, and they held themselves and each other accountable outside of the usual teacher-student classroom hierarchy. Nevertheless, the instructors we talked to guided students carefully through the process, scaffolding their work with assignments that engaged them with crucial stages in research and inquiry. This grounded flexibility provided students and teachers both a basis on which to evaluate their work and a process through which they could adjust their understanding of the project and its goals as they met unexpected challenges and opportunities.

Moritz had his students work on the wiki in two different classes 1 year apart (autumn 2007 and autumn 2008). The sequence of assignments connected to the wiki differed slightly for each class, but the principles behind them were similar. To hold true to the wiki site's motto, Moritz's students had to explain the variation and diversity among foraging societies, recognize these groups' current material situations apart from the contexts studied in past research, and ultimately think carefully about ethnographic representation. The first class, which initially built the wiki, started by preparing an annotated bibliography of one forager group, and then the students collaboratively wrote an article on the society. Next, they each composed a critical review of an article on a broader theoretical topic, such as land tenure or sexual division of labor among foraging groups, and again developed a wiki page on the topic with another group of students. On top of these two assignments, Moritz's students had to make 10 significant contributions to the wiki beyond these projects and write a reflection on these contributions at the end of the quarter. Moritz gave the students examples of possible contributions, including adding further pages on research related to foragers, maps or other media on various groups, and editing other groups' pages. He also asked students to include a summary of their contributions that would show up in the wiki's roll of changes and to contribute to a dialogue about their changes in a page's discussion forum. To keep students accountable, he noted that he would evaluate the quality and quantity of their contributions. During the second class (in 2008), Moritz invited students from the previous class to come and give their perspective on the project and to suggest places where the site could be improved, effectively handing over the project to the new class of students. The new group then wrote an evaluation of the wiki as an effective online source. Moritz condensed the annotated bibliography and critical review into one research paper that compared three societies (two related to their common readings and another of their choice) on a theoretical topic covered on the wiki by the previous class. This assignment similarly guided students through the research process that they needed to critically evaluate their work on the wiki. As in the previous class, the students each needed to make 10 contributions during the quarter and reflect on those contributions in a two-page paper.

Like Moritz's wiki site, Furlong's home page presented the mission of *Future Directions in Psychological Science* by asking students to take up habits of inquiry so they shared responsibility for holding their and their colleague's work accountable to a collective set of values for scientific practice. The call for papers on the wiki outlined three goals for authors:

- They should provide a review of current knowledge in the field of psychology by identifying a topic currently of interest to psychologists and discussing the current body of knowledge addressing that topic.



- They should identify gaps in the current knowledge by identifying one testable question related to the topic that has been left unanswered.
- Authors should propose a study to address the unanswered question. They should clearly explain how the results of the proposed study will address a gap in previous knowledge. (personal communication, December 16, 2009)

Furlong's students began with three reviews based on two articles on a topic, one of which must cite the other. The first two addressed each of the articles individually, and the third explored how the articles were in conversation with each other in addressing the topic students were researching. The students, in groups of four, individually had to choose different articles so that each group had familiarized itself with eight articles on its topic. These assignments served to give students a strong sense of how cognitive science worked in practice and was communicated and thus gave them a basis on which to design their own projects. They also, as we will note below, gave students models from which to develop criteria for assessment as well as a limited, collective expertise on the topic they were exploring. The groups then began to put together their research methodologies step-by-step, beginning from a hypothesis and outline, moving on to the introduction and literature review, developing their methodological section, before pulling their work together as a complete article.

During Selfe's professional communication class, in addition to a traditional reading discussion assignment of professional communication topics (usability, writing process theory, rhetoric, intellectual property), students were asked each week to build and collaboratively review resources for their chosen professions. On a protected wiki site, they began by generating annotations of online and print resources that they identified as useful to new professionals and students in their major. Initially, resource entries were text heavy, and they provided students with abundant traditional research, writing, developmental editing, and proofreading opportunities.

Gradually students were introduced to different media types that could be embedded in or linked to their wiki entries. As they began collecting audio interviews, constructing collages, and annotating digital objects for their wiki, the visual and aural nature of their work became more important to them and to the success of the site. Graphic elements were modified for online viewing, and audio interviews with professionals in their field were edited down into manageable chunks and linked to appropriate interview reports. The human and technological affordances that they discovered or that frustrated them about the wiki system became productive moments of discussion: As they practiced attending to both the act of composing and to the system in which they composed, the students learned firsthand through production, peer review, and usability activities how to effectively use this wiki system to meet the particular demands of their projects. What resulted was a wiki—*Exploring 21st Century Professions*—that went public for a short time after the class was completed (with permission of the students and their interviewees).

## SHARING ASSESSMENT ECOLOGIES

As Navarre Cleary, Sanders-Betzold, Hoover, and St. John (2009) discovered in their own research on wikis, none of the assignments and pedagogical approaches the instructors take here are particularly novel. What is perhaps different is that the endpoints of these projects were not predetermined. Moritz had no particular sense of what shape his students' wiki would take other

than that it would be in some ways like a series of Wikipedia articles, grounded by careful anthropological practice. Furlong did not have many preconceptions of her students' methodological articles. Although the work they were doing—identifying a gap in the research literature, posing hypotheses, designing research methodologies, and anticipating potential outcomes—was central to scientific practice, the form that their essays took was distinctive because no outlet for these particular kinds of essays, which posed research and identified specific methods without actually performing it or reporting on collected data, existed in the field. Selfe assumed that students would reveal their own understanding of both the professional resources and, eventually, how advanced practitioners in each field would represent their communication activities. But the exact nature and predominant modality of sites created by diverse professional communicators was, at best, undefined and uncertain. Despite this uncertainty, each of these instructors used regular, diverse, and distributed methods of assessment to gauge student learning and to carefully guide the students' projects along the way. This distribution of assessment, in fact, allowed instructors and their students to collectively grapple with the challenges the emerging projects posed, and they could adjust the project in light of their shared values about how knowledge worked in the class.

In each case, students in Moritz's, Furlong's, and Selfe's classes were not simply doing work individually, responsible only to the instructor and to the evaluative criteria imposed from outside the students' work. The projects' collective natures, facilitated by the wikis, provided a framework for students as they evaluated their colleagues' and their own work. Although each instructor provided guidance to students in the assessment process, preparing students to both practice the inquiry of the discipline and discern the criteria by which practitioners within the field evaluate each other's work, the students were able to take responsibility for assessing their work and to commit to a context in which this assessment was meaningful outside of the class assignment. Ultimately, this student-initiated assessment not only helped students put the discipline's values to practice but also helped each instructor gauge students' learning throughout the process and think more flexibly about the structure of the projects their students were doing: what students were capable of and how technology might be changing the work they were doing in the classroom.

Moritz was able to evaluate students' progress from a number of different vantage points. First, he examined the articles themselves as they developed and evaluated the assignments meant to inform that work. Early in the process, Moritz gave feedback in text, which students had to address as they edited their pages. The feedback was framed in terms of the target habits of thought, asking students, for example, to clarify variation among groups that they were comparing or to better contextualize some of the ethnographic research. Next, the requirement that students summarize their contributions and discuss their changes in the page forums created a space for both Moritz and his students to address challenges and questions in their research and writing. As we will see below, the discussion forums were a crucial place where Moritz gauged how students were adopting the habits of mind encapsulated in the site's motto. But what really focused students' approach to assessment and their commitment to the ways of thinking that the site promoted was the idea that the wiki was to be a public resource for other students. Thus, the students' sense of what was at stake for ethically representing foraging societies fundamentally shaped how they evaluated their writing and even what shape the pages took. For instance, if they were supposed to avoid generalizations across different societies and focus on variation, how might they frame the pages that focused on broad theoretical issues like sexual

division of labor? If they wanted readers to critically evaluate representations of foragers, how would they contextualize visual media on the site, which might unintentionally reinforce stereotyping myths? Neither Moritz nor his students had anticipated these questions, but their sense of mission guided their work throughout the quarter, shaped by their disciplinary commitments and their awareness of how their readership might evaluate the site's content.

Furlong and a colleague who volunteered to help her respond to the students' projects gave feedback at crucial stages in the process, particularly at early stages of development. At each of the three stages of the article development (introduction, methodology, and the complete article), Furlong asked students to submit criteria, and she gathered them into a shared rubric. These rubrics were then used as the basis for a double-blind peer review between groups doing similar projects. Furlong collected the reviews and summarized them in an editorial letter, highlighting comments she thought were particularly crucial for the students to address. Like Moritz's students, Furlong's students (at least the successful ones, she noted) took advantage of the wiki's commenting function to work out pressing questions in their research. The tenor of assessment was shaped by Furlong's lectures on the scientific process and the assignments that had introduced students to professional research. Because each member of a group had to report on different articles, the groups developed a limited but significant expertise on their topic, which usually overlapped with the topics on which at least one other group was working. Furlong noted that the overlap gave students a basis on which they could do peer review, in terms of both having explicit models from which to develop criteria and giving them a sense that they had common community standards to uphold within the discipline. The seriousness with which students took these standards and the conscientiousness with which they applied them to their own and their peers' work surprised her.

One might think that the writing focus, the necessary rigor of the evaluations ("Last chance to practice professional writing in a safe environment!"), and the student expectations of Selfe's professional communication course would work against the kind of student-involved assessment practices that we are suggesting in this article. This was not the case. Over the term, students were responsible for researching, reviewing, and annotating professional resources: online and print pieces but also people, places, events, and relevant media. The class started off with very traditional assessment responsibilities. Students handed in resource draft work every week to Selfe and a peer-response group. A close reading and response by the teacher was combined and compared with contextual comments from each individual in their peer-response group. Over time, however, students learned that they would succeed in holding on to reasonable language choices, tone, and organization if they argued from a professional rhetorical point of view. Those types of arguments began influencing the criteria for judging an individual's compositions.

Because the class and instructor were exploring the issues of linking, site design, and media issues in the wiki together, they negotiated each round of complexity as students were asked to modify images, create collages, and edit audio interviews. What does it mean to have an effective collage for your particular professional or near-professional audience? How will audio influence your resource compositions? How can you use the interactive portions of the site? What navigation will make sense to your viewers/readers/responders? Each answer had to be determined rhetorically according to the students' own and their target professions' expectations.

Then Selfe asked them to find a series of reviewers who had advanced knowledge of their profession. They conducted short usability tests of the content, organization, and media work on their site. Many chose to ask the professionals whom they had interviewed, along with

advanced students, graduate students, lecturers, and professors in a related discipline, to test and provide feedback for their sites. These out-of-class moments of assessment had a substantial influence on how the group valued (positive and negative) the wiki work as students reported on their findings.

### WHAT THEY FOUND AS THE PROJECTS DEVELOPED

It is one thing to have pedagogical approaches and assessment practices in place that engage students in authentic inquiry, but it is another to actually see how their work plays out. In this next section, we will examine what each of these instructors found as their courses proceeded: how well their students demonstrated the habits of thought they wanted them to practice, what surprises they found along the way, and how they collaborated with students to address unexpected issues. This process of assessment was recursive. As the project developed, there were moments where it became clear to the instructors and students that components of the project did not enact their core habits of thought as faithfully as they could. These were moments where, under the guidance of the instructor, the students could collaboratively reevaluate their work on both individual and collective levels.

In practice, Moritz was able to see his students' progress throughout the quarter in enacting the Web site's mission from the different vantage points that we noted above. One, of course, was the Web site itself. The front page included a disclaimer that reflected the students' desire to establish readers' critical eyes for how to interpret representations of foraging groups, including the information on the site itself. This critical stance was reflected throughout the page, culminating in an account of the myths that plague research on foragers to preface a bibliography on work to dispel these stereotypes:

The goal of this wiki is to redefine the contemporary world's idea of the typical hunter-gatherer. Also, much of the information posted on this site may come across as a "snapshot in time" in the mind of the reader; in other words, these societies depicted here have not stayed static. Their culture may once have been defined as hunter-gatherers, but keep in mind that today, many of these societies have been touched by technology, and have become extinct or drastically different. Some, at the point of study, were no longer Hunter and Gatherers in the strict sense; they had become semi-integrated in the monetary economy that surrounded them. (personal communication, October 20, 2008)

Moritz noted that this framing passage on the front page evolved out of conversations that the class had about how they might prepare readers to critically evaluate the information the site presented in light of its motto. As we mentioned above, Moritz had many other opportunities to see how students were adopting the appropriate modes for researching and representing foraging societies. The collaborative components of the wiki gave students a chance to collectively identify unexpected challenges in developing the site and address them together. In one of his interviews with Manion, Moritz noted how discussions about the structure and form of the site's articles led to broader discussions about research and representation:

It's the form that actually led to conceptual discussions or theoretical discussions. . . . How do you divide up your analysis of a particular society or how do you describe societies? . . . It's showing that

this hunter and gatherer wiki is a legitimate source and is an authoritative source but at the same time engendering that the visitors are critical just as students had to be critical. . . . That's something that I didn't think of when I designed the course but that came up at the end of the course. (M. Moritz, personal communication, February 14, 2011)

Moritz was able to see and respond to these issues throughout the quarter in places like the students' discussions as the pages developed. For example, the group working on the page on sexual division of labor was debating whether or not to include their own critiques of research on the topic along with summaries of the research itself. One student suggested they include a disclaimer before the critical reviews, explaining that they were written by students and were not scholarly material. Another student agreed that they should include a disclaimer but stressed the importance of including both students' and scholars' critiques of scholarship: "I agree that our page should mostly provide information, but I think that it is also a good learning experience to see how anthropologists (and their students!) think critically about what is published" (personal communication, November 26, 2007). These sorts of conversations let Moritz know that his students were on track. If they were not on track, he initiated the conversation himself in the comments. In the two-page reflections that Moritz asked them to write on their wiki contributions at the end of the quarter, students revealed how the site's motto and the habits of scientific thinking that the assignment reflected shaped how they evaluated their own and their classmates' work. In a reflective essay on the project, one student noted the responsibility he felt as he thought about including media, like clips from the 1980 comedy about a Bushman tribe in South Africa, *The Gods Must Be Crazy*:

*The Gods Must be Crazy* is the foraging myth, and by posting it on our wiki with a YouTube excerpt from the film, we can break down the myth, critique the film, and gauge its impact on those societies and how we think about them. This is an important example because films can be used to educate people.

The fact that the wiki was intended as a public resource gave a context to the methods of inquiry that students were exploring in class and to the evaluative criteria they were applying to their work. They were not only completing an assignment but also informing their readership about a topic that had true social, political, and economic consequences for the groups they were studying. This sense of mission strongly shaped how they prepared and composed the material on the site, offered them challenges that struck straight to the heart of the course's values and became the foundation by which they evaluated their own work and the work of their colleagues.

Furlong was very impressed with the rubrics that her students helped her create (see Table 1). Although she was expecting students to focus overwhelmingly on surface issues like grammar and style, she was surprised at the extent to which her students identified criteria that addressed scientific reasoning in such sophisticated ways. For example, students in the sample rubric were able to articulate the importance of identifying and controlling variables in a number of ways: from operationalizing them and identifying potential confounding variables in their methods to framing the discussion of their potential results in terms of their operationalized variables. Furthermore, she found that students often set the bar for expectations higher than she might have, sometimes to the point where she had to temper their expectations in her evaluations of

TABLE 1  
Furlong's Student-Initiated Rubric for Methods Section of Paper

	<i>The Best Work (A/A-)</i>	<i>Acceptable Work (B+/C+)</i>	<i>Unacceptable Work (C/D)</i>
Method	Clear description of the number, age, gender, recruitment, and other attributes of participants, including assignment to conditions.	Vague description of the number, age, gender, recruitment, and other attributes of participants, including assignment to conditions.	Fails to adequately describe participants, recruitment, and/or assignment to conditions.
Apparatus	The materials are clearly explained including any surveys, etc., to be used.	The materials are vaguely or unclearly described, including any surveys, etc., to be used.	The materials are too vague or incomplete.
Procedure	Description of the study is clear and includes specific info on the independent variable (IV), dependent variable (DV), and control of confounds.	Description of the study may be slightly confusing or vague and may include some gaps in the logic.	Description of the study is confusing or vague and/or includes serious gaps in logic.
Replicability	Provides enough detail to allow for replicability.	Provides most of the info needed to replicate.	Fails to provide enough detail to replicate.
Definitions	IV and DV are clear and operationally defined.	IV and DV are operationally defined, but may be vague or hard to understand.	IV and DV are not operationally defined or are too vague or confusing.
Confounds	Confounding variables have clearly been controlled.	Most confounding variables have been controlled.	Confounding variables have not been controlled.
Validity	Validity of IV and DV supported with evidence.	IV and DV appear valid.	IV and DV appear invalid.
Results	Predicted results presented in terms of operational definitions and clearly support hypothesis.	Predicted results presented in terms of operational definitions provide vague support of hypothesis.	Predicted results not presented in terms of operational definitions, fail to connect to hypothesis.
Literature	Clearly connects predicted results to gaps in literature.	Connects predicted results to literature, may be vague or less than clear.	Fails to adequately connect predicted results to literature.
Implications	Clear real-world implications connecting to the topic.	Vague real-world implications connecting to the topic.	No real-world implications connecting to the topic.
Relevance to hypothesis	Method clearly provides a strong test of the hypothesis.	Method provides a test of the hypothesis, but there may be some gaps in the logic.	Method fails to provide a strong test of the hypothesis.

TABLE 1  
Continued

	<i>The Best Work (A/A-)</i>	<i>Acceptable Work (B+/C+)</i>	<i>Unacceptable Work (C/D)</i>
Clarity	Clear, detailed description of the experiment, variables, participants and apparatus.	Description of experiment, variables, participants, and apparatus may need some clarification.	Confusing description of experiment, variables, participants, and apparatus.
Mechanics	Few mistakes in spelling, grammar, word choice and punctuation.	Some mistakes but not enough to interfere with understanding.	Significant mistakes affecting ability to understand the paper.
Active voice	Generally uses active voice.	Occasionally uses active voice, but uses a significant amount of passive voice.	Rarely uses active voice, relies almost entirely on passive voice.
Jargon	Uses jargon only when necessary for clarity, defines it when first introduced.	Uses jargon frequently, but defines it the first time it is introduced.	Uses a great deal of undefined jargon.
Flow	Paper flows smoothly, facilitating understanding.	Generally smooth, but may be some rough places.	Stilted or hard to read.
Organization	Organized and clear; flows well as the connections/transitions between points are evident.	Generally well organized; may be a few places where connections/transitions are unclear.	Poor organization showing little direction; connections between points are unclear.
Writing style	Few or no mistakes in citations, use of clear and appropriate headings/sections.	Some mistakes in citations and headings/sections.	Many significant mistakes, headings/sections are inappropriate.
Concision	The writing is clear and concise.	The writing is clear but may be slightly wordy.	The writing is unclear and/or too wordy.



their work. For example, in another rubric (not shared in this article), students wanted their colleagues to not only show evidence for each of their claims but also account for counterevidence for each of them. Although she obviously considered this a worthy and sometimes necessary goal, she recognized that it was a very difficult task for undergraduates early in their careers, as much as it is for graduate students with some experience in the field. As she collected the criteria for the rubric from students, she was able to evaluate their understanding of key habits of thought she wanted them to emulate, and she could frame how they used those criteria to inform their work as she compiled the rubric. As impressed with the rubrics as she was, she was also impressed that the students applied them as rigorously as they did during their peer review:

The thing that gave me the most insight into their scientific reasoning were their peer reviews. . . . The students who were thinking like scientists as I had hoped they would do were thinking “big picture.” They were going after people’s big picture ideas and general methods as opposed to nitpicking commas and grammar and APA style. (personal communication, February 11, 2011)

In addition to students’ peer reviews, Furlong was also able to see students learning in their comments to each other as they composed their articles:

One person would say, “I think we have a confound here,” and then the next person would come and say, “Oh, yeah, I think you’re right, maybe we could fix it this way.” And then a third group member would chime in and say, “Nope. That would be another confound. . . . Those were the kinds of conversations that were really exciting to see my students having because those are conversations that scientists have. (personal communication, February 11, 2011)

Furlong explained that students actually valued this student-centered assessment more than her own assessment:

I think they felt much more accountable to each other than they would have felt to me, because to me it’s just an assignment; they’re doing it because they have to—but when they know their classmates are going to read this and they know they are going to be evaluated by their own classmates, I feel they were much more invested in it. (personal communication, May 3, 2010)

Furlong did find that throughout the process she had to clarify a number of issues for students, for example, when she helped students understand how to paraphrase ideas from research articles when they were following an author’s language too closely. She quickly intervened and spoke with students about how they should engage with the ideas of other scholars in their writing. Once she had clarified this issue, she saw that students were rigorously policing themselves as they wrote their group drafts and peer reviews. Another issue they faced was understanding what role visual models played in the methodological writing they were doing. Students, Furlong noted, were uncomfortable with creating charts predicting what their findings might be because it seemed to them like they were fabricating data. Furlong was able to explain that anticipating possible results was a crucial step in preparing to collect and analyze data, and students were able to work out their design challenge through this lens.

The challenge for Selfe was to engage and assess students in at least three areas: a willingness

- to explore professional writing contexts
- to compose rhetorically appropriate alphabetic texts
- to become more practiced media composers and systems managers.

By the end of the term, students' willingness to engage in professional exploration became apparent in many ways, but two indicators stood out. First, almost all students in their final reflections or presentations to the class mentioned interviewees by name or referred to what they learned from those individuals. Second, though the assignment asked them to conduct and report on three interviews, most students went well over the word count for that portion of the assignment, all collected at least three interviews, and several collected more than three even though the process was quite time consuming. One student who hoped to become a fashion editor and another interested in public accounting composed four interviews, providing audio clips and reports for each. One prelaw student collected five interviews during the last half of the 10-week term.

Judging what constitutes rhetorically appropriate student compositions is difficult when the range of disciplines and professions is so varied. However, by the end of the term, the students' style of writing, page design, and arrangement of content became more discipline specific. Students succeeded in justifying their writing, organization, and design work if they made arguments based on a professional rhetorical point of view (see Figure 1). The graphic emphasis of the fashion major; the narrative, text-based style of the English major; and the concise, bullet-point organization of the accounting major all speak to their intended audiences and their ability to make a clear case for these compositions both to the teacher and their peer cohort. The more students owned the means of assessment of their textual and media production, the more serious and adaptable they seemed to be about their own compositions.

The media production and technology assessment for Selfe's class fell almost entirely onto the shoulders of the students involved. Although he chose the media focus for the class (imaging, collage, or audio editing), Selfe is not a visual or audio professional. Because he had only basic technological skills in both areas, which the class learned quickly, the students proceeded to hash out the specifics of media assessment with him, some of them bringing extensive visual and aural experience to the task. The in-class assessment process was enacted in the weekly review sessions of each student's multimodal wiki entry. Each week they taught each other a little more about audio editing, visual design, navigation, and other media-related issues in varied professional contexts. Each week those sessions fed back into the work students would attempt the following week.

A short example of the kind of mutual learning taking place might be useful here. In the course of conducting interviews with professionals and academics, students often accumulated large, hour-long audio files. My criteria for appropriate use in their interview reports (largely textual with photos of their work space) was to edit the large audio files down into useful nuggets, or clips. How long a useful nugget would be was left up to each student. They argued for their choices (from 1.5 minutes to 20 seconds) based on the expectations of their intended audiences. Our future accountant suggested that wiki users from her area would tolerate only short audio clips that emphasized the important points described in the written (also short) interview report. An English major hoping for a job in an arts organization claimed that longer clips that

Downloaded by [Nationwide Childrens Hospital] at 09:21 11 January 2012



FIGURE 1 Students used discipline-specific writing, page design, and content arrangements by the end of the class. (This figure is available in color online.)

provided the aural context of the interviewer and interviewee’s response, also embedded in a fairly long textual report, made most sense for her audiences. They then tested those assumptions during usability sessions with students and professionals. In the end, few usability subjects made critical comments about the audio clip inclusion. They simply appreciated the work and insights.

It was after students’ class reports on usability testing that individually their design and media work seemed to come into focus. Usability test subjects most often provided thankful and positive comments with reasonable, substantial suggestions. But some were quite harsh. One student reported that her interviewee and usability tester said, “I would not associate my name with this site. It is not professional enough for a job portfolio.” Many others had suggested that the default navigation system of the wiki made it seem unprofessional and confusing. After an intense in-class discussion of user responses, students began designing their own, more appropriate navigation and organizational systems. Figure 2 illustrates three approaches used to

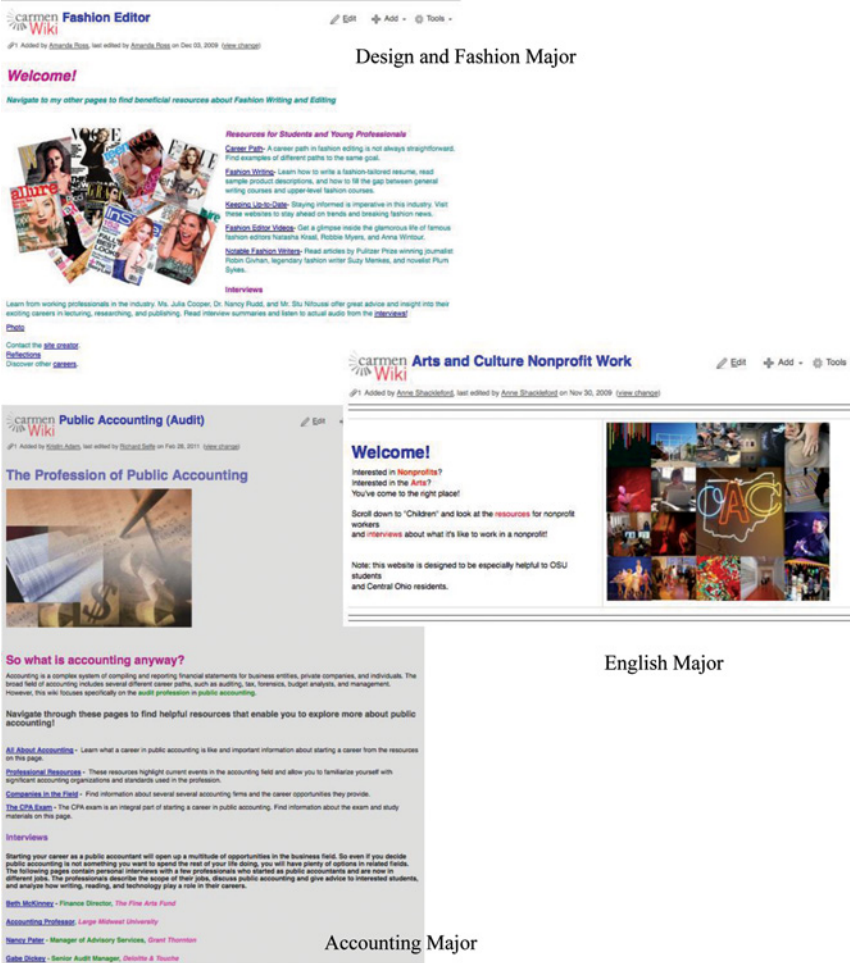


FIGURE 2 Students designed discipline-specific navigational systems. (This figure is available in color online.)

overcome the perceived limitations of the default wiki navigation system. This assessment approach was not by any means a total success. But because students were involved through the term and because we were able to modify expectations—based on students’ previous experiences, the comments made by professionals, and usability participants—the process seemed to provide students with some sense of ownership of the material.

## CONCLUSION

We offer these cases to suggest a framework for more robust research on assessing collaborative digital media work like wikis. Our study evolved out of collaborations that involved only

instructors. A more complete picture would examine students' learning more closely as they come to understand the habits of thought their instructors want them to enact, how they see themselves putting these habits into practice, and how they use these habits to evaluate their own work and the work of other students. The perspective we get from the instructors we talked to, however, gives us a clearer sense of how they were able to manage a complex, evolving project while giving students an opportunity to practice carefully modeled forms of inquiry.

Each of the courses we have presented here gave students some control as they took up habits of thought that their instructor wanted them to learn. Students were asked to take part in assessing their and their colleagues' work and were shown how to apply assessment throughout the term as they produced mediated wikis. But students did not begin these projects cold, thrown into the deep end and expected to swim. Each of the three instructors very carefully scaffolded their subassignments to prepare students to understand the central modes of knowledge making in their fields: the kinds of questions to be explored, the preferred objects of study, the analytical lenses to be applied—all the activities involved in inquiry. As expert practitioners, instructors are the most prepared to model this activity and to illuminate the habits of thought and practice that undergird this activity.

Though instructors using digital media are expert practitioners in their fields, their expertise, by and large, has been shaped in the contexts of print conventions and standards. Though they are prepared and comfortable in knowing what it takes to produce knowledge in our disciplines and in the medium of print, as a group they are much less prepared to know how the forms of inquiry they value might transfer to other media. That is why they need to give students the space to show them what is possible in new media. Teachers need to use every class to learn from the collective experiences of students and to learn with them. Tensions will arise between print-informed expectations and what is feasible in new media. But those tensions will arise where instructors' values about knowledge are of most import—where students and teachers have the most to learn, both about digital media work and about how inquiry in their fields can be done in a digital age.

Giving students the responsibility for shaping knowledge work in new media does not mean relinquishing our roles as experts. Both Moritz and Furlong, at some point in their conversations with Manion, described their roles in their students' projects as "senior editors." Selfe ended up adopting a similar role. They all offered guidance to students as they prepared their projects and managed the assessment process; yet, like all good editors, though they generally safeguarded the values of the field, they maintained a distance from the review process, letting students determine what was possible within the scope of their projects. If we want students to be invested in our disciplinary values, we need to prepare them to put these values to practice and to become practitioners in their own right. That they are struggling with this work in the context of a new medium is timely for us as well, because in their struggle they are offering us new possibilities about how the disciplinary values we hold most dear might be reshaped, recreated, disseminated, and revalued in new contexts.

## NOTES

1. We would like to thank Dr. Ellen Furlong and Professor Mark Moritz for sharing their and their students' work on these projects. Both of them graciously offered their time to speak with us, and after reviewing our drafts describing their

work, we gave them the option to use pseudonyms or have their names be made public. Both chose to have their names revealed.

2. All of these wikis are currently offline, and as a result, all references to the sites will be treated as personal communication. Furlong never intended her students' articles to be public beyond the members of the class. Moritz and Selfe, though they initially intended their wikis to be ongoing projects, found that they were difficult to sustain across a number of courses and maintain in between them, so they decided to take the sites offline. Though the issue of sustaining wikis beyond a course setting is a significant one, our focus here is on assessment in the context of a single course. Wider publics might be involved (as they were for Moritz and Selfe), but these publics do not necessarily need to be ongoing for students engage with them.

3. The North Carolina State University Campus Writing and Speaking Program's site (Campus Writing & Speaking Program, NC State University, n.d.) offers examples of outcomes statements from across the disciplines that were developed using the process Carter (2003) describes. Furthermore, many academic organizations have recently published helpful rubrics and articulations of general learning goals as "habits of thought," such as the AACU's VALUE rubrics (Rhodes, 2010) and the NCTE's Framework for Success in Post-Secondary Writing (Council of Writing Program Administrators, National Council of Teachers of English, & National Writing Project, 2011). As helpful as these resources are, what made the projects we describe here successful was how the habits of thought that grounded the instructors' projects were not only discipline specific but were keyed to the particular projects and goals for the class.

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