



International Journal for the Scholarship of Teaching and Learning

Volume 6 | Number 1

Article 10

1-2012

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Recommended Citation

Kalin, Jason (2012) "Doing What Comes Naturally? Student Perceptions and Use of Collaborative Technologies," *International Journal for the Scholarship of Teaching and Learning*: Vol. 6: No. 1, Article 10.

Available at: <https://doi.org/10.20429/ijstl.2012.060110>

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Keywords

Collaboration, Technology, Technical communication, Student learning

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Doing What Comes Naturally? Student Perceptions and Use of Collaborative Technologies

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Abstract

This study investigates how students perceive and use collaborative technologies while also examining the meanings students assign to both collaboration and technology. A qualitative inductive analysis of students' assignments in a professional communication course demonstrates that students use technology to collaborate for its Accessibility, A/synchronicity, and Collaborativity. Students perceive and use technology within a functional literacy framework wherein technologies are tools providing pragmatic means to complete a shared-document assignment. These results are important for integrating collaborative assignments and collaborative technologies to promote social learning within the classroom.

Key Words: collaboration, technology, technical communication, student learning

Introduction

Today's college students are, or will become, more technologically embedded and practiced than any previous generation, for they are coming of age during the emergence and dominance of socially-centered and socially-constructed Web technologies: Facebook and Flickr, Tumblr and Twitter, Wikipedia and Wordpress, just to name a few. Each technology offers instantaneous, synchronous communication while making asynchronous communication easier as well. Laptops are more popular than desktops, and most students have a mobile phone. Indeed, many researchers and commentators have called this generation of college students the Net Generation or Digital Natives (Oblinger & Oblinger, 2005; Palfrey & Gasser, 2008; Prensky, 2001; Tapscott, 2009). Other researchers and scholars have been critical of the digital native designation, arguing that the term has been undertheorized, lacking both critical scrutiny and sound empirical basis (Bennet, Maton, & Kervin, 2008; Karper, 2009). Regardless of the moniker attached to them, these students, as users of current and future social media, are already, or will be soon, confronted by and participating in the unending multivoiced and multivalent conversations of their technologized discourse communities; thus, they are already technical communicators.

Nevertheless, as Porter (2004), Selber (2004), and Vie (2008) have pointed out, many, if not most, students are unaware of the social context in which they communicate; they do not understand sufficiently the power and force latent in their communication. That is, many students consider these socially-centered online applications as neutral communication tools without learning, or even realizing, how to use these applications in rhetorically aware ways. I take as a definition of rhetoric Charles Bazerman's (1988): "By rhetoric I mean most broadly the study of how people use language and other symbols to realize human goals and carry out human activities. Rhetoric is ultimately a practical study offering people

greater control over their symbolic activity” (p. 6). Students may have technical dexterity with their technologies, but their rhetorical dexterity remains undeveloped, and it is in this sense of rhetoric that many students are illiterate. Drawing upon Porter (2004), if students remain rhetorically illiterate technology users, this is “an indictment of an educational system that never helped [them] to understand it” (p. 196).

Our task, then, as technical communication instructors should be to provide our students with increased rhetorical awareness of the ways in which they already interact and communicate within social networks, thus enabling them to better situate themselves within these networks. Here, borrowing from Selber (2004), students should be well-versed in the multiliteracies of these new social technologies: “Students who are not adequately exposed to all three literacy categories [functional, critical, and rhetorical] will find it difficult to participate fully and meaningfully in technological activities” (p. 24). Therefore, we should teach students to become not only critical users of these technologies, but also critical questioners and producers of content and information with the ultimate learning outcome that they become more critical thinkers. Similarly, Vie (2008) wrote, “Compositionists should focus on incorporating into their pedagogy technologies that students are familiar with but do not think critically about: online social networking sites, podcasts, audio mash-ups, blogs, and wikis” (p. 9). If students make these shifts from users to questioners to producers, they will begin to reconstruct the field of knowledge in which they find themselves when using current and future social media.

Similarly, in the professional workplace, students will have to make the shift from user to producer, for most workplace writing genres, such as memos and progress reports, require students to write transactionally. For students to write transactionally, they will have to not only produce information, but also “engage in a transference of information for the purposes of informing the uninformed or demonstrating mastery over content” (Petraglia as cited in Spinuzzi, 2004, p. 338). As Johnson-Eilola suggested, students need to develop a repertoire of rhetorical moves that they can apply to whatever social or technical communication situation they encounter in their professional careers (Murphy, 2006). Indeed, Freedman and Adam (2004) argued that “when students leave the university to enter the workplace, they not only need to learn new genres of discourse but they also need to learn new ways to learn such genres” (p. 334). Spinuzzi (2004) made a similar claim when he stated that students need “to learn *how to learn* genres” (p. 346). If we educate students in the multiliteracies of technology—functional, critical, and rhetorical—they will be better able to identify, understand, and enter the conversations and communications of their respective workplaces. But, how do we do it?

Introducing and using collaborative technologies in the classroom may be a step in the right pedagogical direction. Collaborative technologies, or the use of technologies to collaborate, have the potential to allow students to socially-construct Selber’s multiliteracies of technology while also preparing them for the collaboration that will be important in their future workplaces. However, the research on collaboration and especially using technologies to collaborate remains varied and underdeveloped because, in part, definitions of collaboration are widely construed and operationalized for specific research purposes. Allen et al. (1987) wrote, “Collaboration refers to a variety of interactive writing experiences, making it difficult or impossible to assess research projects accurately or to use their findings effectively” (p. 70). Though written in 1987, this assessment remains accurate. To be sure, many studies of collaboration and technology have helped move the field forward; nevertheless, most research studying the use of technologies to collaborate focuses on the two components of collaboration—process and product—without first considering *student*

perceptions of both collaboration and technology. Doing so, I argue, will help us as instructors to advance the implementation and integration of collaborative technologies. Furthermore, considering student perceptions reflects two of my core pedagogical commitments: First, to be an effective teacher, I must meet students according to what they already bring to class; and second, “pedagogy must drive technology” (Breuch, 2004, p. 491) so that technology becomes fully integrated into the purposes and goals of the classroom. Indeed, while teaching the two courses used for the present study, I realized I needed to understand better how my students perceived collaboration and the technologies they used to collaborate so that I could integrate collaborative technologies in future courses. Before we can realize the benefits of technology and collaboration, we must better understand our students and how they use technology, especially during this time of ostensible *digital native* colonization.

A Review of Collaboration & Technology Studies

Faigley and Miller (1982) reported that 73.5 percent of the professionals surveyed wrote collaboratively as part of their jobs. Similarly, Ede and Lunsford (1986) noted that 87 percent of professional wrote collaboratively at least some of time. Given these studies and others like them, professional writing courses began to introduce collaboration and collaborative writing as course requirements. Indeed, Rymer (1993) claimed, “Professional writing instructors’ main motivation for adopting writing groups . . . has been to prepare students for the group authoring experience that will characterize their career writing” (p. 183). Similarly, Jones (2006) argued that, however collaboration was defined, it remained integral to the workplace, noting that “technical communication managers reported the ability to collaborate with subject matter experts and the ability to collaborate with coworkers as the top 2 of 63 core competencies for technical communicators” (p. 283). The shift from the individual writing to collaborative writing should be situated within the discursive and pedagogical movement that was happening within composition classrooms at the same time—a new focus on the social construction of knowledge.

The socially-constructed knowledge movement piqued interest in collaborative learning. By introducing collaboration into the classroom, teachers were stressing that becoming a writer and creating a piece of writing were processes rather than products. Collaborative learning promotes knowing, thinking, and acting in the classroom by encouraging students to converse with each other, to question each other, and to search each other for meaning. In the process, students foster a community of common understanding and respect, belonging and camaraderie. Bruffee (1984), often credited with initiating the socially-constructed knowledge movement, explained its principle pedagogical commitment:

Our task [as writing teachers] must involve engaging students in conversation among themselves at as many points in both the writing and the reading process as possible, and that we should contrive to ensure that students’ conversation about what they read and write is similar in as many ways as possible to the way we would like them eventually to read and write. The way they talk with each other determines the way they will think and the way they will write. (p. 422)

This pedagogy remains best practice because by engaging students in this way, we begin to demonstrate the social construction of knowledge. And to encourage this learning environment in the classroom, we should consider the modes by which students already communicate with one another. For today’s students, this increasingly entails online

technologies and mobile phones. In the process, collaboration and technology become intricately bound—so much so that no discussion of collaboration is complete without accounting for technologies. The same relationship holds for technical communication more broadly because nearly all workplace writers depend on various technologies to communicate through and collaborate on documents to solve workplace problems (Dorbin, Keller, & Weisser, 2010). As scholars, researchers, and instructors in technical communication classrooms, we must prepare our students to be more rhetorically aware of their technology use so that they become more effective and meaningful contributors to and participants in socially-constructed knowledge within any given context—the classroom, the workplace, or their social lives.

While noting the various definitions of collaboration, Ede and Lunsford (1990) defined *writing* as “any of the activities that lead to a complete written document,” and stated that *group writing* is “any writing done in collaboration with one or more persons” (p. 14). Among the most common types of collaborative writing in the workplace is the shared document. Allen et al. (1987) defined the shared document as requiring multiple authors to produce a single text. A shared document, then, results directly from the collaborative process. As implied in Allen et al.’s description, interaction is a necessary, but not sufficient condition for collaboration. Indeed, Burnett, White, and Duin (1998) argued that interaction must also include *intentionality* and *purpose* to be collaborative: “Collaboration must include the idea that people plan or intend to act together in a purposeful manner, with an understanding that their activity has a common goal” (p. 137). I raise this issue of collaborative writing and the shared document because the assignments analyzed as data for this study were scaffolding for shared-document collaboration: I asked my students to report on collaborative technologies early in the semester in the hope that they would use such technologies for their shared-document assignment later in the semester. Here, it is enough to comment that while a shared document highlights the product of collaboration, it does not fully address the process or modes of collaboration.

Ede and Lunsford (1990) described two modes of collaboration—hierarchical and dialogic. They outlined hierarchical collaboration as “carefully, and often rigidly, structured, driven by highly specific goals, and carried out by people playing clearly defined and delimited roles” (p. 134). Productivity and efficiency are the essence of this collaboration wherein knowledge is understood as information to be found. When used to organize collaboration, it often produces a better written product because it plays to group members’ respective strengths. For these reasons, Ede and Lunsford noted that hierarchical collaboration is used often in scientific and technical workplaces because these fields are most concerned with productivity, efficiency, and results. In these settings, collaborative writing becomes a means to an end, a goal-driven pragmatism. Yancey & Spooner (1998) noted that groups that organize hierarchically, that is, with “a clear structure, division of roles, division of knowledge, efficiency,” often do so as *cooperators* rather than *collaborators* (p. 52). Cooperators are “individuals more or less isolate, but working in concert with others on a joint project” (p. 52), whereas collaborators achieve a degree of integration and solidarity that constitutes a kind of collective, or we might say, dialogic intelligence.

Dialogic collaboration is “loosely structured and the roles enacted within it are fluid,” and “the process of articulating goals is often as important as the goals themselves and sometimes even more important” (p. 133). Furthermore, dialogic collaborators value “the creative tension inherent in multivoiced and multivalent ventures” (p. 133). As such, dialogical collaboration often produces texts that have a plurality of voices because collaboration occurs throughout the writing process, allowing group members to participate

in knowledge making. Indeed, the social production of knowledge in which each member contributes leads to both group and individual satisfaction. Successful dialogic collaboration would allow a group to move from a committee to a community (Miller, 1994).

Ede and Lunsford were careful to maintain that we should “resist efforts automatically to equate dialogic collaboration with ‘good’ student-centered, process-oriented teaching and hierarchical collaboration with ‘bad’ teacher-centered, product-oriented teaching” (p. 134). They argued that each mode of collaboration may be used properly and successfully in the classroom given the right situation and desired learning goals. In analyzing my students’ assignments, I noticed that students referred to both modes of collaboration, and they often did so in relation to the technology they used. Indeed, these two modes of collaboration help us understand the role of technology in collaboration. In hierarchical collaboration, it seems technology, like collaboration itself, becomes a pragmatic means, a tool to an end; in contrast, in dialogic collaboration, technology becomes positioned as a social, interactive space for collaboration, facilitating process and product—product as a production.

In both hierarchical and dialogic collaboration, individuals working together must negotiate a variety of group dynamics. Cole and Nast-Cole (1992), for example, suggested that understanding effective collaboration required studying eight different dynamics: purpose, communication, content and process, task and maintenance activities, roles, norms, leadership, and stages. Purpose refers to the group’s reason for collaborating, while communication refers to the group’s ability to work together towards that purpose. Content and process refer to not only what the product is but also how it is produced. Task activities move the product towards completion, while maintenance activities sustain group dynamics. Roles, such as writer or editor, which may be fluid as a group progresses, allows the group to maintain itself and to complete the project. Norms and leadership depend on the group’s shared understandings and attitudes. And finally, the concept of stages acknowledges that groups and their dynamics evolve over time and through various stages of the project. In drawing upon the work of Cole and Nast-Cole, Noël and Robert (2003) argued that computer-supported collaborative writing technologies must help groups to manage these dynamics. They suggested, for example, that an asynchronous writing technology would help members know who did what and when to the documents being produced. Such awareness would allow the group to collaboratively negotiate tasks and maintenance activities and so the content of the product and the process of collaboration.

Similarly, Chin and Carroll noted that although “a variety of synchronous and asynchronous CMC [computer-mediated communication] tools are available today to support collaborative learning” (p. 237), simply introducing the technology and “assuming collaboration will take place is insufficient in understanding both the technology and collaboration because it emphasizes a ‘tool-centric’ approach” (p. 233). They argued that what is needed is a better understanding and a finer articulation of collaborative activities so that technology can be introduced to best fulfill those requirements. Therefore, they developed a heuristic based on *collaboration phases*, such as deriving goals, objectives, and hypotheses; executing experiments and collecting data; writing up lab reports; and presenting results and findings to the teacher and class. For example, they suggested that during the group formation phase of collaboration in which members are not face-to-face, a live audio technology may be best suited because it offers real-time communication. When discussing and analyzing results and findings, they posited that instant messaging and a shared document might be most beneficial because the technologies combine to offer real-time communication and a collective reference. Thus, for these three pairs of authors—Cole and Nast-Cole, Noël and Robert, and Chin and Carroll—technologies must be designed so as to be responsive to

group dynamics if they are to support collaboration. Here, I would add that, drawing upon Selber's multiliteracies, it is equally important that groups are responsive to the affordances and constraints of technologies and the kinds of collaboration they may be able to support.

For technology to promote either hierarchical or dialogic collaboration, it must perform certain functions. For example, Tammaro, Mosier, Goodwin, and Spitz (1997) insisted that for a technology to be collaborative, it must: (1) support social, cognitive, and procedural complexity; (2) benefit everyone; (3) support individuals and groups; and (4) be flexible. Although these four characteristics are certainly useful for conceptualizing technology as collaborative, they are insufficient for distinguishing between technology that could be used collaboratively and technology that is intuitively designed to be collaborative. Thus, Lipponen and Lallimo (2004) argued that increased attention to both collaboration and technology within the classroom has increased the confusion about both.

Lipponen and Lallimo (2004) claimed that the proliferation of technologies used to collaborate has made it "difficult for educators to identify and evaluate the ones that actually foster collaborative learning in education" (p. 434). Therefore, they distinguished between *collaboratively usable applications* and *collaborative technology*. The former refers to "any technological application or system that can be used for collaboration" (p. 436). The latter denotes "a technology that is especially designed and tested (i.e., is grounded on careful theoretical and empirical analyses) to support and establish collaboration in education" (p. 436). Lipponen and Lallimo defined four characteristics of collaborative technology:

- (1) Its design is grounded on some explicitly argued theory of learning or pedagogical model;
- (2) it relies on the idea of groupware in supporting wide-area collaboration;
- (3) it supports users' activities by providing advanced procedural facilitation or socio-cognitive scaffolding;
- and (4) it offers a variety of representational and community building tools. (p. 436)

Although quite similar to the characteristics defined by Tammaro, Mosier, Goodwin, and Spitz (1997), Lipponen and Lallimo foregrounded the explicit design of technology as shaping and promoting the process of collaboration. They concluded, "In order to utilize all the possibilities of collaborative technology, and to develop more innovative technology that is accessible to teachers and students, researchers and software developers definitely need to understand more about designing collaborative technology" (p. 439). Doing so requires thinking about and incorporating multiple perspectives and disciplines within the design and implementation processes, including psychological, philosophical, and pedagogical expertise. We, as technical communication instructors, should strive for this goal. However, most of us, I am sure, are constrained by the technology we already have in the classroom, and that typically entails making do with *collaboratively usable applications*. Given collaboratively usable technologies, we must understand the specific consequences and contexts of these technologies. I propose that Selber (2004) has presented a good starting place.

Selber (2004) proposed a three-pronged pedagogical strategy that incorporates functional, critical, and rhetorical literacies. To outline each literacy, Selber adopted a metaphor, described a subject position, and stated an objective. Functional literacy focuses on computers as tools, students as users of technology, with the objective of effective use. Critical literacy emphasizes computers as cultural artifacts, students as questioners of technology, with the objective of informed critique. Rhetorical literacy stresses computers

as hypertextual media, students as producers of technology, with the objective of reflective praxis. All three literacies filter experiences with computers, and students must become adept with these literacies at various times and in various combinations. Because he emphasized writing and communication, Selber's multiliteracy approach provides an apt pedagogical strategy for those seeking to use collaboratively usable technologies. In particular, rhetorical literacy stands out as pertinent to collaboration because it emphasizes the process and product of technology use, encouraging reflective praxis. Rhetorical praxis suggests that we should build in reflective praxis within the collaborative process and product so that students become more aware of and better able to negotiate the situated meanings and contexts they encounter in classroom and the workplace.

This brief review of collaboration, collaborative writing, and collaborative technology shows that defining any of those terms is problematic; nevertheless, the definitions do not need to be standardized to be productive. Indeed, they need to be continually deepened and expanded. Of this potential confusion, Ede and Lunsford (1990) wrote, "The shifting and conflicting nature of the definitions revolving around the term *collaborative writing* seems to us to call not for simplification or standardization but for a Burkean complexifying—a series of perspectives by incongruity" (p. 16). With this study, I seek to foster such complexifying by bringing to bear students', often incongruous, perspectives on collaboration and collaboratively usable technologies.

Methods

In this study, I investigated the meanings students assigned to collaboration and the ways in which students managed collaboration for course assignments. Specifically, this study attempts to provide insight into the technologies students use to collaborate and their reasoning for using such technologies. My primary research questions:

RQ1: What technologies do students use to collaborate?

RQ2: How do students use technology to manage the collaborative process?

RQ3: What meanings do students assign to collaboration and technology?

In responding to these questions, I was informed by action research along with discourse analysis. I did not conceive this study as a pre-designed intervention in the classroom. Rather, I came to this study within the course of the class itself, after reading my students' memo assignments and realizing that their responses could potentially yield an interesting opportunity to reflect on learning, collaboration, and technology and my own role as instructor. Indeed, action research takes the instructor's own practice as a significant component of research and, in so doing, seeks to advance practices of teaching and learning: "Action research . . . aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously" (Gilmore as cited in O'Brien, 2001). As action research, I attempted to bring students into the study as well, by asking them to reflect on their own perceptions and practices of collaboration and technology. Although I was not able to implement a plan of action to address collaboration and use of technology in the classes studied, the following results and discussion have helped me to better understand the consequences of my choice of assignments and my role as a teacher and facilitator of collaboration and collaboratively usable technologies.

To reduce and interpret the data, I chose discourse analysis, particularly an inductive analytical framework, to help ensure that the data analysis was systematic and rigorous. Discourse analysis is particularly capable of uncovering relevant patterns in the data. Gee (1999) argued that this method of qualitative discourse analysis provides the framework needed to understand the situated meanings within discourses. According to Gee, situated meanings, in part, uncover the relevant ways of knowing and what is accepted as knowledge within discourse communities. Because I was interested in discovering the meanings students assigned to collaboration, including their use of technology in the collaborative process, this methodological framework allowed me to track important concepts and patterns in their discourse to better understand their possible meanings and potential impact on collaborative processes and pedagogies.

To be clear, I studied my own classroom and used assignments I designed as data, and as such the study and data reflect my pedagogical intentions prior to and during the course. Therefore, the results, or more precisely the student perceptions of collaboration and technology that I discuss below, have been determined at least partially, but importantly, by my actions and assignments. As the instructor, I situated my students in a certain context of practice that influenced their practices as students. For example, I required that much of the collaboration was to occur outside the classroom, thus forcing students to become responsible for their collaboration. This pedagogical choice, however, likely influenced how students perceived collaboration, namely as an extra time commitment. One other consequence of this choice: I was not able to observe in-depth students' process of collaboration; instead, I relied upon their written assignments and reflections. In these ways, I was not a disinterested participant, nor did I intend to be. I wanted to discover better pedagogical strategies for integrating collaboration and technology in my classroom, not just any classroom. After conducting this study, I realize that while I wanted to promote a certain mode of collaboration—dialogical—I did not have the practices or assignments in place to promote a strong form of dialogical collaboration that also took advantage of technology. Though this study contextualizes my classroom experience, I hope it provides insight into better pedagogical practices for others, as well.

Setting

I adopted two sections of a course I teach titled, *Communication for Engineering and Technology*, with a total enrollment of 39 students. All students enrolled in the class were included in the study; to receive human-subjects approval, all students provided informed consent for their assignments to be used for research purposes. The two classes were composed of juniors and seniors, and most students majored in engineering disciplines. Student population consisted of 35 males and 4 females, which, though an ostensibly drastic divide, is common for this class at my university. As such, the classes represented a typical course in professional communication.

The curriculum focused on learning the conventions of workplace writing genres, such as memos, employment documents, proposals, progress reports, and feasibility reports, to enable students to become rhetorically aware participants in their future workplace discourse communities. Group work and collaboration are indispensable in the workplace; therefore, I required students to work in groups to complete their major assignment cycle. During the middle of the semester, groups drafted a proposal in which they detailed the rationale for some problem and then proposed a research solution for that problem. Their final projects built upon this proposal with most groups choosing to write a feasibility report. To complete this assignment cycle, students had to collaborate, producing two shared documents.

I randomly assigned students to groups. In the two classes, I had a total of eleven groups, with six groups of four students and five groups of three students. Beyond separating students into groups, my involvement in the collaborative process was limited to in-class meetings. I scheduled in-class groupwork leading up to and after their proposals so that they could have a convenient time and setting to meet while also providing me with project updates. In the in-class meetings, my role focused on the products, not the collaboration per se. That is, I did not make collaboration the focus of my pedagogy; rather, because students were working in groups, collaboration became an assumed part of the assignments. Although not my original intention, I recognized that this setting could provide insight into how students use technology to collaborate when left to manage their collaboration.

Data Sources

Two separate student assignments were used as data sources. The first assignment required students to recommend a collaborative technology for potential use later in the semester when working in their groups to complete their shared documents. This assignment asked students to write two one-page single-spaced memos; thus, I had 78 collaborative technology memos as a portion of my data sample. In the assignment description, students were prompted to explain the collaborative affordances and constraints of each collaborative technology. Put simply, students were required to discuss how each technology could help their groups collaborate more efficiently. Students were free to choose any technology they wanted, but I did recommend they keep in mind its potential usefulness when working in groups later in the semester. In using this assignment, I wanted students to think critically about both collaborative processes and the technologies that might facilitate those processes. It was upon reading these assignments that I considered conducting the present study because my students had interesting perceptions about technology and collaboration. To help contextualize these assignments, I adapted a later assignment—a progress report—to fit the research purposes of this study while still remaining true to the original learning outcomes of the assignment.

The adapted assignment required each student to report on the progress of their group projects. The progress report's structure was typical for the genre; however, in light of the collaborative technology memos, I asked my students to stray slightly from convention. I required them to include a section, at least a paragraph, at the end of their progress reports that discussed specifically their experiences collaborating and using technology to collaborate. I prompted my students with the following questions: How have you collaborated, and what have your experiences been collaborating? Have you used technology to collaborate, and if so, how have you used it? Have you used the technology from your collaborative technologies memos? I encouraged my students to critically reflect on both collaborative processes and the technologies they used to facilitate those processes. However, there was one important difference: Whereas the collaborative technology memo asked students to think about collaboration and technology *prior to* collaboration, the progress reports asked students to do so *after* and *during* collaboration and the use of technology.

Data Analysis

I analyzed the assignments using an inductive analytical framework that allowed me to reduce the data, to create thematic categories, and to draw conclusions based upon those categories (Glaser & Strauss, 1967; Miles & Huberman, 1994). In the data-reduction phase, I reviewed the data by t-units so that I could isolate references to collaboration and

technology while also keeping references within their discursive context. During this phase, I looked for emergent themes regarding students' perceptions and use of technologies to collaborate by applying a wide variety of codes. Initially, I based these codes on emic terms drawn from the students' discourse. For example, students often noted that a technology was *easy to use* and *intuitive*, or *time-saving* and *instantaneous*, or allowed *group communication* and *file-sharing*. In reviewing and reducing the codes, I began to consolidate these terms and themes according to their respective properties, which necessitated etic terms. Accordingly, I used constant comparison technique to further reduce codes into integrated categories according to similarities and differences (Glaser & Strauss, 1967). In so doing, I identified three coding categories: Accessibility, A/synchronicity, and, what I called, Collaborativity. For example, I coded *easy to use* and *intuitive* as *Accessibility* because these terms refer to the availability of and familiarity with the technology. Similarly, I coded temporal references, such as *time-saving* and *instantaneous*, as *A/synchronicity*. Finally, I coded *group communication* and *file-sharing* as *Collaborativity* because these terms referred to how technologies allowed for collaboration and to how groups actually collaborated. These coding categories are overlapping so that a statement could be marked as both Accessibility and Collaborativity. Coding and reducing the data in this way allowed me to explore how these categories functioned together in students' perceptions and situated meanings of collaboration, technology, and using technology to collaborate.

Although all efforts were taken to assure data were analyzed in a systematic way, it is important to note that given the limited nature of the data sample, the particular course, and my prominent role in that course, the coding categories and their interrelationships are interpretive, reflecting the situatedness of the data. As such, the results and discussion presented here are not meant to be generalizable, but rather suggestive of characteristics that may be found in similar students, courses, and pedagogies. While the findings presented have spurred my own growth as a teacher, I hope the findings will also stimulate instructors with similar pedagogical commitments.

Results

The following presents the results regarding which technologies were proposed—the collaborative technology memo—and which technologies were actually used—the progress report—to collaborate. I, then, present the results from the inductive coding analysis, detailing three emergent categories: Accessibility, A/synchronicity, and Collaborativity.

Collaborative Technology Memo

In the collaborative technology memos (n=78), students reported on a total of 40 different technologies that could be used for collaboration, ranging from Skype, a Voice over Internet Protocol (VoIP) service that allows for videoconferencing discussed in 15 memos, to Twitter, a microblogging service mentioned once. Some of the technologies could be grouped. For example, Google Docs and Zoho, discussed in four and one memo(s) respectively, offer online applications comparable to Microsoft Office.

The most frequently discussed technologies for collaboration with the number of times mentioned are as follows: Skype (15), Google Docs (5), Blogging platforms (4), Google Calendar (4), Facebook (4), Message Boards (4), Email (3), Instant Messaging (3), and Online Mindmapping (3). These nine technologies accounted for 57% of the memos, and the remaining technologies (33) were discussed in only one or two memos. Because I required students to write about two potential collaborative technologies, these results are

not entirely surprising. For my purposes to follow, I draw student examples from the more frequently discussed technologies.

Progress Report

In the progress reports (n=39), students reported on a total of five technologies used to collaborate while completing their proposal assignments. All students used email to send updates, to share files, and to schedule meetings with their groups. Six students mentioned the use of cell phones and text messaging to call or to contact group members. One student mentioned Facebook as a means of communication within the group. Three students, all from the same group, mentioned drop.io, a file-sharing service. Interestingly, other than email, cell phones, instant messaging, and Facebook, drop.io was the only technology from the memos that a group later adopted for collaboration. Skype, the most frequently discussed technology from the memos, was only mentioned in order to state that it was not being used; this applies to all the other technologies from the memos, as well.

Accessibility

Accessibility refers to the availability, familiarity, and ease of use of a particular collaborative technology. Accessibility was the most frequently cited reason for both proposing and adopting a collaboratively usable technology. Students demonstrated the significance of accessibility in the following examples.

Collaborative Technology Memo

"The first strength is that most college students already have AIM [AOL Instant Messenger] and are proficient with it."

"The [university] provides every student or teacher with their own email address."

"Google Documents' primary strength is the ease with which new users can access and use it."

"Most VoIP [Skype] interfaces have a very shallow learning curve—users need only download and install the program, and a helpful tutorial guides them through the features."

"The majority of students use [Facebook] daily, and are familiar with how to quickly navigate it."

Progress Report

"The learning curve involved with software that would help to alleviate this problem [scheduling a common meeting time], including the software I addressed in an earlier memorandum, is much too time consuming. Therefore, outside of in-person meetings, our group has restricted our use on technology to simple emails and the AOL instant messaging to accomplish most of our collaboration."

"The primary challenge in using more advanced collaborative options has been a lack of familiarity among the group with these technologies."

"Since this project is not long term I feel that Skype is not the most effective way to communicate because it would involve teaching the other group members how to use it."

"I think the main reason that we have not branched out to use another type of collaborative technology is we are already very accustomed to using email to work on group assignments."

We use it daily, and therefore find it easy to utilize. It also does not require downloading anything, if someone does not have it, or learning how to use it.”

“I tried setting up a space on LinkedIn the professional networking site to collaborate with the group and upload shared documents, but this ended up being too complicated for our needs. As students we have about five to six different places online to visit daily to get assignments and check on classes. Adding another site or page to check seemed that something would get lost in the cracks. As a group, we decided email would be a great primary resource for exchanging needed information because it is something we are already using.”

A/synchronicity

A/synchronicity refers to the temporal aspect of communication. Synchronous communication occurs when interactants are present at the same time; asynchronous communication occurs when interactants are *not* present at the same time. I included asynchronous and synchronous references in one code category because depending on the communication context, students claimed that either mode of communication could be a benefit or drawback to collaboration. Students show the importance of these two features in the following examples.

Collaborative Technology Memo

“The group conferencing feature [in AIM] enables multiple people to talk to each other in one conversation, instead of the normal two personal chat.”

“Groups can even work together on the same document in real time, communicating through chat as Google Docs records and shows the changes being made right in front of you.”

“Skype allows users to talk to each other in real time while each person is in a different location.”

“Then, if you want to revise a file, you can tell the person what you are changing while you are changing it so they can edit it at the same time and discuss the changes easily.”

“[You] can communicate instantly using the chat feature if your peers are online, but if they aren't you can send a message regarding what group work needs to be done.”

Progress Report

“When this project was established, we decided it would be a good idea to set up a wiki to quickly post results from tests or contacts. We quickly realized it was easier to simply email each other updates as they came along to us. Going to a website we created and then searching for updates was more work than opening our email, which is a task we do more than 10 times on any given day.”

“The only difficulty that [email] is causing is waiting for each other to check their mail and then formulate a reply that takes some time.”

“Not being able to meet in person has forced us to utilize e-mail because it does not require us to be online at the same time. For the time that we can meet online at the same time, we have been able to utilize instant messaging.”

"The only problem we have encountered with using email is that some of our group members check their email more frequently than the other group members. This creates some problems in the weight that each of us has in the final product. As time crunches down the group members that check email more frequently have more an influence into what gets submitted."

"Although email communication is convenient to accommodate individual schedules, it is far too slow to receive timely feedback and ensure all group members are contributing."

Collaborativity

Collaborativity refers to the process or mode of collaboration and the role of technology in facilitating that collaboration, thus denoting the relationship between collaboration and technology. This category shows how students began to differentiate between process and product, hierarchical and dialogic, collaboratively usable technologies and collaborative technologies.

Collaborative Technology Memo

"With AIM users can see when group members are online and easily communicate with them from their own rooms."

"As detailed below, the ease of access and ability to track changes makes Google Documents an excellent choice for use in collaborative document creation."

"Another benefit of Skype is that there are many different features, such as instant messaging, video calling, file transferring, and screen sharing. This allows a greater variety of ways to contact other users and makes Skype a better option over other applications that only perform one of these functions."

[Referring to Facebook]: "Posting comments, pictures, and links allow for a wide range of information to be viewed on the same page. This allows the group to share as much information as possible as quickly as possible .

"One of the greatest strengths of the use of bulletin board software in collaborative project is the organization the software imposes on communications."

Progress Report

"This method [email] of group collaboration worked very well for us, as every member of the group checked their e-mail regularly, and we were able to send documents as e-mail attachments."

"Email is the only technology we need as the only thing we really need to do for this assignment is send messages to each other and pass each other our completed sections of the paper."

"We would all write our parts and then send them to one person. He would then send it back and we would edit the project and send it back to him again so he could fix it."

"We sent our respective parts of the proposal to each other and used the comment feature in Microsoft word in order to edit our proposal."

"Technologically we were not that advanced, but we were able to achieve what we needed using technology."

Discussion & Implications

I undertook this study to better understand my students' perceptions and use of both collaboration and technology. To do so, I asked three specific research questions:

RQ1: What technologies do students use to collaborate?

RQ2: How do students use technology to manage the collaborative process?

RQ3: What meanings do students assign to collaboration and technology?

What technologies do students use to collaborate?

When proposing technologies in their memos, students focused on those technologies they believed to be accessible, as evidenced by the most prominent coding category. That is, students recommended technologies that were available, familiar, and easy to use. And they often emphasized certain design features, such as interface and intuitiveness, which ostensibly promote easier use of the technology, and thus easier collaboration. Even though students recommended a wide range of technologies, this is likely a result of the assignment requirements rather than their familiarity with these technologies. Indeed, several of the technologies mentioned only once, for example Keep and Share, DimDim, Exostar's Forum Pass, Cisco's telepresence, OpenGoo, and Fle3, seemed to have been a result of Web searches using terms such as *collaboration AND technology*, *collaborative media*, or *collaborative technologies*. I posit this connection because upon investigating these technologies, as I was unfamiliar with them, I noticed that many of the features touted in the memos were also prominently displayed on the Web sites for these technologies. To be sure, students did not plagiarize, but the similarities did suggest students were unfamiliar with the technologies. Furthermore, the majority of the recommended technologies were more popular and more likely to be familiar to students, such as Skype, Google Docs, instant messaging, and mobile phones. Although certainly not an indictment of my students, it suggests that students did not think critically about what or how technologies could be used to collaborate; thus, one of my desired learning outcomes for the assignment was not achieved.

When students were asked to reflect on the technologies they had used to collaborate, the number of technologies used was reduced to five—email, mobile phones, instant messaging, Facebook, and drop.io—and of these five, only the first three were used by more than one group. Put simply, students used those technologies that they were already familiar with and comfortable using in their day-to-day activities. Indeed, they were uncomfortable with using technology that was unfamiliar, as the examples from the Accessibility-Progress Reports section demonstrate. When actually using technology, rather than thinking about technology, students were much more hesitant regarding steep "learning curves" that were "too time consuming." In fact, the same qualities that recommended the technology in the memos became hindrances in the progress reports. Skype, for example, was no longer easy to use, but rather required too much time commitment to learn how to use it. Although such stances reflect the different experiences of different students, they reveal an underlying student perception about using technology to collaborate: It is convenient until it is not. As long as technology does not seem like too much trouble, students may adopt it for collaborative purposes; however, if they have to go beyond their comfort zones, technology is no longer helpful. As an example, consider one student's reasoning for not using a wiki:

“One thing we have learned was that it was difficult to use collaborative media tools that you have not been taught to use. I still don’t understand wikis and how they work.” It seems that if the students did not already understand it, they were not willing to learn it for this assignment. Rather than learning new technologies, students stuck with those technologies they used daily and “find easy to utilize,” most prominently email. Nevertheless, one positive implication of this comment: Groups did not employ technologies the whole group could not use, thus implying that students were able to negotiate the collaborative process, or at least, one dynamic of collaboration.

In reflecting upon which technologies students recommended versus those they actually used, I realize, as the literature review suggests, that simply requiring students to collaborate and introducing them to technologies via an assignment is not enough to promote the collaborative use of technology. As the last student comment reveals, if I want to promote the collaborative use of technology, I have to be sure students are familiar with those technologies and have to incorporate them as part of my classroom instruction. Indeed, the examples suggest that students choose technologies not only because they are familiar with them, but also, and more importantly, because they have achieved some level of functional literacy with them. That is, students use these technologies—email, instant messaging, mobile phones—because they already are adept users. Consequently, students view these technologies as tools, as means to an end—the end being the completion of the shared document. As an instructor, I need to think critically about the ways I can encourage my students to become critical investigators and rhetorical producers of technology. Therefore, rather than asking students to recommend a collaborative technology, I may use Selber’s multiliteracies to structure the memo assignment, requiring students to research in-depth one specific technology and how they could employ it functionally, critically, and rhetorically. Doing so, I hope, would encourage students to reflect on how technologies structure collaboration processes and products.

How do students use technology to manage the collaborative process?

In recommending a technology in the memo, one student showed some awareness of technology’s ability to structure communication: “One of the greatest strengths of the use of bulletin board software in collaborative project is the organization the software imposes on communications.” The comment suggests that the student thought about how technology might structure collaboration. Each post would correspond to a specific topic necessary for completing the assignment; in this way, the group could stay organized while managing their project. However, of all the memos, this was a singular example. Nevertheless, when discussing technologies in their progress reports, more students demonstrated functional and critical awareness. For example, one student remarked, “Since this project is not long term I feel that Skype is not the most effective way to communicate because it would involve teaching other group members how to use it.” Here, the student implies that Skype was not a useful technology for the collaborative purposes of the assignment. Another student demonstrated a similar situation:

I tried setting up a space on LinkedIn the professional networking site to collaborate with the group and upload shared documents, but this ended up being too complicated for our needs. As students we have about five to six different places online to visit daily to get assignments and check on classes. Adding another site or page to check seemed that something would get lost in the cracks. As a group, we decided email would be a great primary resource for exchanging needed information because it is something we are already using.

Here, the student makes two interesting moves. First, he tried to use LinkedIn to manage and coordinate the project; however, this process was too complicated. Perhaps, LinkedIn was too complicated because as a professional social networking site, it might not be conducive to collaboration. LinkedIn is used primarily to make business connections, not group collaboration. The student, however, recognized that "email would be great primary resource" because he and his group already checked it throughout the day. In this way, group collaboration has a chance of becoming incorporated into students' daily interactions, perhaps, as Ede and Lunsford (1990) might suggest, dialogically. Nevertheless, the phrase, "primary resource for exchanging needed information," indicates a more hierarchical, structured collaboration wherein collaboration is the transfer of information from those who have it to those who need it. Indeed, the hierarchical mode of collaboration dominated the students' discourse about using technology to collaborate.

Because the major assignment required a shared document, students were most interested in dividing the necessary sections, researching and writing independently, and then sending the documents to one member so that he could collate the shared document. Given the literature on collaboration, we might say that this was more cooperation than collaboration, more committee than community. That is, this practice, though a legitimate form and mode of group work, indicates a hierarchical mode of collaboration that uses technology functionally. Again, students appeared to employ technology as mere tools to complete the project. As long as the tools were useful to the task, principally emailing documents as attachments, the tools were sufficient means for collaboration: "Not being able to meet in person has forced us to utilize e-mail because it does not require us to be online at the same time. For the time that we can meet online at the same time, we have been able to utilize instant messaging." Nevertheless, Lipponen and Lallimo (2004) argued that although collaborators can use email to share documents and comment on one another's work, this sort of collaboration "does not organize discussion very much and does not scaffold learning in a pedagogically meaningful way" (p. 436). Precisely because students already use emails and attachments, they are not induced to learn new modes of collaboration or new collaborative uses of technology. Students, however, showed some dissatisfaction with this technological mode of collaboration. For example, the A/synchronicity category indicates students were disappointed by the time delay between information sent and group reply:

The only problem we have encountered with using email is that some of our group members check their email more frequently than the other group members. This creates some problems in the weight that each of us has in the final product. As time crunches down the group members that check email more frequently have more an influence into what gets submitted.

Here, asynchronous communication, a feature for some groups, becomes a hindrance to dialogic collaboration while also upholding a hierarchical collaboration: Those students who responded quickly became the authority figures within the group, controlling the outcome of the shared document. This remark recalls the different dynamics inherent in collaboration, namely roles, leadership, and task and maintenance activities, and suggests that this student, at least, would prefer a more dialogic approach to using technology for collaboration.

To promote more dialogic collaboration, I, again, would begin with a multiliteracies approach and stress that collaboration requires not only interaction, but also purpose and intentionality. However, this purpose and intentionality would not be limited to the product of collaboration; rather, they would be directed towards the process of collaboration.

Students need to consider the purpose and intentionality of using technology to collaborate. I think one way to do this beyond Selber's multiliteracies is Lanham's (1993) look AT/look THROUGH bi-stable oscillation. Lanham claimed that we look THROUGH technology when we want to do something with it; we look AT a technology when we want to play games with it. Similarly, Bolter and Grusin (1999) proposed a double logic of remediation—immediacy and hypermediacy. The logic of immediacy, or transparency, "dictates that the medium itself should disappear and leave us in the presence of the thing represented." (p. 5-6). Immediacy attempts to make the interactant forget the presence of the medium and is similar to Lanham's look THROUGH. In contrast, the logic of hypermediacy calls attention to the medium itself by multiplying "the signs of mediation and in this way tries to reproduce the rich sensorium of human experience" (p. 34). Hypermediacy reminds the interactant of the presence of the medium and is similar to Lanham's look AT. I introduce both Lanham's look AT/look THROUGH and Bolter and Grusin's double logic of remediation to suggest that if we want students to collaborate dialogically, we might first consider pedagogically meaningful ways to provoke students to look AT technology, to notice its hypermediacy. It seems most students only through look THROUGH technology to achieve their collaborative purposes. However, if we start by looking AT technology, noticing its hypermediacy, we may begin to stimulate playful experiences with technology and its possibilities for collaboration. Once students look AT technology for play, they may look THROUGH technology for purpose. Indeed, dialogic collaboration incorporates both look AT and THROUGH in rapid oscillation moving from the social process to the social product of collaboration. And doing so requires students to move beyond functional use of technology to critical understanding and rhetorical production. Technology, thus, shifts from a tool to a shared space of social collaboration.

What meanings do students assign to collaboration and technology?

This question has largely been covered within the previous two discussions. Here, I would add that students, when left to manage collaboration by themselves, view collaboration as another course requirement, not necessarily good or bad. Indeed, the course requirement—the shared-document assignment—played an important role in encouraging certain kinds of collaboration, namely hierarchical collaboration; that is, a shared-document assignment seems to encourage students to perceive collaboration as the functional transfer of information rather than the co-construction of knowledge. As teachers, we need to think more critically and rhetorically about how our assignments inherently structure modes of collaboration, and then we need to provide the classroom environment to facilitate the desired modes of collaboration.

Finally, based on many of their comments, students seem to think that collaboration equals time commitment, drawing them away from other activities (again, this observation may reflect the mode of collaboration supported by the shared-document assignment): "The one thing that has been difficult is the time each of us have available to meet. We can all meet at the same time, but can't all stay as long as we would like to." And the following: "The hardest part of a collaborative project is finding the time when everyone involved can meet and discuss what has been done so far and what still needs to be done." And finally: "So far the experiences have been rather slow going because of the needed time to more effectively collaborate with all group members is just not there." Although these comments are ostensibly discouraging in that students are dissatisfied with collaboration, they also imply that students want to find better ways to collaborate—if only they had the time. Here, I think, is an opportunity. As teachers, we have to encourage students to perceive collaboration as more than a time commitment. Collaboration must become a mode of

thinking and being in the classroom so that collaboration has a meaningful place in students' understanding of learning.

Conclusion

I undertook this study to better understand my students' perceptions and use of both collaboration and technology while also seeking to improve my and others' pedagogical practices. I believe students' perceptions of technology and collaboration should be starting points for implementing and integrating both within the classroom; however, though we should start with these perceptions, we should not remain bound to them. As the results and discussion of this study demonstrate, students mostly perceived technologies as tools they could use to collaborate pragmatically while completing their group assignments. Furthermore, this study suggests that because students perceive collaboration and technology as interrelated tools—a hammer and a nail—collaborative technologies are only useful if they fulfill the requirements of the intended use. As such, students largely used technology within a hierarchical mode of collaboration wherein they worked to one another's strengths enabling them to produce a better shared document. However, there is a potential problem: Students may not be required to improve their collaborative and technological weaknesses; thus, what students learn about and from either technology or collaboration remains limited and tied to that specific collaborative experience. Such perceptions and practices are not sufficient for today's classrooms and workplaces where to be literate requires a commitment in both teaching and learning to dialogic collaboration, multiliteracies, and reflective praxis. As Moxley and Meehan (2007) averred, "And, perhaps, most importantly, we believe we need to revise our writing classrooms so students have access to the collaborative writing tools and practices that are required to be literate in the 21st century." This study's most important finding shows how students' perceptions of technology and collaboration are bound to functional literacy. For our students this may always be good enough, but for us as teachers it never should be.

In titling this study, "Doing What Comes Naturally? Student Perceptions and Use of Collaborative Technologies," I drew upon Stanley Fish's (1999) book of the same name, *Doing What Comes Naturally*. Fish explained,

I intend [the title] to refer to the unreflective actions that follow from being embedded in a context of practice. This kind of action—and in my argument there is no other—is anything but natural in the sense of proceeding independently of historical and social formations; but once those formations are in place (and they always are), what you think to do will not be calculated in relation to a higher law or an overarching theory but will issue from you as naturally as breathing. (p. ix)

Fish argued that we are always "embedded in a context of practice" so much so that our actions, including what we think is possible, are determined by the context of practice. Indeed, we become assimilated into the context so that our actions and thought processes become natural, even though they are socially and culturally constructed. I invoke Fish's title and theory to highlight both our perceptions of students using technology and students' perceptions of their own use of technology. Perhaps, we see the current generation of students as digital natives because we are "embedded in a context of practice" that we impose upon our students. We see our students as digital natives because that is what our context tells us we should be seeing. What is required, and what I think this study shows, is that we cannot allow our perceptions of technology to obscure our students' perceptions of

technology. Nevertheless, our students' perceptions are as embedded in a context of practice as much as our own. Although this seems natural enough to them, it is only natural because these technologies have become embedded within their context of practice, their lives. To counteract this embedded functional literacy, we need to develop continually perspectives by incongruity, a rhetorical pedagogy that places the discovery of alternatives and the command of contingencies at the heart of the teaching and learning processes.

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