Client-Based Writing about Science: Immersing Science Students in Real Writing Contexts

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Abstract: Giving students direct experience with the writing contexts and demands they will soon face as professionals focuses their attention on learning as much as possible from a required writing course. Our approach has concentrated on developing an experiential (client-based) curriculum to provide students the benefits of writing for real audiences as well as meeting both student and teacher goals—engagement with real content, authentic practice of key writing skills, and sophisticated analysis of rhetorical context. Anticipating—and avoiding—potential pitfalls can help students take full advantage of the opportunities inherent in the client-based curriculum.

Teachers of writing courses face a barrier that even the best-intentioned students put up. Even those students who understand the value of practicing writing skills often note that writing tasks in these courses have no real audience or purpose beyond fulfilling course assignments. Students write papers for their teachers to read and evaluate. Even those assignments with specific rhetorical contexts or designated publication guidelines get interpreted by students as merely academic exercises. In earlier versions of our courses, students would accept the challenge to write for a specific publication and would do their best to meet the standards of that publication but would note in end-of-semester evaluations that "I knew you were the only one who would read my paper."

Attempts to break through this barrier have included inventive and useful options for students. Some writing teachers have designed topical courses in which students can investigate content and questions from broad academic perspectives or within their disciplines. Other teachers focus on specific genres or assignments to engage students: Poronnik and Moni (2006; see also Moni et al. 2007) describe how writing Op-Ed pieces improves physiology students' awareness of mass media as gatekeepers of the public understanding of science, and Hein (2006) describes a similarly focused assignment using a case approach to writing about forensic science. (See also Motavalli et al. 2007; Myers 2007; and Purcell-Gates et al. 2007). Or in some instances, as Moskovitz and Kellogg describe (2005), writing teachers take up certain kinds of disciplinary writing even with groups of students from diverse majors. Despite their ability to engage students intellectually, such courses and writing assignments still lack the component that will break through the students' psychological barrier of writing only to the teacher.

A major effort to move beyond academic exercises, though, has involved physically moving outside the classroom for student writing tasks. Huckin (1997) notes projects as early as 1981 that involved sending students "out into the community to do writing projects for local businesses, campus

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organizations, government agencies, or nonprofit organizations." Since the mid-1990s, these community and client-based projects have been joined by service-learning projects that specifically focus on civic engagement. (See Cushman, 2002, and Herzberg, 1994, for explication of the tenets of SL writing projects; Adler-Kassner et al. also focus on the logistics of SL projects themselves.) Many senior design projects in engineering (Uhl, 1982) similarly pair groups of students with clients who need design solutions. Wojahn et al. (2001) update this well-established practice by adding a technical writer to the senior design team to more closely replicate the multidisciplinary teams that both engineering students and technical writing students will join in future workplaces.

Long a staple of technical and business communication classes, client- and community-based projects of these various sorts serve valuable functions including, as Blakeslee notes (2001), conveying "the rhetorical contexts and the social actions entailed" by professional genres and tasks. As she goes on to explain, "client assignments that involve actual workplace projects … potentially preserve more of the culture of the workplace, while also allowing students to address a variety of audiences" (170).

In our effort to move beyond academic writing assignments, we needed not only to consider the possibilities for community connections but the particular needs of our students. The students in CO301B are science students, usually in their last semester or last year of baccalaureate work in such fields as biochemistry, chemical engineering, microbiology, computer science, wildlife biology, natural resource management, watershed science, physics, and environmental health, among others. They see themselves as scientists, but rather than fulfilling their advanced communication requirement through a technical writing course in which they would write to experts in their scientific communities, they choose an English department offering that focuses on writing to non-expert readers. Our clients — or site partners, as we call them — do not need technical documentation or scientific writing. Instead, they are looking to meet their readers' needs with writing that assumes little to no background in science, builds an appropriate knowledge base in the text itself, and then explains the key concepts thoroughly and clearly.

Our adaptation pairs students with content experts in various sciences settings (hereafter, site partners) who set the standards for what to include and how to present material for target audiences. Such an experiential or client-based approach can provide students the benefits of writing for real audiences as well as meet both student and teacher goals — engagement with real content, authentic practice of key writing skills, and sophisticated analysis of rhetorical context.

First, let us describe an upper-division writing course and how we have integrated experiential learning. We will then address the advantages and potential pitfalls of this client-based project approach for teachers and students.

The Course

CO301B, Writing in the Sciences, is an upper-division writing course taught in the English department for students majoring in science and technical disciplines, including the full range of biological and physical sciences, engineering, and mathematics. The course fulfills a university core requirement for upper-division writing, one of seven courses that students can choose from at the moment. Students are most often seniors, close to graduation, who have disciplinary knowledge they can draw on as writers. Many plan to attend graduate and professional school, but some plan to go directly into careers in their fields. All are proficient writers of lab reports, and some have experience with some managerial genres (resource management plans, for example). Few, though, have engaged in the kinds of writing that require they translate complex disciplinary knowledge for non-expert readers. And that work is precisely the focus of this course.

In previous versions of this course, Kate asked students to look closely at writing about science as it appears in a wide range of public venues—brochures, magazines and newspaper articles, websites, and so on. Students then defined their own plan to produce similar kinds of texts for non-expert audiences. Most students found the tasks challenging (and somewhat rewarding) but many found the tasks too artificial.

The latest version of the course with our client-based project links each student with a campus or community partner. (See Table 1 for an illustrative list.) The site partners have signed onto the collaboration because they need various documents for the audiences they want to communicate with. For instance, the Larimer County Department of Health and Environment (LCDHE) recently decided to add a new website for children to their current efforts at dissemination of local health information. Generating material for an entire website demands far too much time for the current staff at LCDHE, so being able to draw on young scientists' content knowledge helps the agency see how to realize this project.

Table 1. List of Sample Campus and Community Site Partners

- Colorado Climate Center Colorado Water Research Institute
- CSU Equine Extension
- CSU Oceanography Project
- Discovery Science Center
- Environmental Learning Center
- Ft. Collins Audubon Society
- Poudre Valley Hospital System
- Garbage Garage (Larimer County Dept. of Waste Management)
- Larimer County Dept. of Health and Environment
- Little Shop of Physics
- Rangeland Resources Agriculture Research Station
- Rocky Mountain Raptor Center
- Trees, Water, People
- USGS Biological Resources
- Walgreens Pharmacy
- Various departments and research projects on campus

Students hear about the site-partner connection on the first day of the semester, and they review their site partner options immediately. The students can choose from our list of established contacts or recruit their own site partners. We give students a clear timeline for meeting with site partners, including an initial interview for introductions and conversation about the expectations from the partnership. (See Table 2 for the list of required site partner contacts and goals.)

Table 2. Information About Site Partner Contacts Students Receive on the First Day of Class.

Dates and Contacts with Site Partners:

Visit 1

Before September 6, visit your site. Make an appointment to meet with your primary contact person at the site. Your main goals with this visit are to

- introduce yourself and establish a connection with the site,
- collect at least one sample of the kind of writing you'll do for the site partner,
- get a preliminary sense of the writing context – who target readers are, what the site partner wants readers to do with texts, what other elements of the context are critical to situating your writing.

If you can get a sample text written for the same audience that you'll be writing to, do so. If you can only collect generic samples of texts written at the site, those samples will serve our initial purposes.

Before you leave, share with your site partner your time-line for getting the work of the semester completed. (See below.) If possible, set appointments for the next visits.

Visit 2

By September 15, you will need to spend considerable time with your site partner, interviewing your primary contact and other site members. You may also decide to conduct a survey of or interviews with potential readers of the final documents (target audience members). Plan carefully how you can get the most out of your time on the site but don't stint at this point. The more you know about the document(s) and target audience(s) for your final work, the more easily that work will progress.

Visit 3

Between October 11 and November 1, you'll take your drafted document and text-based interview questions to your site partner to conduct at least one text-based interview. A copy of your text-based interview questions and a summary of the interview need to be included with your portfolio on November 15. Also, the Daily on November 1 asks you write up a specific plan of the revisions you will make based on insights gleaned from the text-based interview.

Final Document "Hand Off"

We will have a final gathering of students and site partners during the final exam time. Students need to be prepared to display their final copies of document(s) for all to browse. Then students will turn over a final copy of the document(s) to the site partner (paper and electronic copies) and to me.
8 TR class — Thursday, December 13, 9:10

The visits outlined here constitute the minimum contacts. Some site partners have noted that more regular visits are more useful for them, so think about making a standing appointment for every other week.

Over the first several weeks of the semester, students work closely with their site partners to lay out the project in detail while our class work focuses on giving students workable tools to interrogate the rhetorical contexts they will be writing in. Students bring samples from the site to class to do group and individual analysis of rhetorical context, genre conventions and constraints, and specific text features. Students also begin working on a formal proposal memo that details their work plan for the rest of the semester.

The proposal memo pulls together information students have collected from site partners, their own brainstorming about materials and formats, and their plans for the documents they will write. We ask them to attend to several points that can guide their work through the remainder of the project:

- target audience for each document
- target readers' background knowledge
- the site partner's goals in having the student write the text
- readers' probable goals for picking up the text
- how the site partner and target readers are likely to use the text (what might they do with the information after reading

- any constraints on the document based on reading skill or level
- how the document fits into the larger context of the site or other documents on this topic
- what the text itself needs to look like
- what the student needs to learn to be able to present the topic content confidently
- where the student will find content information as demonstrated by a preliminary list of credible sources

Following a round of revisions to the proposal memo, students send the memo to site partners and turn in a final draft for grading. Students then draft, revise, edit, and format documents for their site partners. Table 3 lists documents students have written in recent sections of this class. (See also https://writing.colostate.edu/sciencewritingconsortium for our gallery of student samples and other information about the course.)

Table 3. Illustrative List of Documents Produced for Site Partners

For Adult Audiences:

- Three-fold brochures about diabetes, avian flu, current research in weed management
- Pamphlets on running and nutrition, dialysis access, cancer-drug trials
- Eight-fold brochure on zoonotic diseases
- Newsletter articles on cloud-mapping satellites, coumadin, avian flu
- Magazine article on endangered toads

For Teenage Readers:

- Pamphlet on cardiovascular effects of smoking
- Three-fold brochure on choosing, packing, and wearing a backpack to avoid back pain
- Web-text on climate change
- Pamphlet on careers in biochemistry

For Children:

- Books on heart anatomy and physiology
- Web materials on what germs are and how to fight them
- Placards on mummification for a children's science museum
- Hands-on activities to learn about recycling

Advantages of a Client-based Approach

Organizing and managing their time to work with site partners definitely challenges students in this new version of the course, but the rewards more than outweigh the effort, in our view. Students must grapple with rhetorical decision-making to meet the exigencies of an immediate writing context. They gain first-hand experience with the complexity of sometimes contradictory advice about their emerging drafts as well as the shifting needs of government and community agencies, researchers, and educators. Perhaps most important, they must accept responsibility for their work not only as a student but also as a writing partner, a role few of them experience before they begin this project. Let us address some of these rewards in more detail.

Investment in Interrogating Rhetorical Context

Analytic tasks to help students understand rhetorical context can be very effective in building students' knowledge base for audience accommodation. Through analytic work, students can become quite savvy about genre, format, and stylistic features designed to meet the needs of readers. Our students clearly gain in sophistication as they work through the sequence of analytic tasks that precede their work on the site partner documents.

But for many students, such analytic tasks remain pro forma academic tasks. Yes, students can complete the tasks and produce coherent and detailed analysis. But in the past many of even Kate's best students showed little connection between analysis and execution when they began drafting their own work.

In the current version of the writing course, students begin the semester by working through three separate analyses of mainstream media texts on a science topic we choose. (We need about two weeks at the beginning of the semester for students to identify and contact site partners for initial interviews, and this work on a common topic builds an important knowledge base while students set up initial site partner contacts.) Students complete most of these tasks—rhetorical, genre, and text analysis—in small groups to build expertise about interrogating a text. By the time students complete these group analyses, students have collected sample documents from site partners and some preliminary guidelines for their own documents. (We ask students to be sure to collect sample documents written to the same target audiences they will write to.) Students then complete the same analytic tasks again on their sample documents.

Throughout this process, we remind students that their analysis feeds into their proposal memo outlining the rhetorical context of their planned documents. As students realize how much these analyses will help them plan and draft their own documents, the analytic responses get fuller and more nuanced, reinforcing results noted by Wickliff (1997). By the time we get the proposal memo (about five weeks into the term) each student has written 12-15 pages of detailed analysis of sample documents. They have also met with site partners (and sometimes other site contacts) at least twice. A few students have even, by this point, surveyed some target readers for information about background knowledge and reading preferences and goals.

The client-based approach to this class has not changed the analysis students do, nor has it changed the emphasis on understanding how rhetorical context shapes writers' decisions for effective writing within that context. What it has changed, though, is students' willingness to engage seriously with this detailed investigation of the rhetorical context because so much more now depends on "getting it right" for the site partners and target readers.

Authentic Feedback

One of the most interesting side-effects of the revised curriculum is the shift Kate sees in her role as commenter on students' drafts. In the past, students accepted, without question, Kate's authority and expertise as a writing teacher to comment on their writing, whether the particular draft was an academic paper or a potential article for *Colorado Outdoors*, a regional environmental magazine. In the new curriculum, students challenge Kate's knowledge of local conventions. Students forward emails that site partners send asking for certain revisions based on site needs. Students even report in their reflective writing at the end of the semester that they deferred to the site partner and ignored Kate's advice because they saw their primary goal as meeting site partner needs. When the partnership is working as planned, students see course teachers as secondary to the site partners who can give much more authentic feedback about the draft. (Taylor [2006] takes up this issue in

much more detail.) Students clearly dread hearing "This pamphlet won't work for our audience" from a site partner. One young man was almost in tears when he got that message from two different contacts at his site. But he took the marked up copy from the site partner and reworked almost the entire text. And when the site partner publicly praised his work at our end-of-semester gathering, this student beamed with success.

The students in this project become invested with their site partner documents in a way that academic papers never seemed to engage them. Building in multiple opportunities for site partners to see and respond to texts gives students direct feedback about how well their texts achieve real-world goals. Students still want to know if they have met the criteria for the course, and they are delighted when the course criteria overlap smoothly with site partner needs. But if the site partner asks for changes that we question, the site partner wins every time—and that is success from the client-based point of view.

Hands-on Experience with Nonacademic Genres, Formatting

As arguments for WID have made clear (see, for instance, Carpenter & Crest, 2001), students need to learn the disciplinary conventions for the writing that will dominate their professional lives as academics. For many science students approaching the end of their baccalaureate work, gaining more experience writing research articles rather than just lab reports dominates their thinking. But as others argue as well (Motavalli et al. 2007; Myers 2007; Purcell-Gates et al. 2007) students need to understand the mainstream genres that scientists can use to communicate with non-expert readers. Familiarity with these genres, not just as readers but as writers, can help students see the limitations of certain genres for communicating detail about scientific concepts. Students can also come to see how other genres accommodate wider ranges of readers, or how a once-over-lightly genre like the three-fold brochure can invite readers to explore a topic in much more detail elsewhere. Without direct experience writing and formatting these common genres for writing about science, students can be dismissive of their value and substance.

In CO301B, site partners often ask students to draft material that will be accessible to adult readers completely unfamiliar with a scientific topic. Particularly government agencies that conduct research on precisely focused questions need to be able to communicate the substance and importance of the ongoing work without burdening readers with many pages of background information. Students often find themselves baffled by how to approach such a request, and they must work through their own assumptions about what constitutes clear science communication as well as limitations of space and time for uninformed readers. As these profoundly rhetorical issues come to the fore, students eagerly search my small library of science documents—brochures, newsletters, fund-raising materials, websites, magazine articles, placards, and so on—to find the right way to communicate with their target readers. Students who dismiss the three-fold brochure as too skimpy at the beginning of the project discover that it can fill a vital need for certain readers, and they work hard to shape details to fit the conventional format. Sometimes, we get drawn into a conversation between the student and site partner in which the student argues for an expanded brochure or multiple documents to flesh out more detail about concepts and research projects. And at the end of the semester, students report that working with the genres of mainstream science communication and formatting these documents, though tedious and time-consuming, are among the most valuable aspects of the course.

Responsibility to the Site Partner, and the Larger Community, Not Just the Teacher

Perhaps most critical of the benefits to students is the partnership itself. A few students have been able to use their partnership to develop internship or other employment opportunities. The most surprising outcome of one partnership involved a student who had recently struggled through cancer treatment. As a cancer survivor in his early twenties, he felt uncomfortably distanced from other students in his classes, but he felt compelled to find a way to connect with other cancer survivors. Through his partnership with our local hospital, this student was able not only to write materials that the hospital turned into a full-scale campaign to reach out to cancer survivors throughout our community but he was also able to find solutions to his felt dissonance with the academic community.

For most students, though, the partnership does not reach this level of significance. Nonetheless, working with a site partner gives students new perspectives on their disciplinary goals and their professional expectations. For most students, this project represents a unique opportunity during their college years to create documents that someone will use—to explain diabetes to newly diagnosed patients, to highlight health warnings and immunization recommendations to travelers, to forge connections between scientific research and day-to-day life. As one student explained in her end-of semester reflection:

> In many classes we spend long diligent hours working on heart felt projects, we take pride in these projects, but that's usually all they really are, rarely does anything come of it. This class gave us the opportunity to work for something besides a grade, work with someone gracious enough to provide their time to help a college student so close to graduating. It made me feel like I was really trying to apply my knowledge for a worthy cause and purpose.

The worthiness of student work quickly becomes evident when site partners come together at the final gathering of the semester. In each semester we have used the client-based approach, site partners have asked for copies of other students' final work – to share with colleagues, to generate more ideas for their own sites, or, in one notable case, to send to parents dealing with the health issue that the student had written so clearly about.

Potential Pitfalls

As with any significant redesign of a course, problems emerged in the first offerings of the new curriculum. Our most serious concern starting into the redesign did not come to pass: we feared that the client-based approach would require more teacher time overall in this variation than prior versions of the course. Additional time spent contacting site partners balanced with less time on drafts of documents: students prepared more complete and polished drafts throughout the process, significantly reducing the time we spend on helping students brainstorm and generate material for their portfolios. Still, some problems remain.

"Slacker" Students

For the students who take on the project as an opportunity to get real experience, the course is a huge success for both site partners and students. But in each of the four sections with this design, we have encountered two or three students who either do not make a commitment to the project or who will not give it adequate time and attention. In two instances, site partners were so disappointed in the

final document that they decided not to participate again. Though rare thus far, the "disengaged" student can be a serious problem.

After this extreme response in the first semester of the project, we built in more explicit advice for students and more checkpoints to track interactions with site partners. We now underscore repeatedly that working with the site partner is key component of the course and that students who anticipate problems with time should take a different course. We also check in with site partners and ask for feedback if problems start to arise. Kate was able to head off one serious conflict with timely emails to the student and site partner in question, though intervention cannot solve every such problem.

Nurturing relationships with site partners does take teachers' time, but any students who struggle in a writing class take extra time. Making clear to students that when they do not follow through on the commitment to a site partner they disappoint a professional relying on them has reduced the problem of the slacker student, but it will continue to challenge problem-solving skills in future iterations of the course.

The Disappearing Site Partner

The flip side of this coin is the site partner who disappears mid-semester. Again, in one extreme case, a local environmental non-profit group lost its funding and had to shut down all operations at the end of its fiscal year (Oct. 31). The student had no warning and was left with no way to disseminate her project (a newsletter on a local river clean-up and conservation efforts) to its target audience. We salvaged the project, but we had to find a substitute to do text-based interviews on her document drafts.

More likely than this rare case is the research professor who leaves campus for a conference or research at a remote location or the community partner who gets caught up in other activities. Site partners are not always available on students' schedules, nor are site partners always able to respond to students' phone calls and emails. Our response to this difficulty has been to encourage students to set a full semester's appointment schedule at the first site partner meeting. To this end, we give students the detailed timeline for the minimum number of site partner meetings on the first day of class and we return to the timeline frequently over the next weeks to underscore the importance of each contact. We pointedly advise students to ask about site partner travel plans and potential scheduling difficulties. Students who follow this advice early in the semester have relatively few problems connecting with site partners, and we accommodate some deadline shifts for students who are genuinely disadvantaged by "absent" site partners.

Over time, as well, we are learning more about which site partners are more and less available to students. We now provide gentle warnings to students when they ask to work with certain site partners. For example, when a student signs up to work with our local children's science museum (about 2 miles from campus), we alert students to this partner's aversion to email. Face-to-face contacts with this site partner have been very successful for students, but no other contact, including telephone calls, have worked at all. By heading off inevitable conflicts, we can help students benefit from rather than suffer through the project.

Unworkable Site Partner Expectations

Educating site partners about what students can accomplish in a single project/semester has also emerged as a key issue in the success of this approach to the course. Infrequently, some site partners have asked students to write detailed program assessments, conference summaries, or grants. One

student brought two reams of paper to Kate's office the morning after her first site partner contact. The site partner had asked the student to read all the material, select the most important community health-program descriptions, and draft a grant to coordinate community health efforts. The student and Kate brainstormed for an appropriate document that she could propose to this site partner, and we discussed in detail how to present the idea. The site partner was very pleased with the proposed alternative, and the student not only gained more confidence about her planning skills but she also felt reassured about her agency to set limits for her work. In short, even though we give clear guidelines to site partners in advance of the semester or as soon as they are recruited by a student, we still need to intervene from time to time or help students see how they can negotiate with site partners. (See also Kastman Breuch 2001 for more detail on student-client interactions.)

On the opposite end of the spectrum, site partners often have very limited needs. Much more typical is the site partner who meets with a student to request a single three-fold brochure. We explain carefully to students that they must meet our minimum requirement for course work (approximately 15 double-spaced pages of text), and then we work to suggest additional documents that might be of use to these site partners. No site partner has turned down the additional documents that students have generated, but we have occasionally had to convince site partners how these documents might be useful.

Looking Toward the Future

As Freedman and Adam argue in "Bridging the Gap: University-based writing that is more than simulation" (2000), students learn most effectively from activities that immerse them in the practices of working professionals in the field. Our students, particularly those juniors and seniors taking COCC301B, will soon be the working professionals acting as naturalists/interpreters, chemists, engineers, county extension agents, vet medicine and medical students, park service rangers, and so on. Giving them more direct experience with the writing contexts and demands they will soon face as professionals will focus their attention more closely on learning as much as possible from the required writing course.

The course we have described here brings students face-to-face with the increasing demands of a society that needs to be scientifically and technically literate not only for day-to-day activities but for personal, political and civic decisions. Grounding that experience in detailed research into a specific setting helps students see the impact of their scientific studies for readers who eschew our academic disciplinary boundaries and genres.

Working out a client-based approach certainly entails spadework, and making sure the partnerships are productive takes some attention. But the pay-off—for students and teachers—definitely makes the effort worthwhile.

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