Technical Writing—Using Technology Innovation

to Teach Critical Thinking and Writing in Professional Contexts

by

Christine Russell, East Carolina University

I was first assigned to teach technical writing (ITEC 3290) Fall 2006—my first year as a Visiting Assistant Professor with East Carolina University’s Department of Technology Systems. Although I have educational background in technical writing and communication, I had not taught technical writing at all before. In fact, my areas of expertise are in teaching writing using technology, new media, and technology and law. For me, the courses were holding cards until spring semester when I taught technology and law in my new department. I was, to say the least, a little unsure how to begin and what to do. Fortunately, some of my colleagues were there to give me advice and get me started.

At first, I assumed that my students would all be from some department in my new College. That would mean my students should be majors from construction management, computer science, technology systems, and industrial technology programs. However, on the very first day of class I found I had students from criminal justice, biology, recreation and leisure studies, and others, in addition to those from the departments within my home school. Most of these students were business minors and had already taken one course in technical writing with our English department—although not all had done so. So, the challenge I saw immediately was how to build on what the students already knew, challenge them to go further, and provide them with some experience that would help them in entering the work world or professional schools like medical, veterinarian, or law. With the basics covered, my students could benefit from experience in creative and adaptive thinking as well as in critical thinking. Additionally, I wanted to show them that technical writing really can be fun. One more component had to be considered; I would be teaching one section online and one section face-to-face, so my assignments and goals for the class needed to be ones that could be accomplished in both settings.

My course plan and assignments were formulated with these issues in mind and with my goals set out as follows: to build on solid writing and design skills, to learn to identify problems and creatively solve them, and to communicate those proposed solutions in writing and orally to an audience in the most effective way possible.

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Two methods were used to accomplish these goals: (1) use technology, particularly collaborative options, as an everyday working tool so that students are no longer overwhelmed by its use and (2) create a system of assignments that would stretch students’ intellectual and creative skills as well as their writing skills.

This paper discusses the system of assignments created; a forthcoming paper will discuss the integration of new software used as tools.

**Assignments**

In order to create a series of assignments to accomplish the previously stated goals, I had to think hard about my audience: who were taking these classes and where might their interests intersect with the professional worlds they were about to enter? Additionally, I had to find some commonality between such a broad array of majors. Finally, I realized technology was the key.

I must admit here to being a “techie geek” myself, but these assignments don’t require teachers to have any advanced knowledge of technology, just a willingness to learn as they go. I stress, however, that these assignments can be adapted for use in face-to-face classroom environments using no technology except for students using PowerPoint for the oral presentations. Even if you are not “geeky,” read on.

As an end goal I wanted students to create a series of documents that culminated in a full internal memorandum or technical report. The series of assignments required students to identify a current problem in their industry, or identify a growth potential in their industry, that could be met with the adaptation of current, newer technology or emerging technology. This approach may not seem new, but the new aspect involved students using technology in ways that it *was not* currently used to solve their identified problem or to create growth.

The assignments in the series helped them identify issues/growth potential, explore new and emerging technology as a tool to solve problems and encourage growth, and then to merge that knowledge into a document that presented the information appropriately to their given audiences. I have heard from many employers in corporate America that this kind of skill set is one of the things they find missing in college graduates—faith in their ability to solve problems creatively and independently, and the ability to appropriately convey those solutions to the decision makers.

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The series of assignments and steps in this process required students to
- Brainstorm ideas, and identify problems and growth challenges for chosen industry.
- Research data on problem or growth potential in identified market/environment.
- Research possible technology solutions and applications.
- Write a technical proposal to their chosen audience including: identification of problem/growth opportunity, justification of the same, proposed technical solution and description of technology use and application.
- Write a technical report that expands on the proposal, including technical descriptions of the applied technology, assessments of strengths and weaknesses of the technology implementation, rationale for implementation, cost/forecasted growth analysis, and recommendation.
- Meet as a group, and choose one technical report to adapt as a presentation to the class using multi media presentation techniques where possible. (A simple traditional presentation using PowerPoint also works for this assignment.)

The advantage of this series of work assignments is that students are engaged in their topics, see its relevance to their proposed work, engage in creative application of their writing and document productions skills, and learn to adapt their work to different audiences with different goals. The teacher may choose to make the technical proposal a persuasive or informative report, for example. I typically set up the proposal as a persuasive document, the technical report as an informative document, and the presentations as persuasive. For the presentations, students choose the best technical report for the class audience, assign the audience a role (e.g., the CEO of a particular company), and then prepare the presentation to convince the decision makers to implement their full written technical proposal and reports.

One thing I learned the first time I used this series of exercises is that students wanted more time to prepare and to give their oral presentations. They actually enjoyed this assignment and wanted to give longer presentations with more detail. In short, they were very proud of their work and wanted to share it with the class. The class, in turn, was really interested in the presentations given, a situation which resulted in especially collaborative peer evaluation and responses.

**Step One—Assignment #1: Brainstorming ideas and identifying problems and growth challenges for chosen industry.**

For this assignment, students—especially those who have no technical background or believe they don’t—need the teacher to provide a starting point. I begin by posting a

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series of places and news articles that students can go to begin thinking about the changing world of technology and its applications. For example, I provide a link to Second Life, a 3D virtual reality environment whose popularity is increasing. (The link is www.secondlife.com.) In class, or as a small group outside of class, we tour this environment, and then we discuss how this technology and environment might impact many businesses in the future. We might discuss what it means to use these environments for a variety of purposes and environments, such as college classes, dating, selling products, selling and test driving cars, and viewing movies and art. The idea is to get students thinking about the ways these technologies may be used in their work worlds. I also provide students with basic information about biometrics, RFID, GPS networks and anything else I learn about. We discuss how those might be used in other industries. We include cloning, software, and any kind of technology that we see or think of.

After a couple of class sessions with students participating in these discussions, students are each required to find and present one technology to the class and to suggest how it might be used somewhere else. We complete this activity using a discussion board venue. Students in face-to-face sections also talk live in the classroom to stimulate creative discussion.

For the DE classes, I use Centra, which allows us to hold live, synchronous discussions using voice and video or text, as well as to see web sites and materials together as a class. Centra contains an interactive white board, and the software runs video off of a standard web cam situated with the instructor, and/or with any students who also wish to allow others to see them as they talk. Centra has the added bonus of letting me record the sessions so students can go back and watch a segment on brainstorming at any time for more inspiration, or if they missed that class period.

For the face-to-face classes, I use ECU’s global classroom that allows for the same or similar activities, but we’re all in the same room together. Without the global classroom, I would use Centra as a supportive mechanism to live class discussion and brainstorming. Once students have a lot of ideas about technologies and ways to apply those technologies creatively, I work in individual conferences with them to identify their problems or growth opportunities and they are ready to begin the preparation/research work.

A few examples of student ideas/applications for this assignment include the following:

- Creation of live video web streaming for the Greenville downtown area to increase tourism and sales as well as to provide safety.

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• Creation of smart weapons for police using a combination of biometric technology and global position satellites to provide police with concrete evidence of where their weapon was used, how it was used, and in what time frame and manner, as well as to provide police with protection from being shot with their own weapon as it would not fire unless the fingerprint of the shooter matched one on file with the police department.
• Redesign of movie rental businesses like Blockbuster using Bittorrent software.
• Creation of smart armor and weaponry for military personnel that would identify and better protect military. One of the functions of the weaponry would be to identify the size and weight of target, and if the size and weight matched a child instead of adult, the weapon would only stun, not kill.
• Use of chipping technology to protect children, pets, and property making loss, fraud, and kidnapping more difficult.
• Sales of cars and movies using virtual reality technology.
• Use of cloning techniques to improve food supply internationally for poor nations.
• Use of “green building” techniques.
• Creation of “smart cars” and “smart homes.”
• Creation of virtual reality schools for at risk youth.

Step Two—Assignment #2: Research data on problem or growth potential in identified market/environment.

This assignment is completed in a traditional fashion. I also devote class time to a short section on primary research, allowing students to create surveys and interview plans to use as anecdotal evidence for their reports. They learn how to use focus groups and other standard marketing research techniques as well as standard library and written research techniques. By providing a list of databases often used by journalists for their research, students can access basic demographic research in communities, for example, should that be necessary. Their projected costs analyses did sometimes require them to make educated guesses about dollar amounts as they didn’t always have access to those figures, but they were able to make good suggested dollar amount proposals based on current/estimated costs of technology and likely sales generation, if any. In the cost section of the series of assignments, I am more interested in a reasonable assessment and the ability to see and state the negative and positive issues associated with costs. Because students will need to describe clearly how the technology itself works, they must research the technology itself that they propose to use. Students submit a bibliography of materials for the research assignment. They usually have anywhere from 5-10

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independent sources for this work and often more if the technology has been existent for some time, like GPS or RFID technologies.

**Step Three—Assignment #3: Writing a technical proposal assignment**

Students create technical proposals using the directions contained in Attachment 1: Writing a Technical Proposal. Once the technical proposal drafts are created by students, we assign a group of three peer reviewers to each proposal, and the student responsible for the proposal meets with their reviewers to discuss potential problems and strengths of the proposal contents. The students generate a short peer review sheet, with input from both the student writer and the peer reviewers, including suggestions, ideas, and strengths/weaknesses of the proposal. This peer review includes an evaluation of course document design and writing. Student writers then modify their document and submit for grading. I schedule for myself a short turn around time to comment on the submissions. We will complete the peer reviews at the beginning of one week, and the product is due by the end of the week. I have the short turn around time because this situation is typical in a standard workplace.

Once the proposal is completed, students begin work on the final technical report product. By this time, they have received their proposals with my comments and suggested revisions as they go forward with the technical reports.

**Step Four—Assignment #4: Write a Technical Report**

This assignment requires that students write an informative report as an internal memorandum. Their audience will be the decision makers in their particular industry; the tone and content should be appropriate. This is a standard report using all of the standard headings. I allow students some latitude in headings and content used depending on their audience and the problem/technology used, but overall they are expected to have headings typically used in any technical report. Usually, I meet individually with students to discuss specific content and headings for each student’s project. This approach makes the student responsible for the outcome and the materials they produce; I find it makes them work harder when they have more choices but must explain or defend those choices at grading time.

Students are required to have the following visuals:

- At a minimum, three visual representations of the information, with at least one explanatory graph or chart.

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At least one visual depiction of the technology designed to explain the way the technology works.

Some kind of chart showing cost breakdown and financial predictions.

These requirements for the visuals indicate a minimum; it’s been my experience so far that students are so interested in the topics that they far exceed these visual requirements.

Step Five--Assignment #5: Prepare a Presentation

Once all of the technical reports are turned in, I place students in small groups of five people. We begin this process immediately after reports are turned in and before I have graded the individual work. Students are advised to keep a separate copy of their reports and proposals for work on the presentation project. Once assigned to the small groups, students share their individual work.

I devote several class sessions to covering the basics of working in group and group leadership as I find students benefit from these lectures when they are about to embark on a group assignment. After discussion, students decide which proposal they think is best suited to a class presentation and they report that information to me.

As I mentioned earlier in this work, during the first year, I did not leave enough time for this presentation, thinking that students would not be as interested in the presentation assignment and having added the assignment as an afterthought, though a fortunate one. I thought that the subject matter would be interesting, but didn’t yet know whether my assumption would be true when creating my first syllabus. As it turns out, of course, the material was creative and fascinating, and students were deeply committed to presenting their work to their peers in class. I would now leave at least 2-3 weeks for students to prepare and present their presentations.

I allow for many different methods of presentation delivery, including multi media devices, such as podcasts, traditional PowerPoint presentations, and/or any combination of methods they so choose. Most students did use some kind of advanced PowerPoint presentation for the live, face-to-face section, but for the online section, students had access to all kinds of technology; thus, some students with advanced knowledge of technology created short videos and similar presentations. In the coming semesters, I will spend more time encouraging students in the face-to-face section to use the types of presentations that students in the online sections used.

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Each presentation lasted 10-15 minutes, and each group had a short question and answer period with class members after the presentation was complete.

For larger classes, the groups may need to be larger than the ones that I used, or the amount of time needed for this assignment exceeds what is available. Having students develop multi media recorded presentations allows class members to watch those online outside of class, if class time is at a premium.

In conclusion, from the responses students gave on the written portion of ECU’s teacher evaluation surveys, most students seemed to enjoy the cohesion of the assignments as opposed to being asked to write many unrelated short assignments. Interestingly, students simultaneously said in class that this approach of using a series of related assignments involves a lot more time, but in the teacher evaluations, they appeared to view it as less time consuming than that for a classroom conducted in the traditional way. I plan to gather data next year on this issue directly; I suspect part of this response results from their enjoying what they did and, therefore, being less aware of the time they actually spent working on projects. While teaching technical writing in this format may be more time consuming at first for the instructor, like the students, I didn’t feel burdened by the time spent, because of my own level of interest in the work students were creating, I was learning right along with them, and that learning made teaching these classes no longer a place holder for me, but something I enjoyed; I have requested that I be assigned the course to teach in the future. As normally is true with teaching, this is an evolving project, requiring adjustments to the process; in addition, I have begun gathering data related to its efficacy in teaching critical thinking and writing/development skills. I expect the data to prove that the approach does teach critical thinking and writing/development skills, but as we all know, the data will finally be the tell.
Attachment 1: Writing the Technical Proposal

Overview: You are going to use the innovations that you have previously researched to write a technical memo for your current or a future employer. Address some need within the company structure. This need might include, but is not limited to,

- streamlining accounting practices
- using virtual reality for corporate training
- creating online textbooks for students (assuming your business is ECU)
- creating “smart weapons” for the military or current police
- using new search and software techniques for “wiretapping” online communication by law enforcement
- creating ways to hold live, synchronous video conferencing for international meetings with clients
- designing and developing live web casts of environments that might benefit from those as a matter of PR (if you work for a chamber of commerce) or as a matter of security (if you work for a community with rising crime rates)
- developing creative ways and use of software to encourage/foster movie and music downloads for businesses.

You might think of many ways to approach this project, but find a topic that you’re interested in because you’ll be working with the material for the rest of the class. I will post some examples of technical reports for you all to read through as a starting point. These samples are posted for their ideas, not necessarily their execution, so please follow these instructions about those matters.

I would suggest that first you think of industries you are working in now or ones you find interesting. Think of some of the ways that industry might expand or meet new demands from customers or because of growth, or consider current problems already manifesting themselves in the industry.

Next, think in terms of technology—either emerging or ones currently available—and how the technology might be used to address the given problem. For example, consider the following technologies, although others might be used:

- RFID
- Bittorrent
- Biological mapping
- Genetic ids
- Biological security
- Face recognition
- Smart devices
- Internet and email capabilities
- Voice recognition
- Virtual reality environments like Second Life (www.secondlife.com)
- Webcasting

Prepare this technical proposal as an internal proposal, using an informal memo format.

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