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CHAPTER 13

PROBLEM-BASED LEARNING AND INFORMATION LITERACY

Revising a Technical Writing Class

Kelly Diamond
INTRODUCTION AND BACKGROUND

Courses in technical writing are common offerings in colleges and universities as a means of preparing students for job-centered writing and research. West Virginia University (WVU) is no exception; English 305, Technical Writing, offered in the classroom and online, focuses on “writing in scientific and technical fields” and introduces “students to typical genres, workplace practices, document design, and conventions of writing for experts and non-experts” (West Virginia University, 2015–2016). While instructors of English 305 have a certain freedom in designing the course, the WVU department recommends that students in writing courses complete at least 25 pages of polished prose by the end of the class. Typically, students are asked to research and write about professions; create a document providing instructions; and, for the final assignment, propose a feasible solution to a real-life problem supported by outside research.

Professor Gregg Thumm, a colleague in WVU’s Department of English, has taught English 305, Technical Writing, for ten years, teaching at least one online section every academic year. Like most English 305 instructors, his course requires students to complete the typical assignments listed above: a set of instructions, a mechanism description, and a proposal, supported by outside research with an annotated bibliography. Thumm also likes to have group work in his classes as this practice reflects current workplace environments. While these assignments and practices work for onsite students, he found that the student performance and engagement in the online sections were not at the same level as that of his onsite students. Particularly, online student performance on the final proposal assignment was notably weaker. While the onsite students enjoyed working together in their groups, online students resisted group work by not participating in a timely fashion with their group members. Additionally, Thumm noted that submitted proposals had an “assembly-line” feel to them: assignments were poorly researched and not well organized or clearly written. The proposal assignment also seemed to discourage, rather than promote, collaboration and engagement. Online students were also reluctant to use WVU Libraries’ resources, despite the availability of an embedded librarian.

COURSE GOALS

Professor Thumm and I began working in the summer of 2014 to revise his online English 305 course. At the initial meeting, Thumm stated that he wanted the English 305 students to:

- Understand how assignments worked together and had practical application
- Collaborate effectively with classmates
- Become more information literate
- Use WVU Library resources
- Integrate sources into writing projects
- Use correct citations in the text

However, from an instructional design perspective, these course outcomes are weak as they are neither observable nor measurable: for example, an instructor can’t measure “understanding” as this transformation takes place internally. However, an instructor can ask a student to demonstrate understanding through an assortment of assessments such as research papers, tests, quizzes, presentations, and so on. After consultation with
Thumm, we generated a new set of measurable outcomes.

According to our revised outcomes, students finishing the course would be able to:

- Demonstrate the effects of word choice, sentence structure, organization, and document design on the meaning and effectiveness of documents.
- Demonstrate rhetorical principles that shape technical writing to suit a range of readers in a variety of writing situations.
- Identify the needs of an audience and use that understanding to design documents.
- Use databases and other electronic sources to find information.
- Choose relevant sources to support an information need.
- Evaluate and modify a document to ensure its usability and persuasiveness for an audience.

We had measurable learning outcomes for the course, but how would we get the students to achieve them?

**ADDIE AND BACKWARD DESIGN**

The basis of most instructional design processes is ADDIE (Analyze, Design, Develop, Implement, and Evaluate). Designing instruction using the ADDIE system requires creators to analyze the instructional needs, or deficiencies, of the learners; design instruction to address these needs; develop an instructional strategy; implement the instructional strategy; and evaluate not only the learners’ success but the success of the instruction (Gagné, Wager, Golas, & Keller, 2005, pp. 21–37).

For this project, I used a combination of the ADDIE system and backward design. In backward design, course developers first generate the learning outcomes for the course; then create assessments that will determine whether those learning outcomes were met; and lastly design instruction that gives students the knowledge and skills to achieve the outcomes (McTighe & Wiggins, 2005). Now that we had a set of measurable course outcomes, we needed a set of assessments along with appropriate instructional strategies to measure whether students had achieved these outcomes. Thumm and I decided that we wanted final assessments in the course to replicate workplace writing and research assignments as much as possible.

Technical writing in the classroom often does not replicate technical writing performed in the professional world: supervisors assign workplace writing tasks whose requirements may present research and writing challenges. Professional writing requires varied formats and complex research and analytical skills. Mabrito’s (1997) survey of factory supervisors found that required workplace writing was not only “rhetorically diverse” but also written for a variety of audiences as well as purposes (p. 68). Professional writing consisted of not just memos, but “short reports and instructional documents” (Mabrito, 1997, p. 68). As supervisors were promoted, workplace writing became more challenging; assigned writing required “greater documentation and the ability to synthesize and summarize information from a variety of sources” (Mabrito, 1997, p. 68). Survey respondents noted that they had difficulties meeting the readers’ needs and expectations, which they attributed to a “lack of specific triaging writing strategies” (Mabrito, 1997, p. 69).

To better replicate workplace writing and research tasks, we decided to create a final assessment in which students would be
assigned a workplace-situated research scenario. This research scenario would require writing multiple and different documents in diverse formats for different audiences. Not only would assigned research scenarios remove the stress of choosing an appropriate topic, a cognitive task that appeared to impede student success in English 305, it would also more closely replicate authentic workplace writing.

**PBL AND ASSIGNMENT DESIGN**

As we worked on designing the final assignments, we decided to give students more open-ended direction for each assigned writing task. While the research scenarios would provide students with contextual details, the instructions for the assignments were intentionally left unrestricted. While we wanted to replicate the workplace writing experience, as described by Mabrito (1997), our design choice was also informed by problem-based learning, or PBL. While PBL was initially developed in the 1960s for medical education, its elements are readily applied to teaching technical writing to juniors and seniors who will be expected to perform problem-solving writing and research in their careers (Barrows, 1996). Barrows (1996) outlines six foundational principles of PBL:

- Learning Is Student-Centered
- Learning Occurs in Small Student Groups
- Teachers Are Facilitators or Guides
- Problems Form the Organizing Focus and Stimulus for Learning
- Problems Are a Vehicle for the Development of Clinical Problem-Solving Skills
- New Information Is Acquired Through Self-Directed Learning (Barrows, 1996, pp. 5–6)

While we did not require students to work in groups, based on Thumm's past experience with online group work, we wanted students to tackle and to solve the problems outlined in the research scenarios by implementing the foundational skills of the semester’s first half, but also to work through research issues and writing issues on their own. Students were encouraged to contact the instructor and the librarian with questions while the instructor and librarian would occasionally facilitate more difficult problems. We believed that requiring students to focus on the research scenario’s problems and related writing tasks would stimulate implementation of previous foundational skills; considering how to present these solutions and recommendations to diverse audiences would require students to exercise critical thinking skills regarding the needs of diverse audiences. However, these research/writing skills and tasks are complex; students needed a foundation of skills and knowledge practices to be successful.

**SCAFFOLDING THE ASSIGNMENTS**

To give students the skills and knowledge that they would need to effectively complete the final assessment, we designed a series of scaffolded assignments leading up to the assigned research scenarios. During the first half of the semester, assignments focused on foundational and basic skills, which would be used for the major assignment for the class, the research scenarios.1

**Module 1: Ethics of Writing/Concision and Clarity**

Students were given an article from the *Charleston Gazette* (West Virginia) reporting
a link between taking Lexapro and a reduced risk for depression among stroke patients (Smith, 2015). Students were then asked to (1) find the original peer-reviewed study using information found in the newspaper article; (2) complete a brief log outlining their search strategies and providing the citation for the original study; (3) compare and reflect on the differences between the newspaper article and peer-reviewed article; (4) read letters and blog posts on ethical violations present in the original study; (5) rewrite the newspaper article so that the information was accurate but written at an appropriate level for a newspaper audience; and (6) write a brief memo reflecting on their editing decisions and choices.

Online instructional support consisted of the course LibGuide; a video tutorial on using Summon, our discovery system at the time; and a PowToon video, What’s the Deal with Peer-Review? (Diamond, 2015c)

Foundational skills and knowledge for this module included an introduction to the WVU Libraries’ resources, learning how peer review works in academic publishing, considering the audience’s information needs, and writing different documents for those needs. This module asked students to consider how to present information accurately and ethically while also considering the needs of different audiences as well as editing documents for an audience. The assignment also required students to use WVU Library resources to find information to support and inform their writing decisions.

Module 2: Professional Analysis Memo
Students researched their potential career and produced a report for an audience who did not know anything about this profession and wanted to learn more. Students first consulted the Bureau of Labor Statistics Occupational Handbook website to research entry-level professional positions to determine training or education required; the scope and type of work required; the salary range; and the current hiring market. Using WVU Library resources and others, students then researched relevant professional associations and conferences, professional trade journals and peer-reviewed journals, and finally, the best professional social media resources. Next, they prepared a professional report synthesizing this information. For online instructional support, students viewed a Powtoon video, What’s the Deal with Trade Journals? (Diamond, 2014); a Captivate video, Using ABI/Inform to Find Trade and Peer-Reviewed Journals; and an embedded ABI/Inform demonstration video from ProQuest as well as links to the BLS Occupational Handbook.

This module focused on having students practice using a proprietary database; learning the purpose of trade journals and the type of information found within; and synthesizing information for a specific audience in a report.

Module 3: Infographic
Using the information from their professional analysis report, students next created an infographic for high school seniors or first-year college students trying to decide upon a major. Students also drafted a reflective memo explaining what information they chose to highlight and why and their design decisions such as color choices, font choice, layout, and so forth. Foundational skills focused on identifying an audience’s needs and choosing appropriate rhetorical devices as well as effectively communicating with visuals. The online instructional support included a resources page with recommended
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software for creating infographics plus a link to the Life Hacker article, “How to Create Stunning Infographics in 30 Minutes or Less” (Seda, n.d.).

FINAL ASSESSMENT: RESEARCH SCENARIO

Research Scenario Assignments

This module spanned the latter half of the semester and included multiple assignments revolving around assigned research scenarios based on the following areas of study: business, communication, agriculture and forestry, psychology, education, engineering, and public health. The most common majors for students taking English 305 include the hard sciences (biology, chemistry, and physics), mathematics, engineering, and agriculture/forestry.

Each research scenario asked the students to complete the following:

• Part A: Annotated Bibliography
• Part B: Background Report based on their research
• Part C: Final Report with recommendations to a supervisor
• Part D: Visual presentation of their report to an outside group

The six research scenarios were assigned to students based on their majors. While the scenarios are different, each scenario presented the students with a problem at their workplace that their supervisor assigned them to research and solve. Students had to prepare a background report for their boss; a recommendation document for how to proceed to solve or ameliorate the problem; and a presentation to stakeholders outside of the workplace. This assignment replicates workplace writing and research in that the task is assigned and different documents are prepared for different audiences.

As the culminating module, students were assessed on mastery of the course outcomes, particularly demonstrating a control of various rhetorical and presentation strategies and formats informed by the documents’ various purposes and audiences. Students were also assessed on their abilities to find, to select, to evaluate, and to synthesize appropriate information for the varying research and audiences needs of each document.

These concluding assignments also required students to draw upon the foundational skills from previous assignments: searching WVU Library databases and other relevant sources of information; effectively synthesizing this information; understanding and implementing appropriate rhetorical and format conventions of different workplace writing genres; as well as reflecting on multiple audiences’ needs regarding not only the information provided but its presentation as well.

The Annotated Bibliography assignment, while a standard assignment in research writing classes, was designed to encourage students to begin their research as well as to allow the course librarian ample time to provide feedback before students progressed too far into the assignment. Unlike the usual annotated bibliography assignment, we did not require or specify specific genre or publication types. Our only requirements were that students find 10 sources that were “current, relevant, authoritative, accurate, and [had] an academic or informative purpose” [emphasis added]. We wanted students to
think critically about the authority of their sources—not all of the research scenarios required peer-reviewed sources for effective research—as well as the needs of the audience/s specified in the research scenario. This decision was informed by the Association of College and Research Libraries’ (ACRL) Framework for Information Literacy for Higher Education frame Authority Is Constructed and Contextual (ACRL, 2016). We wanted students to reflect on their audiences’ information needs and to critically think about what sources were authoritative for their research scenarios.

To help students successfully complete this assignment, we provided a PowToon video, What’s the Deal with Annotated Bibliographies? (Diamond, 2015b); an embedded YouTube video, Research Therapy: What’s an Annotated Bibliography?; a Captivate video, APA Citations, which outlined the purpose of citations; and links to vendor database demonstration videos, such as EbscoHost and ProQuest. The course librarian graded the submitted Annotated Bibliographies and sent the graded, commented copies to Thumm, who assigned final grades based on her comments.

The Background Report required students to write a factual and objective report detailing background information related to their scenario. Instructions for this assignment simply state that “[y]our report should refrain from making any judgments or evaluations about the scenario.” The specific directions for the Recommendation Report and Visual Presentation were based on the particular research scenario but generally were minimal, instructing students that “[y]our report to your supervisor needs to be detailed, organized, and have cited sources. For your presentation, consider your audience and what information you’ll need to include and exclude and how to present it effectively.” Thumm and I believed that students would produce more thoughtful work if they were given open-ended instructions, as is common in workplace writing (Mabrito, 1997) and as part of our PBL-based and ACRL Framework assignment philosophy.

**EVALUATING THE COURSE**

We performed a citation analysis of the annotated bibliographies and final reports from fall 2014 and spring 2015. For each research assignment, students were not given specific requirements for sources to be used, but were instructed to use their best judgment in regard to the sources needed. The sources in the Annotated Bibliographies as well as the sources found in the Background Reports’ Works Cited pages were counted as well as categorized based on source and publication types. We found that students primarily cited trade journals, peer-reviewed journals, popular articles from library databases, and government websites for these two assignments (see Figures 13.1 through 13.4).

In addition to the quantitative data, we also wanted to know how students perceived instructional elements, of course. We surveyed the students using the survey function in LibGuides, asking the following questions:

1. Which instructional videos did you find useful?
2. Which instructional videos did you find least useful?
3. Please comment on the instructional videos’ usefulness.
4. Please comment on the librarian’s helpfulness.
Figure 13.1 Citation analysis of works cited pages: Graph 1.

Figure 13.2 Citation analysis of works cited pages: Graph 2.
Figure 13.3 Citation analysis of works cited pages: Graph 3.

Figure 13.4 Citation analysis of works cited pages: Graph 4.
Student Survey Results

From the fall 2014 and spring 2015 semesters, we received 41 responses to the Student Survey.

Which instructional videos did you find useful? \( n = 41 \)
- What’s the Deal with Trade Journals? 67%
- What’s the Deal with Annotated Bibliographies? 55%
- Database Demonstration: How to Search ABI/Inform 45%
- Embedded links within weekly modules (to usa.gov, for example) 36%
- English 305 Technical Writing Research Guide 36%
- What’s the Deal with Peer-Reviewed Journals 27%

Which instructional videos did you find least useful? \( n = 41 \)
- What’s the Deal with Peer-Reviewed Journals? 45%
- What’s the Deal with Annotated Bibliographies? 18%
- Embedded links within weekly modules (to usa.gov, for example) 1%
- What’s the Deal with Trade Journals? 1%
- Database Demonstration: How to Search ABI/Inform 1%
- English 305 Technical Writing Research Guide 1%

Please comment on the instructional videos’ usefulness.
- These links simply made the work a bit less tedious and did a good job of supplementing other readings assigned.
- Annotated Bibliographies is [sic] the only item that has not been fully covered in any previous classes that I have taken, therefore; the information pertaining [sic] Annotated Bibliographies were [sic] the most helpful to me.
- I now understand how to search for trade and peer review journals which is why I think this resource was most helpful. Also, the infographic links were tremendously helpful.
- I didn’t know what a trade journal was or how to find them, so the database demonstration told me exactly where to find them.
- I thought the websites were helpful because it gave me visual examples that I could keep referring back too [sic].
- Used the link to the APA basics sheet as a reference for my annotated bib,[sic] Very helpful for quick structure reference.

Please comment on the librarian’s helpfulness.
- Mrs. [sic] Diamond seemed to [be] involved with the class once the research portion came around. She seemed helpful and sent out multiple emails telling students to contact whenever they needed help or if they ever had questions.
- I never asked for help directly but she seemed ready to help if I ever had a question.
- I only emailed her once to ask a question, but she responded in a timely manner and was helpful.
- Did not need him/her!
- I didn’t talk to the librarian at all.
- I did not use her during the course.
- N/A. She was readily available but I never needed her assistance.

Comments on Survey Results

We believed that students’ unfamiliarity with trade journals and using ABI/Inform led them to rank those videos highly. We also found
that students appreciated the refresher on annotated bibliographies, particularly as this video outlines why instructors assign them and their usefulness for students, instead of focusing on the mechanics of the annotated bibliography’s creation. The peer-reviewed journals video was ranked last, probably due to students’ familiarity with these journals for past research assignments as most students were juniors or seniors. While few students contacted me, the course librarian, most seemed to appreciate my visibility in the course, my e-mails, and my posts on the discussion board.

SUMMARY/REFLECTION

The course outcomes that we started with included the following:

• Demonstrate rhetorical principles that shape technical writing to suit a range of readers in a variety of writing situations.
• Identify the needs of an audience and use that understanding to design documents.
• Use databases and other electronic sources to find information.
• Choose relevant sources to support an information need.
• Evaluate and modify a document to ensure its usability and persuasiveness for an audience.

Students’ performance on the assignments succeeded in achieving these course outcomes. By researching a solution to workplace problem and creating various documents for diverse audiences, students needed to show a command of rhetorical principles, understand the needs of different audiences, choose appropriate sources, and incorporate them effectively, considering the documents’ and audiences’ needs. Professor Thumm was pleased with improved student performance in the class and found the new assignments reenergized the course, student engagement, and his involvement. He continued to use these assignments until he retired in the spring of 2017.

Part of our success was not only the incorporation of PBL principles into course design but also the incorporation of elements of the ACRL Framework into the course design. PBL works well, especially conjoined with the Framework, in that both encourage students to move away from following step-by-step directions for assignments and quantifiable assignment directions (page length, number of sources used or cited, etc.) and instead focus on problem solving through critical thinking and self-directed learning with minimal facilitation from instructors. While not explicitly stated in the lesson objectives, the frame Authority Is Constructed and Contextual’s knowledge practices and dispositions—“learners recognize that authoritative content may be packaged formally or informally and may include sources of all media types. . . . Learners motivate themselves to find authoritative sources, recognizing that authority may be conferred or manifested in unexpected ways”—encouraged us to let our students explore and use resources without explicit directions from us about what types they “should” be using and how many they needed to fulfill an assignment’s requirements (ACRL, 2016).

By directing students to focus on the needs of assigned documents instead of artificial source type and number requirements, we found that they chose appropriate sources for their research scenarios: students examining 3-D printers for office purchase consulted technology blogs and trade magazines;
students who were given a medical issue to research relied heavily on PubMed and the CDC’s website. Requiring students to focus and to engage with solving the problem meant their attention shifted from finding sources to checking off a list of assignment requirements to critically engaging with the research scenario’s problem as well as reflecting on the differing needs of multiple audiences. Workplace writing inverts the standard classroom assignment paradigm: instead of choosing a topic and fulfilling specific assignment requirements, workers are assigned topics, or tasks, with little to no directions. While a college technical writing course cannot entirely replicate the experience of workplace research and writing, a well-designed course can give students the tools to tackle the writing job at hand.

NOTES

1. Complete text of all the research scenarios, assignment directions with rubrics, and links to online supporting materials can be found at the English 305 LibGuide at http://libguides.wvu.edu/english305_thumm

2. This assignment was adapted from an assignment developed by Paul Smith.

REFERENCES


