

## **2006-983: PROOFREADING EXERCISES TO IMPROVE TECHNICAL WRITING IN A FRESHMAN ENGINEERING COURSE**

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# **Proofreading Exercises to Improve Technical Writing in a Freshman Engineering Course**

## **Abstract**

The freshman curriculum for engineering students has recently been completely restructured at Ohio Northern University (ONU). All engineering majors now take a common three-course introduction to engineering sequence during their first year. An important component of this new sequence is the inclusion of more technical communication exercises in the everyday coursework. In the 2005-06 academic year, a technical writing book has been added as a required text, which is used extensively in the first course; it is further used as a reference in subsequent courses. However, in spite of several lectures and reading assignments on the basic rules of grammar and punctuation, it was found that students continued to submit work which contained obvious and significant errors.

In an effort to improve students' ability to identify and correct their own errors, two exercises in proofreading were given to the students. First, each student was asked to create a report. Another student was then made responsible for proofreading the document. When this assignment was graded, both the author and the proofreader lost points for any errors which were found by the instructor. Additional assignments were given in which students were asked to find errors in written material and in graphs.

Student performance was assessed by the faculty teaching this course (four faculty taught a total of five sections) on the basis of the above assignments. In addition, students were given a self-assessment of how their writing and proofreading skills have been affected by this assignment. In-class quizzes were given to measure students' ability to proofread by asking them to find errors in written work and in graphs. Finally, two similar questions on the final examination were used to measure students' ability to proofread. This paper discusses the proofreading assignment, the results of the various forms of assessment, lessons learned, and plans for modification for next year's classes.

## **Introduction**

As part of curriculum reform at ONU, a new sequence of three freshman courses was created in the Engineering College. These courses were designed to have significant technical communication content, and were first implemented in the 2004-05 academic year. Feedback from both students and faculty, obtained as part of our standard continuous improvement processes, indicated that this sequence needed significant improvement, particularly in the first course, which contained much of the focus on technical communication. In response to this feedback, the first course, especially its technical communications aspect, was redesigned during the summer of 2005. A new technical communication text was required for the course, and significant classroom time was devoted to technical communication content. Initial assignments, however, indicated

that although students understood the concepts and definitions covered in the technical communication text, they were handing in writing assignments that were still full of errors and difficult to read. It seemed clear that students were either not taking the time to proofread their own work or were not able to adequately find their own mistakes. Accordingly, the team of four professors teaching this course agreed to include multiple proofreading exercises throughout the last half of the course. These included multiple exercises in finding errors in text or in graphs. Also included was an assignment in which students exchanged papers with each other, proofread the other's paper, and then returned it to the original author for the mistakes to be fixed.

## **Background**

It is widely agreed that engineering students need to improve their communications skills, a belief reinforced by the current ABET accreditation criteria<sup>1</sup>. A wide variety of efforts have been implemented in order to try to integrate teaching communication into engineering education. A good summary of these efforts can be found in Ford and Riley<sup>2</sup>.

Using proofreading to improve writing in integrated engineering and communication courses is also not new. Some of these courses (e.g. Hendricks and Pappas<sup>3</sup>) require students to proofread their own documents, while others have student teams proofread multiple drafts of the documents they are creating (e.g. Sullivan and Baren<sup>4</sup>). The work described by Barbara Olds<sup>5</sup> is more similar to the work presented in this paper in that students edit the papers written by their peers. In Olds the emphasis is more on true editing (comments on structure, whether the paper is correct for the audience, etc.) rather than simply on identifying errors.

## **Proofreading Assignments**

Multiple assignments throughout the term were used in order to evaluate and improve the students' ability to proofread. Students were regularly provided with a set of reading questions for each section of the technical writing course. These assignments, and some related questions on the mid-term exam, asked them to find the errors in a sentence. These typically related to specific topics in technical communication, such as conciseness, punctuation, capitalization, etc. Since these were typically done with one sentence, rather than as part of a complete document, these were primarily used to make sure students understood the concepts, rather than to see if they could really proofread a document.

The major assignment in the proofreading area was that students were asked to discuss a case study related to ethical decision-making in engineering<sup>6</sup>. Students had the option of selecting from a variety of cases. Most of the papers written were two to three pages in length. When the students brought their papers with them on the due date, they were told to exchange papers with another student. That student was to proofread the paper, noting errors and possible corrections. When completed, the proofreader would return the paper to the author, who would make changes and turn in both the new paper, and the proofread

original. The professors pointed out to the students that not all of the proofreader's comments would necessarily be correct. When grading the final papers, both the author and the proofreader would receive full credit if the paper had no errors. However, if there were errors, both the author and the proofreader would be penalized, assuming that the author had not ignored instructions to fix the error from the proofreader.

In addition to this assignment, two in-class quizzes were given relating to proofreading. One of them was a one-page document with approximately ten errors. Students were asked to identify these errors. The second quiz consisted of two graphs, which contained approximately ten common errors between the two of them. Finally, the final exam also included two such exercises.

### **Faculty and Student Assessment**

Various means of assessment have been used regarding this course. As stated earlier, the most significant assignment in this area involved having students exchange papers and proofread them. A sample of six papers was chosen to span the range of grades received. The original draft was reviewed by the instructor to determine:

- the number of errors correctly identified by the proofreader,
- the number of errors missed by the proofreader, and
- the number of items incorrectly identified as errors by the proofreader.

The instructor then compared the final version of the paper to the draft version in order to determine:

- the number of errors in the draft which also appeared in the final version, and
- the number of new errors in the final version (errors which did not appear in the draft).

Additional comments were also made by the instructor to indicate qualitative differences between the draft and final versions, which may not appear in the quantitative counting of errors.

Table 1. Qualitative Assessment of Proofreading Assignment

Errors in draft			Errors in final paper		Total errors (draft/final)	Comments
caught	missed	incorrect	repeated	new		
0	0	0	0	0	0/0	Reviewer made no comments, although minor improvements were possible.
3	0	0	1	0	3/1	Reviewer made good comments which improved the overall tone and structure of the essay.
14	2	0	3	0	16/3	Reviewer made good comments which were implemented to significantly improve the essay.
10	2	2	1	3	12/4	New errors were introduced by proofreader; however, final version is still better than draft.
12	3	2	5	0	15/5	Final version is much improved in tone and structure.
11	4	0	7	0	15/7	Final version is somewhat better in tone and structure. Author did not implement several suggested changes.

The results provided in Table 1 show several things. First, there was wide variation in the initial quality of the papers, with two being quite good (zero and three errors), while four had over ten errors. Secondly, and similarly, some proofreaders were better than others. The overall performance, however, was fairly clear and positive. All of the final papers were significantly improved when compared to the original. Only one of the students, however, found all of the errors in the paper (for another student, there were none to find).

In addition to this faculty assessment, students were asked to fill out the survey shown in Figure 1. In this figure, the numbers in the blank indicate the mean and, in parentheses, the median response to each question. For example, the average of responses to question number two was a 3.8, with the median response a 4. 122 students responded out of 122 enrolled in the course. It must be noted that these students were spread across five different sections taught by four different professors. The mean response for each professor is shown in Table 2.

**Fall Quarter, 2005-2006**  
**GE104**  
**Proofreading Exercise Evaluation**

Use the following scale:

- 5 – Strongly Agree
- 4 – Agree
- 3 – Neither agree nor disagree
- 2 – Disagree
- 1 – Strongly Disagree

- 4.0 (4) 1) I was able to find mistakes in the document I proofread.
- 3.8 (4) 2) The other proofreader was able to find mistakes in my document.
- 3.7 (4) 3) Having a proofreader helped me turn in a better document.
- 3.8 (4) 4) I was able to understand all of the comments the proofreader made.
- 3.2 (3) 5) I changed all the things that the proofreader marked on my document.
- 2.8 (3) 6) I found all of the mistakes when I proofread someone else's document.
- 3.1 (3) 7) This exercise has improved my proofreading ability.
- 3.2 (3) 8) This exercise has helped me create better-written documents.
- 2.9 (3) 9) I would like to do more of this type of assignment.
- 2.5 (2) 10) This assignment did not help my writing or my proofreading.

Please describe what you found the most helpful and least helpful about this assignment:

Figure 1: Student survey with mean and median responses.

Table 2: Mean response by professor

	<i>Prof</i> 1	<i>Prof</i> 2	<i>Prof</i> 3	<i>Prof</i> 4
Q1	4.1	3.9	3.9	4.1
Q2	3.7	3.9	3.8	3.8
Q3	3.7	3.5	4.1	3.6
Q4	3.7	4.1	4.0	3.5
Q5	3.1	3.4	3.5	2.6
Q6	2.6	3.0	3.0	2.9
Q7	3.3	2.9	3.2	2.6
Q8	3.3	3.0	3.6	3.0
Q9	3.1	2.4	3.2	2.8
Q10	2.4	2.8	2.0	3.1

It can be seen that there are differences between professors, particularly on a few questions. For example, question 5 shows a range of 0.9, question 9, 0.8, and question 10, 1.1. The survey and the assignment were identical across all sections, so it is not clear if these differences were related to a real difference among the students, or differences in how they felt about their professors.

Several things are worth noting about the overall responses. The median response to the first four questions was ‘Agree.’ This matches well with the sampling of individual papers above, which showed that students were able to find errors, and that the final documents were improved because of the proofreading exercise. Also, at least when looking at the median response, there is an apparent disagreement between the neutral responses to questions 7 and 8 (that is, students did not agree that this assignment helped their proofreading, or to create better-written documents), and question 10, where students’ median response was that they disagreed with the statement that ‘This assignment did not help my writing or my proofreading.’ This difference is less pronounced, however, when looking at individual professors mean scores. Professor 3’s class, for instance, had the strongest negative reaction to question 10, and the strongest positive reaction to question 8.

Quantitative assessment was also completed on the two quizzes and the two final examination questions which dealt with proofreading. The results were analyzed through use of performance criteria vectors<sup>7</sup>. In order to have a uniform reporting method, the following four categories are used for proofreading assignment assessment:

Table 3. Categories used for Assessment

Category	Point value	General Description
Exemplary	3	Student applies knowledge with virtually no conceptual or procedural errors
Adequate	2	Student applies knowledge with no significant conceptual errors and only minor procedural errors.
Minimal	1	Student applies knowledge with occasional conceptual errors and only minor procedural errors.
Unsatisfactory	0	Student makes significant conceptual and/or procedural errors when applying knowledge.

For assessment of the proofreading exercises, the specification of the performance criteria that correlate to these categories is based upon the scores received for the assignments. The “exemplary” categorization was used for students getting over 90% of the questions correct. The “adequate” category described a performance level where students got between 75% and 90% of the questions correct. The boundary between “minimal” and “unsatisfactory” was set at 60%. For conciseness, this data is reported in vector format; the “EAMU” vector contains the following four fields in order: Exemplary, Adequate, Minimal, and Unsatisfactory. The numbers in each vector correspond to the percentage of students in that category for each of the four exercises. The vectors are shown in Table 4. These vectors show that there were fewer unsatisfactory students at the time the final exam was taken, indicating improvement. There is a general trend toward improved performance on the final compared to the quizzes, particularly when looking at the paragraph proofreading problems. Students are spread across the Exemplary, Adequate, and Minimal categories, indicating that the exercises were sufficiently challenging to the students.

Table 4. Quantitative Assessment Results

	EAMU Vector
Proofreading quiz, paragraph	(20.0, 28.3, 26.7, 25.0)
Proofreading quiz, graphs	(33.0, 32.0, 27.8, 7.2)
Final Exam, paragraph proofreading	(29.5, 34.4, 24.6, 11.5)
Final Exam, graph	(31.1, 37.7, 24.6, 6.6)

It is felt that there is significant room for improvement on this initial implementation of proofreading exercises. One thing that was noticed was that many of the proofreaders tried to completely rewrite the other student’s paper, rather than just noting errors and areas for improvement. These directions will be clarified for next year’s assignment. In addition, the proofreading quizzes will be introduced before the main proofreading assignment. It is hoped that this will make it more clear to students that their main job is identifying problems, rather than rewriting the paper.

One error that was made this year is that two of the professors (1 and 2) had returned the graded proofreading assignments before the student survey form was distributed, while professors 3 and 4 had not. This may be the reason for some of the variation seen in Table 1, though it is not clear since much of the largest variation is between professors 3 and 4. Several of the students, though, used the open-ended response section of the survey to complain about the grading, and it seems likely that this may have had a direct effect on how they responded to other survey questions. Another improvement will be in the selection used for proofreading on the final exam. This exercise was based on a description of systems engineers, with several errors created for the students to find. However, many of the students were unfamiliar with the term 'systems engineer,' and therefore marked this as an error at multiple points in the text. The text used next year will be as clear as possible, and not introduce new terms, in order to attempt to avoid this confusion. Finally, the schedule will be such that on at least one additional assignment, students will be given extra time for proofreading. This will either be of their own individual assignment, or of a group report.

## **Conclusions**

It is felt that the proofreading exercises introduced in this course have helped students produce better-quality work. A sampling of the papers showed that proofreading the documents improved the quality of the papers across the board. While some students were much better proofreaders than others, all authors were able to use the input of their proofreader to improve their paper. While other institutions can certainly adapt and implement such exercises, it must be noted that this is a time-intensive activity, as the professors essentially graded each paper twice. The authors will be glad to share assignments with other educators upon request.

Proofreading exercises on quizzes and exams helped students find errors in the work of others. However, these exercises will be scheduled differently and used in conjunction with the major writing assignment in the future. It is hoped that this difference will improve the proofreading performance of the students. An additional exercise will also be provided where the student is asked to show evidence of proofreading their own, or at least their own group's, work.

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