AC 2011-1170: PROJECT-DIRECTED WRITING ASSISTANCE IN CON-STRUCTION MANAGEMENT PROGRAM

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Project-Directed Writing Assistance in Construction Management Program

Abstract

Employers and teachers have long been concerned about students majoring in various disciplines whose poor written English prevents them from reaching their full potential in the university and in their professional lives. In engineering and construction management programs in particular, the workplace success of new graduates is ultimately affected by their oral and written communication skills. However, these students' academic preparation for industry's needs in terms of written communication has been widely acknowledged as inadequate. For instance, the consistently low results on the communication skills section of the American Institute of Constructors exam taken by the students majoring in Construction Management show the urgent need for discipline-specific writing instruction. It is, therefore, imperative that such students be offered help with discipline-specific written discourse. Yet the number of writing intensive classes for such students and the number of professionals who specialize in developing writing programs and services for these students are rather small. This empirical study fills this gap by investigating how project-directed supplemental writing assistance affects writing quality in a junior-level construction management class. By using both quantitative and qualitative methods of data collection and analysis, the researchers examined the students' progress in writing two drafts of a proposal and assessed students' performance on the following commonly problematic areas: formatting, clarity of data/results presentation, and appropriateness of writing for intended audience. The results of the study suggest that supplemental writing assistance has a significant overall positive effect on student writing, and is especially beneficial in heightening their audience awareness. The results of this study indicate that more writing opportunities and project-directed instruction in on disciplinary writing should be provided to students to help them become successful in their future careers.

Introduction and background

For a career in construction management (CM) and engineering, effective communication skills are crucial despite a common misconception that these professionals deal mostly with quantitative information. Construction managers, in particular, are expected not only to be able to comprehend technical documents such as those developed by engineers, but also to communicate the intent of these documents to less technically inclined subcontractors. In fact, the Construction Industry Institute indicates that communication is the single most important factor contributing to successful project management³². Moreover, the higher CM and engineering specialists climb the professional job ladder, the more writing they will be required to perform^{7,24,26}. The field of CM education differs from that of civil engineering in that it tends to be more applied and devotes more attention to management and techniques than its engineering counterpart, and less time to basic science, mathematics, and design¹⁹. However, there are many similarities between the two fields of study in terms of general program content. Since there is a dearth of research specifically relating to writing in the field of construction management, we will often draw upon closely related findings from engineering.

Previous research suggests that the workplace success of new graduates is ultimately affected by their oral and written communication skills⁹. Thus, the importance of effective writing and communication skills for construction managers and engineers is generally recognized and always scored high on employers' lists of desirable attributes^{5,23}. Previous research has also shown that while graduating engineering students are competent technically, they often lack communication skills, which prevents them from reaching their full potential in the workplace or academic careers ^{15,22}. In light of these facts, learning technical communication skills, and writing skills in particular, becomes crucial for all engineering and construction management students.

Academic preparation of students for professional writing

The importance of the effective skills in oral, written, and graphical communication of ideas of future engineers has been pointed out as early as 1955 in the Report of the Committee on Evaluation of Engineering Education². However, while a range of approaches to teaching communication skills and writing to engineering undergraduates is available, the inadequacy of academic writing programs in preparing new engineering hires to communicate effectively in the workplace has been widely acknowledged^{3,10,15,24,26,37}.

A concern about this lack of professional preparation of engineering graduates' in terms of communication skills has also been voiced by both U.S. companies and ABET (the Accreditation Board for Engineering and Technology), who argue that in addition to having superior technical skills, today's engineering graduates should be able to communicate effectively, perform well in the global workplace, function in multidisciplinary teams, and use problem-solving and critical-thinking skills^{1,35,37}. The changes in the ABET engineering assessment criteria raised interest in studying student performance in multiple areas, including writing, because one of the criteria that institutions undergoing ABET's accreditation process must meet is students' "ability to communicate effectively" both verbally and in writing¹. In light of these facts, technical communication skills, and writing skills in particular, become especially important for engineering and construction management students alike, and learning these skills becomes crucial for them.

Although the importance of writing has been emphasized by faculty and practitioners alike, many students view writing as merely part of their coursework but not as an activity that is essentially related to their career goals³⁶. Faculty echo these observations by acknowledging that students rarely take seriously even required English and humanities classes and often see them as a break from their technical courses and as a task that is external to engineering practice^{4,24,26}. Thus, the perceived notion held by students that engineers generally do not need to write and the diametrically opposed perceptions of engineering faculty and industry that students lack necessary writing skills make it difficult to successfully implement writing in engineering¹⁰.

Further, although faculty regularly stress the importance of writing, they are frequently unwilling to teach it to their students, often due to faculty beliefs that despite their own publications and writing in the workplace, "their knowledge about [discipline-specific] writing and responding to writing does not meet the needs of their students"¹⁰. These professors do not feel competent to either teach or evaluate writing²⁹ and are often unaware of which aspects of their writing are

based on personal preferences and which are specific to the whole discipline²⁷. Moreover, resistance to incorporating writing in the curriculum can sometimes be due to the added burden to these professors who will have to read and evaluate students' written work.

In the past, it has been assumed that introductory-level freshman composition courses can prepare undergraduate students from a variety of disciplines to communicate more effectively in their majors. However, because typical assignments in these writing courses are too different from what students are being asked to produce in their respective fields of study, the transferability of writing skills becomes doubtful^{10, 16, 24}. In fact, the results of multiple surveys of engineering students and graduates point to the fact that English departments may not be the appropriate place to teach engineers to become effective technical writers and that teaching technical writing in the context of engineering discipline may provide a link between writing and engineering²⁴ and thus may aid students in transferring writing skills learned to other engineering contexts requiring writing.

In response to these concerns, other approaches to improving the communication skills of undergraduates have been developed, including (a) requiring students take general technical communication courses taught within English departments, (b) establishing communication labs providing assistance with students' writing on a voluntary basis, and (c) providing disciplinespecific intensive writing courses. Required technical communications courses taught in English departments may present opportunities for engineering students to be exposed to some of the genres used in engineering. However, these courses are typically intended for students from a wide range of disciplines and provide instruction on a variety of genres, some of which may have little resemblance to those practiced in engineering, making knowledge transfer into their engineering courses challenging. In fact, previous research shows that many engineering students fail to apply rhetorical strategies learned in one context to similar writing tasks they face in different contexts⁹ because they tend to interpret those tasks as completely different^{13,17}. Further, what might be considered effective communication in one discipline may not necessarily be thought of in this way in another, which can further translate into differing assessment practices used by writing and engineering instructors^{25,34,38}. General technical communications courses, therefore, may not be the most desirable context for discipline-specific writing instruction of engineering and construction management undergraduates.

Another frequently used approach to improving the communication skills and writing of engineering students, for instance, involves creating communication labs that provide assistance with students' writing on a voluntary basis^{31,32}. However, such labs generally employ instructors from English departments; therefore, the extent to which the instruction can aid engineering undergraduates to become enculturated into their own discipline is questionable. As a result, to facilitate the acquisition of writing skills necessary for students' transition to the workplace, many engineering programs are shifting from general technical communication courses and communication labs to discipline-specific communications courses designed with future engineers in mind⁴.

Even within the context of teaching writing in discipline-specific technical communications courses, several problems have been identified. These include the challenges (a) to provide an environment conducive of facilitating students' integration into the community of their discipline

and (b) to design a discipline-specific technical communications courses with tasks that are perceived as real, not simulations⁴. Previous research shows that these challenges can be overcome by situating technical communications courses within particular departments, connecting them to students' classes within their discipline, and creating real situations in which students are writing for meaning^{4,9,24,27,35}. In this case students are able to connect communications skills and course assignments with learning in their discipline and therefore perceive these assignments as necessary and serving their needs.

This brings us to the particular context of the present study which intends to provide writing assistance to students enrolled in a junior-level CM course (Steel Building Systems). The writing assistance consisted of a writing workshop, written feedback, and tutoring sessions which all targeted two specific writing assignments – a Schematic Design Report and a Cost Estimate Report. The two reports written in this CM class are types of proposals (specifically, responses to a formal request for proposal). Because proposals comprise one of the largest proportions of the writing assignments required of the students majoring in engineering and construction management and because they are frequently written by professional engineers and project managers, the results of this study may have pedagogical implications for improving writing instruction provided to such students. A short outline of the project is presented below:

CM class: Steel Building Systems Project: Design the frame of a building

- 1. Project-directed writing assistance:
 - a. 50-minute writing workshop before the first draft
 - b. Review of Draft 1 and marginal feedback provided online
 - c. 30-minute writing feedback and critique meeting of Draft 1
 - d. Review of writing of both Drafts 1 and 2 using the rubric
- 2. Student questionnaire to gain additional insights about the helpfulness of writing assistance

The ultimate goal of the study is to identify (a) whether project-directed writing assistance helps CM students improve their writing in areas that are typically problematic for them and (b) to what extent such intervention is effective so that such student writers can be provided with targeted writing instruction, helping them become better writers in their discipline. To achieve these goals, the study intends to answer the following research questions:

- 1) Does supplemental project-directed writing assistance help CM students improve their writing?
- 2) In which problematic areas, as defined below, do CM students improve and to what extent?

Method

Setting and participants: Data were collected by a CM faculty member who taught the class and a graduate student in English who served as a writing consultant. Data collection took place in Steel Building Systems, a junior-level construction management course at a public middle-sized Southwestern university in the US. Of the 28 students enrolled in the class, 2 were females, and

the rest were males. Although Steel Building Systems is a junior-level class, most (15) of the students were seniors (54%), 12 were juniors (43%), and 1 was sophomore (3%). The two written assignments required of students were group projects, so students were divided into groups, each consisting of 2-4 students. There were 9 groups of students working on written assignments. According to the results of the student questionnaire administered after the project was finished, out of 23 students who answered the questions in the survey, 12 (52%) had already taken a junior-level technical writing course either in the English or CM department while 11 (48%) had only taken freshman composition courses.

The two written assignments in the class included the Schematic Design and the Cost Estimate Reports which are types of proposals. More specifically, the Schematic Design report was considered to be a step, or a draft, leading to the final document produced by the students, the Cost Estimate report. Because one document was built on the other using much of its structure and content, the Schematic Design report will be referred to as Draft 1 within this paper whereas the Cost Estimate report will be referred to as Draft 2 or the final draft.

Materials: Both qualitative and quantitative data were collected during this project. In order to answer the two research questions for the study, a rubric that called for separate scores for different areas of student writing was created (see Appendix A). Further, to gain additional insights about students' perceptions of the helpfulness of the writing and self-assessment as writers, a student questionnaire was developed and administered after the project was finished (see Appendix B).

The writing assessment rubric created for the project was intended to target areas of writing that the researchers previously identified as commonly problematic for CM students. These areas are

- 1) Formatting a formal report
- 2) Clarity of data/results presentation
- 3) Appropriateness of writing for intended audience

Examples of common comments received by CM students from their professor in the past that illustrate the identified areas of writing listed above:

- 1) Placing text that belongs to one section in a different one (e.g., most frequently this problem occurred with the Purpose and Background sections).
- 2) Referring to the audience as you (i.e., formal vs. informal language).
- 3) Repeating verbatim in the Conclusion what was already written somewhere else in the report.
- 4) Not using parallel structures for items in lists (e.g., bulleted, numbered, within the paragraphs).
- 5) Being vague or not providing enough details for the intended audience to understand the issue at hand better.
- 6) Not including introductory paragraphs and/or not supplementing bulleted lists and tables with a description in text.
- 7) Presenting items in a series of bulleted lists or long paragraphs of text instead of grouping them together and creating a table.

Traditionally, both (a) rubrics used to comment on student technical writing and (b) marginal comments from faculty cover the following four areas: Content, organization, design/format, and mechanics/style^{3,8,14,21,28,30}. For the purposes of this project, the writing consultant provided comments on Formatting, Data/Results Presentation, and Appropriateness of Writing for Intended Audience while the engineering faculty member added CM-specific comments and provided further feedback on writing.

Based on our previous experiences with CM students' writing, initially we developed a rubric that had all equal subcriteria weights. Thus, for example, 25% assigned to the Formatting grading criteria were equally divided to all subcriteria comprising Formatting. However, after reviewing results of a large-scale engineering writing assessment project at the University of Washington²¹, it was decided that some of these subcriteria should receive more weight relative to others because they seem to be more important to the faculty members assessing writing in the disciplines. Thus, the rubric that was developed and used for the project is a result of a number of revisions based on (a) conversations with the engineering faculty teaching the course, (b) analysis of several grading rubrics used for assessment of writing in the disciplines, and engineering writing in particular²⁶, and (c) a pilot of using the designed rubric on students' writing projects. The heavy weight on formatting (25%) reflects the importance of being able to follow instructions, an area that has been shown to be problematic for students. The final rubric (see Appendix A) included the following categories: completeness (20%), formatting (25%), data/results presentation (25%) and appropriateness of writing for intended audience (30%). Note that this rubric is only intended to measure the areas of organization, design/format and mechanics/style while the quality of the content and persuasiveness of the paper were graded separately by the engineering faculty member and are not part of this study.

An internal consistency analysis of the 18 items comprising the total number of items of the rubric found a Cronbach's coefficient α of 0.975. In addition, reliability of the rubric was examined by the means of inter-rater reliability analysis. To measure how consistently two reviewers applied the rubric to assess students' writing, one researcher graded all drafts with the rubric whereas the second researcher randomly chose ten drafts and also graded them using the developed rubric. Following Hayes and Hatch¹¹, the Pearson's Product-Moment Correlational analysis was used to establish inter-rater reliability, yielded relatively high inter-rater correlation for overall set of ratings: 0.73 on the assessment using the developed rubric. Thus, the rubric was considered a reliable instrument to be used for the project.

In addition to the rubric, a questionnaire was developed to get insight on students' perceptions of the helpfulness of the tutorial. The questionnaire (see Appendix B) includes 39 items on a 4-point Likert-scale, 7 open-ended questions, and 2 multiple choice questions. Most of the Likert-scale items were adopted from the Undergraduate Writing Assessment report written by the University of Houston's Writing Center staff in 2006. These items center on students' feelings of confidence in writing ability, appreciation of academic writing as difficult, and consideration of audience when writing. The 27 items in the original student survey developed at the University of Houston were supplemented with 12 additional project-specific items in an attempt to gain more information on students' perceptions of the usefulness of writing assistance they received. Open-ended and multiple-choice questions provided further outlets for students' attitudes toward the supplemental writing instruction and helped us gather information about the amount of

writing students produce in their CM classes regularly and about their previous writing classes. To evaluate this instrument's reliability, Cronbach's alpha was also calculated for the questionnaire's Likert-scale items, yielding a reliability estimate of 0.68, which was considered to be suitable for the purposes of the present study.

Procedure: Repeated-measures experimental design was used for the present study. First, with most students present, the CM instructor delivered a 50-minute presentation on the format and content of the first writing assignment, the Schematic Design report (i.e., Draft 1). In addition, several handouts on proposal writing, data commentary, and APA reference style used in this class were posted for to the course online learning management system. After the workshop, the students had two weeks to finish writing their reports and submit them via the online learning management system. Once the reports were received, the writing consultant reviewed them first for writing-related issues using the Comments feature in MS Word. After all nine reports were reviewed by the writing consultant, the CM instructor reviewed the writing, looking specifically for flaws in CM-related content matters, but also commenting on any additional writing issues. The reports with both writing- and content-related comments were then returned to students who had one week to review them before their optional 30-minute writing tutorial held later that week.

For their tutorial, students had a choice to attend as a group or to send representative group members to discuss their reports. Out of nine student groups, only two chose not to come to attend. Most of the students who came to meet with the writing consultant, however, did not review the comments they received on their drafts prior to the meeting, so in most cases the tutor simply went over all of her comments with the students, leaving all questions about CM content for the CM instructor to answer. After the writing tutorial, the students had two more weeks to produce their Cost Estimate reports (i.e., Draft 2). Once these reports were submitted through the online learning management system, the writing consultant reviewed all nine pairs of reports (Draft 1 and Draft 2) using the rubric developed for this project. In addition, five randomly chosen report pairs were reviewed independently by the CM faculty with the use of the rubric.

Finally, to gain more perspective about students' attitudes toward writing and their perceptions of the usefulness of the supplemental writing instruction they received, a student questionnaire developed for this project was administered. Any student who did not wish to participate was excused; however no students opted out.

Analysis

Because there were only nine pairs of reports (Draft 1 and Draft 2) and because, as the results of Shapiro-Wilk normality test showed, the scores derived from the rubric frequently were not normally distributed, a more conservative, nonparametric test for comparison of two population means (the Wilcoxon Signed-Ranks test or paired Wilcoxon test) was used for the data analysis. The scores derived from the scoring rubric consisted of overall scores for each paper and contained interval data, which is appropriate for using the selected statistical test. Because it was hypothesized that the supplemental writing assistance would have a noticeable effect on the measurement of student writing quality in particular areas, the Wilcoxon Signed-Ranks test was used, as opposed to independent 2-sample Wilcoxon test. Further, to answer the second research

question and assess the effect of writing instruction in each particular area identified in the rubric, four Wilcoxon Signed-Ranks tests were carried out, one per each major criterion assessed (Completeness, Formatting, Data/Results Presentation, and Appropriateness of Writing for Intended Audience). Finally, the results of the student questionnaire were analyzed by using qualitative methods in order to better understand students' perceptions of the usefulness of the writing assistance offered to them.

Results

A Wilcoxon Signed-Ranks test at the $\alpha = 0.05$ level indicated that overall grades assigned by using the rubric were significantly lower for Draft 1 (*Mdn* = 63.50) than for Draft 2 (*Mdn* = 73.25), n = 9, Z = 2.67, p < 0.008, r = 0.89. This result confirmed our initial hypothesis that supplemental writing instruction is beneficial for CM students. This finding also seems to be supported by the answers on the student questionnaire. Specifically, out of 23 students who took the questionnaire, only 5 students (22%) answered "Agree" to the statement saying that "the writing tutorial was a waste of [their] time," and only 3 of these students had actually met with the writing consultant. On the other hand, 7 students responded "Strongly Disagree" to the previous statement, and 11 students answered "Disagree", which suggests that the majority of CM students also perceived additional writing instruction helpful.

wheoxon signed-Kank Test Comparison of the student writing in Drafts 1 and 2						
Area of Writing Assistance	Ν	Median	Range	Ζ	<i>p</i> -value	
Overall				2.67	.008*	
Draft 1	9	63.50	55.25-81.50			
Draft 2	9	73.25	67.75-89.50			
By Section						
1. Completeness				1.30	.194	
Draft 1	9	17.50	10.00-20.00			
Draft 2	9	20.00	15.00-20.00			
2. Formatting				1.76	.079	
Draft 1	9	11.50	8.50-19.00			
Draft 2	9	17.00	11.50-19.00			
3. Data/Results Presentation				1.71	.088	
Draft 1	9	15.00	7.00-20.00			
Draft 2	9	15.00	10.00-22.50			
4. Appropriateness for				2.72	.006*	
Intended Audience						
Draft 1	9	22.50	18.75-26.25			
Draft 2	9	26.25	26.25-30.00			

Table 1.

Wilcoxon Signed-Rank Test Comparison of the Student Writing in Drafts 1 and 2

To answer the second research question, four additional Wilcoxon Signed-Ranks tests were carried out (see Table 1). As can be seen, only students' improvement on the fourth criterion (i.e., Appropriateness for the Intended Audience) in their Drafts 2 was significant, yielding the following result on the Wilcoxon Signed-Ranks test n = 9, Z = 2.72, p < 0.006, r = 0.90. This

finding is important because according to the results of the student questionnaire, almost one third of the CM student respondents (26%) typically do not think about who is going to read their writing when they write. The results of the tests for all other areas of writing identified in the rubric did not produce considerable differences between students' writing in Draft 1 and Draft 2.

Although only two tests demonstrated significant improvements in students' writing from Draft 1 to Draft 2, the overall pattern that can be seen from Table 1 shows generally increasing median scores in Draft 2 in most areas of the rubric and decrease in the range of the students' scores. These findings suggest that overall students' writing improved after the supplemental writing assistance they received in their CM class.

Discussion

The merit of this study lies in developing a better understanding of the usefulness of supplemental project-directed writing instruction in the field of construction management. The rubric items were developed after consulting the CM faculty and drawing on both researchers' personal experiences with writing of CM students and previous research. To answer the two research questions, several tests were carried out using the data collected by using the rubric. Further, the responses to the student questionnaire allowed gaining additional insights about students' perceptions of the helpfulness of such instruction. Overall the results of the study seem to confirm those of the previous research in a number of ways.

First, the results of the study demonstrate that supplemental project-directed writing instruction consisting of a writing workshop, feedback on students' writing, and a writing tutorial together play a role in helping students become better writers. This finding has far-reaching pedagogical implications. Thus, despite the general uncertainty of the faculty in the disciplines about their ability to help students with their writing¹⁰, the results of the study suggest that the faculty can and should not only integrate writing in their classes, but also help their students to enculturate in the field of their studies by providing supplemental writing instruction for particular projects.

Second, although many faculty may seem to make formatting and data presentation their priority in student writing, the findings of the present study showed that feedback on those areas may not result in significant improvements in student writing. This result seems to contradict that of Ford who found that engineering students generally transfer their "knowledge of genres and formats more than anything else"⁹. It is possible, however, that the results of this study can be attributed to the fact that some of the areas of typical weaknesses in writing of CM students can be more easily addressed than others. For example, because these areas seem to be important to most academic instructors, including engineering and CM faculty²¹, technical writing courses could include more instruction on and practice using and citing sources or writing data commentaries. However, "weak content ... may indicate a lack of topic knowledge, and poorly substantiated claims may indicate muddled thinking. These problems are more serious and may indicate that the student needs to mature and to become more comfortable with engineering topics"²¹. In addition, even if a student receives multiple comments about inconsistencies and errors in the use of a particular reference style, this feedback will not necessarily result in considerable changes in the student writing. This reluctance in addressing the problems identified in the tutor's feedback can be ascribed to several contributing factors. For instance, a student might simply be not

familiar with the reference style required in class and therefore be unable to implement changes the tutor suggested. Further, while the students may know what changes were requested, they may not be willing to make those changes if such changes entail considerable amount of work and do not weigh substantially in the evaluation of their writing. Both of these factors can explain the absence of the considerable improvement in CM students' writing on the Formatting area of the rubric.

Similar explanations can be used to explicate the results of the test on the third criterion of the rubric. It is quite plausible that appropriate data and results presentation in students' writing required even more effort and time on students' part so that this area of writing was left virtually unchanged. It is also very possible that it was easier for the students to realize and correct problems identified on the fourth criterion of the grading rubric concerning students' audience awareness. Because these problems reflected students' difficulties with using appropriate language and providing necessary background information, it is conceivable that once these issues have been pointed out to these student writers, they were more easily corrected. It is also possible that the general writing instructors' concern with the content and organization of students' writing made students more aware of the audience's expectations and more motivated to revise their drafts in this particular area of their writing.

Further, based on the outcomes of the present study, both instructors involved in the writing project, the CM professor and the writing consultant, agreed that the project-directed writing assistance has a lot of potential in helping students improve their writing for a specific disciplinary project. Although project-directed writing assistance requires more instructor time and more collaboration between writing and content instructors, it seems that this approach to writing instruction offers several benefits, including improving student motivation, leading to better writing quality that can be monitored, and helping faculty define future writing assignments. However, in addition to simply providing supplemental writing assistance to the students, the study also made it clear to us that other factors must be taken into consideration when developing approaches to help students with their disciplinary writing projects. Thus, due to the general tendency of students to produce better writing when they are responding to clear writing assignments^{6,12}, disciplinary writing assignments should provide students with clear instructions and specify how the writing portion of these assignments will be evaluated. Further, by situating the writing assistance within a particular department and course and by connecting the writing tasks with learning in students' discipline, the collaborating disciplinary faculty and the writing consultants may be able to (a) create an authentic situation that calls for writing of the particular documents and (b) make students see their assignments as necessary and useful to their future careers, thus increasing students' interest and motivation.

Finally, the study was not without limitations. First, the study did not have enough participants to draw any generalizable conclusions about the helpfulness of the project-directed instruction and, therefore, calls for the use of a larger sample by future research. Secondly, lack of attention on the part of some students and corresponding homogeneity of responses indicates threats to the internal validity of the study's student questionnaire that may have been caused by instrument length or repeated use of some of the items. Future research can remedy this limitation by addressing the length of the instrument. Further, although there is a strong tradition of using survey instruments to examine the affective characteristics, such as students' attitudes self-

assessment, and perceptions of the usefulness of the instruction, self-reports have disadvantage of possible social desirability effects. Future research with additional measurement methods can test the extent of these limitations. In addition, the study overlooked the group dynamics which could be an important contributing factor influencing students' writing. Future research may need to gain deeper understanding of engineering group work in academia and in professional settings. Finally, the findings may not generalize to different disciplines because the majority of the participants of the study were junior- and senior-level CM students.

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	Criteria		Scores by Levels			
			Partially	No		
Completeness - 20%	Front Matter	5	2.5	0		
(Includes all sections	Body	5	2.5	0		
in required in RFP)	Back Matter (Both References and Appendices)	5	2.5	0		
	Organization (Follows specific sequence)	5	2.5	0		
Formatting - 25%	In-text citations	6	3	0		
(Follows APA	References	6	3	0		
Format)	Headings / Subheadings (Correspond to RFP) Headers (Include the Project title and page #)	4	2	0		
	Font / Type / Margins	4	2	0		
	• Are appropriate for the project	5	2.5	0		
	Not cluttered present only necessary info look	3	2.5	0		
	professionally					
Data/Results	Visuals enhance the meaning of the text	6	3	0		
Presentation – 25%	Visuals clearly labeled	5	2.5	0		
	• Both important elements in the visual and the caption are included	-				
	Image quality	4	2	0		
	Data shown in appropriate location (results in text, raw data in appendix)	5	2.5	0		
	Follows the format for data commentary discussed in the class	5	2.5	0		
	• Refers to the visual in text, includes necessary elements of data commentary					
Appropriateness of	Uses formal and concise language	7.5	3.75	0		
Writing for	• <i>I</i> and <i>you</i> are not used					
Intended Audience – 30%	 Although concise, word and sentence choice is appropriate for professional writing and varied Text does not include excessive and wordy prose 					
		7.5	3 75	0		
	the report	1.5	5.15	0		
	 Acronyms are explained 					
	Unfamiliar terms are defined					
	• Sufficient context is provided to help reader understand the situation of the text					
		7.5	3.75	0		
	 Presents text that looks professional Proper grammar and mechanics are used throughout Pullated lists are perplied 					
	Builded lists are parallel					
	Structures the ideas and paragraphs so that they flow smoothly and logically	7.5	3.75	0		
Total		100	50	0		

Appendix A: Grading rubric used for the project

Appendix B: Student questionnaire

- *I. Please answer all of the following questions, by circling the appropriate answer or filling in the blank.*
- 1. What year are you in school? (Circle one)

1

2 3 4 5

2. How much writing (in pages) do you usually do for your CM classes per semester?

4

5

3. How many writing classes have you taken while in college?

1 2 3

4. List the writing classes that you have taken so far ______

- 5. What was the name of your team for CM 331?
- *II. Please check (X) the cell that indicates how strongly you agree or disagree with the following statements.*

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree
1. I think about how my papers will sound to someone else.				
2. I know how to evaluate and revise my papers.				
3. I prefer courses that don't require much writing.				
4. I am able to organize my ideas well when I write.				
5. I am comfortable letting other people give me feedback on my writing.				
6. I am confident in my knowledge of English grammar.				
7. I will need to be able to write well after college.				
8. I am able to collect and organize information for my writing.				
9. I am able to communicate ideas effectively in writing.				
10. I can write persuasively.				
11. I know how to find resources to help me with my writing.				
12. I find it difficult to understand what writing assignments are				
asking for.				
13. I seek help on my writing from others.				
14. I am aware of different ways of organizing a paper.				
15. I have a hard time figuring out how to approach a writing				
assignment.				
16. I am able to identify a clear purpose when I write a paper.				
17. I am confident in my writing ability.				
18. I am able to write papers that professors like.				
19. I am able to express my knowledge clearly through writing.				
20. I am comfortable with the kind of language used in college				
writing.				
21. My prior education has prepared me for the written work				
required in my courses.				
22. When I write, I think about who is going to read it.				
23. I could benefit from more writing instruction.				
24. I was prepared for the written work required in this course.				

25. I am glad that writing support was part of this course.	1		
26. The tutoring session was helpful.			
27. The comments made on my paper by the writing tutor were			
useful.			
28. I would like to have access to writing-related help within the			
CM Department.			
29. I would recommend having supplemental writing tutorials for			
this course in the future.			
30. The writing tutorial was a waste of my time.			
31. If I were to take this class again, I would not like to have a			
supplemental writing tutorial.	ļ		
32. I would not be able to understand the comments on my paper			
without meeting with a tutor.	ļ		
33. I met with a writing tutor.			
34. I could not meet with a writing tutor, but some of my team			
members did.			
35. No one in my team could meet with a tutor.			
36. I was in class when the instructor went over the content and			
format of the Schematic Design report.			
37. I knew where to find the handouts for writing assignments but			
I did not use them.			
38. I frequently went back to the handouts for writing			
assignments posted on Vista and reviewed them before			
writing my papers.	ļ		
39. I was not in class when the writing assignments were			
discussed and I did not know about the handouts posted on			
Vista.			

III. Please provide an answer for each of the following questions.

- 6. What one thing could be done to improve the tutoring sessions for this course in the future?
- Which of the following areas of the writing assignments seems to be the most problematic to you? Why? (Formatting, presentation of the results/data, CM content and calculations, reporting your results in a manner appropriate for the intended audience).
- 8. What was the most helpful and the most unhelpful feedback that you received?
- 9. Do you have any other comments or suggestions? (Please use the other side of the page to write them).