# AC 2011-1950: IMPLEMENTING PEER-REVIEWS IN CIVIL ENGINEERING LABORATORIES

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# Implementing Peer-Reviews in Civil Engineering Laboratories


## Abstract

ABET 2009-10 criterion 3 requires that all engineering graduates demonstrate an ability to communicate effectively at the time of graduation (criterion g of a-k outcomes). Technical communication is a critical skill for Civil Engineering students to achieve. However, incorporating technical writing in many engineering courses is difficult. At Seattle University, laboratory reports are used to teach technical writing skills. Unfortunately, students often prepare their reports at the last minute, rather than devoting the time necessary to compose and edit their writing. When the graded report is returned, their focus has likely shifted to the next assignment and they may not even reflect on the feedback received. Peer-reviews were implemented in two Civil Engineering laboratory classes: Mechanics of Materials and Soil Mechanics. The primary purpose of these reviews was two-fold: (1) students were required to think more holistically about their own writing and the writing process and (2) students were exposed to the technical writing process, which includes rough drafts, reviews and revisions. Students prepared preliminary drafts of their reports and then exchanged reports with classmates for review. The review feedback from their classmate was then used in the preparation of the final report. Final reports were submitted to the faculty for grading. Pre- and post- surveys were administered to assess the usefulness of the peer review process. This approach is unique since quantitative data assessing student perceptions of the peer review process is rarely reported and provides a unique (and often unexamined) perspective on the usefulness of the process. Overall, the peer reviews were effective when they were well coordinated by the faculty and a grade was associated with the peer review process. Student responses were mixed with some appreciating the process and how it improved their technical writing skills, while others believing it was too time consuming or not helpful due to poor reviews. Weak students whose work was peer reviewed by strong writers benefitted the most from peer reviews. Student feedback also showed that the rigorous work load in the engineering curriculum posed time constraints that would affect the likelihood of them using peer reviews if they were not required to do so.


## Introduction

Technical communication is a critical skill for undergraduate Civil Engineering students to achieve[1, 2]. It is estimated that a typical engineer spends one third to half a work-day writing proposals, reports, memos and other documents[3, 4]. Recognizing the importance of technical communication, the Accreditation Board for Engineering and Technology (ABET) 2009-10 criterion 3 requires that all engineering graduates demonstrate an ability to communicate effectively at the time of graduation (criterion g of a-k outcomes).

Obtaining strong technical writing from engineering students can be difficult. Students often prepare their reports at the last minute, not recognizing the importance of revising and editing their work. Assignments are often poorly organized, demonstrating weak writing mechanics and grammar and unclear data presentation. Students are also often unfamiliar with technical writing conventions and best practices. When graded reports are returned, student focus has likely shifted to the next assignment and they may not even reflect on the feedback received.

Peer reviews have been effectively used to improve student writing[5-12]. Exposure to the peer review process also prepares students for procedures used in the consulting industry. Mechanical

Engineering faculty at the University of Clemson recently reviewed their laboratory curriculum and concluded that identifying the strengths and weaknesses of peer's reports helped students to better understand what to do and what not to do[12].

Peer reviews were implemented in a variety of ways in engineering curricula. In some cases, peer review was used for a single report or group project in which the reviewers were not intimately familiar with the topic[5, 6, 9]. The intent of this approach was to assure that students can identify missing content, whereas if they already understand the topic well, they may fill in the omitted context on their own. Peer reviews have often been used in laboratory courses[5, 8, 10, 11]. The structure of the reviews varied: strong writers were paired with weak writers[9], reviewers were anonymous[6], work was reviewed by multiple peers[6, 9] or reviews were performed by both students and the faculty member[5, 6, 8]. In two different Civil Engineering courses, multiple laboratory sections were used with one section conducting the peer review and the other section serving as a control[5, 11]. Student grades were consistently higher among the peer-reviewed sections. In all cases surveyed, detailed reviewing instructions and assessment forms were provided to the students[5, 6, 8-11]. At North Carolina State University, Expertiza, a web-based program, was developed to create an interactive review process whereby students can correspond with reviewers to obtain additional feedback about their reviews. The authors were looking to implement an extra credit structure so that students providing ancillary feedback receive additional points[13]. Grading policies varied. In none of the literature surveyed was it reported that students were graded on the quality of their original draft. However, the reviews were graded in some instances[5, 9, 10]. In all cases, improvement in the quality of student writing was observed; however, opinions varied as to whether or not conducting the reviews improved students' writing ability[5, 9]. Quantitative data was rarely obtained to assess student perceptions of the peer review process. In one case, students were asked one question about the peer review process[7], another paper presented a survey given to students but did not share any quantitative data[9].

**Background**

At Seattle University, students are exposed to writing in core curriculum courses. However, they do not take a technical writing course within the Civil Engineering (CE) major. Our curriculum is full of technical courses, with no extra room for an additional stand-alone, technical writing course. Thus, technical writing must be taught within our CE courses. This practice of teaching technical writing within the major curriculum has been found to be effective[14], particularly when compared to stand-alone technical writing courses[14, 15].

Laboratories are a major component of the CE curriculum. Students take at least five CE laboratories as part of their major course requirements. The primary objective of these courses is to provide students with hands-on, experiential learning in which they develop their technical understanding of the subject. However, of almost equal importance is to develop technical writing skills. In particular, we have found that laboratory reports provide an excellent opportunity for teaching technical writing, requiring students to present graphical information and explain it in a concise, logical manner consistent with professional practice.

Seattle University is on the quarter system. Laboratories meet weekly for ten weeks. Most courses have five-seven laboratories throughout the quarter. Thus, turnaround time for both students (to prepare and submit reports) and faculty (for grading) is short. Unfortunately, this situation can result in students not spending sufficient time preparing and editing their reports. It is often clear that reports have not even been proofread. In general, we have observed that students do not seem to understand or appreciate the process of writing, including revision. A review of the literature indicates that other faculty also note this trend[6, 8, 12].

**Implementation of Peer Review Process**

Peer reviews were implemented for two consecutive years in two CE laboratory courses: Mechanics of Materials and Soil Mechanics. The primary purpose of these reviews was two-fold: (1) encourage students to think more holistically about their own writing and the writing process and (2) expose students to the technical writing process, which includes rough drafts, reviews and revisions.

Figure 1 summarizes the peer review and survey implementation process employed at Seattle University. Typically, students take Mechanics of Materials laboratory before Soil Mechanics. Thus, these students were exposed to the peer review process in two different courses. Pre-surveys were completed by the students in Mechanics of Materials to assess their technical writing skills and habits prior to taking any CE laboratory courses. Post-surveys were administered in both courses for two years to assess the effectiveness of the peer review process. For each course, modifications were made to the review process the second time around based on student feedback from the first year. Both pre- and post- surveys were handouts provided for the students for completion in class. Results were tabulated by faculty – no formal survey instruments were produced.

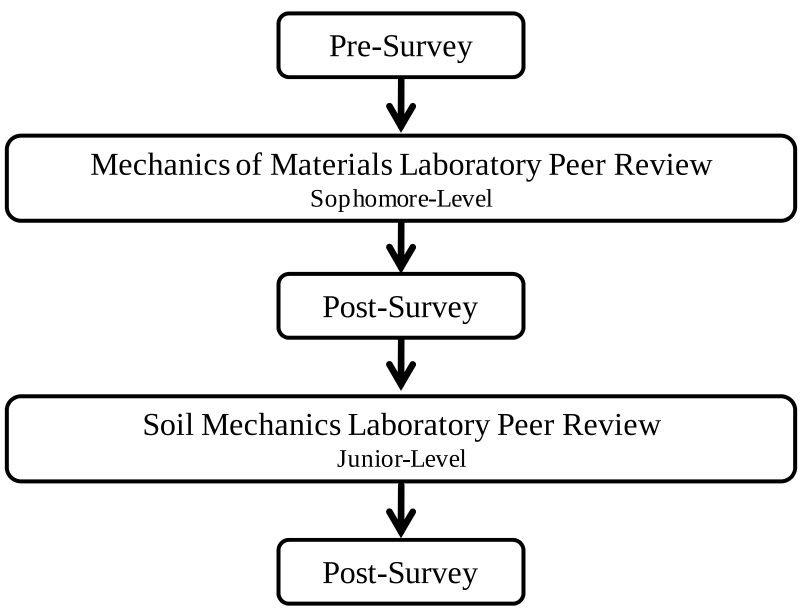


Figure 1. Flowchart of Peer Review Implementation and Survey Process at Seattle University

Figure 2 presents a flowchart of the peer review process used in the Mechanics of Materials and Soil Mechanics Laboratories for the two years in which it was implemented. For both courses, peer reviews were conducted for each laboratory (five – seven in a ten week quarter). Careful scheduling was needed for the peer reviews to allow enough time for students to prepare a rough draft, review a peer's draft, and then edit and finalize their own draft. Generally, we avoided having students work on multiple reports for the same course simultaneously. More detailed discussion of the implementation process follows.

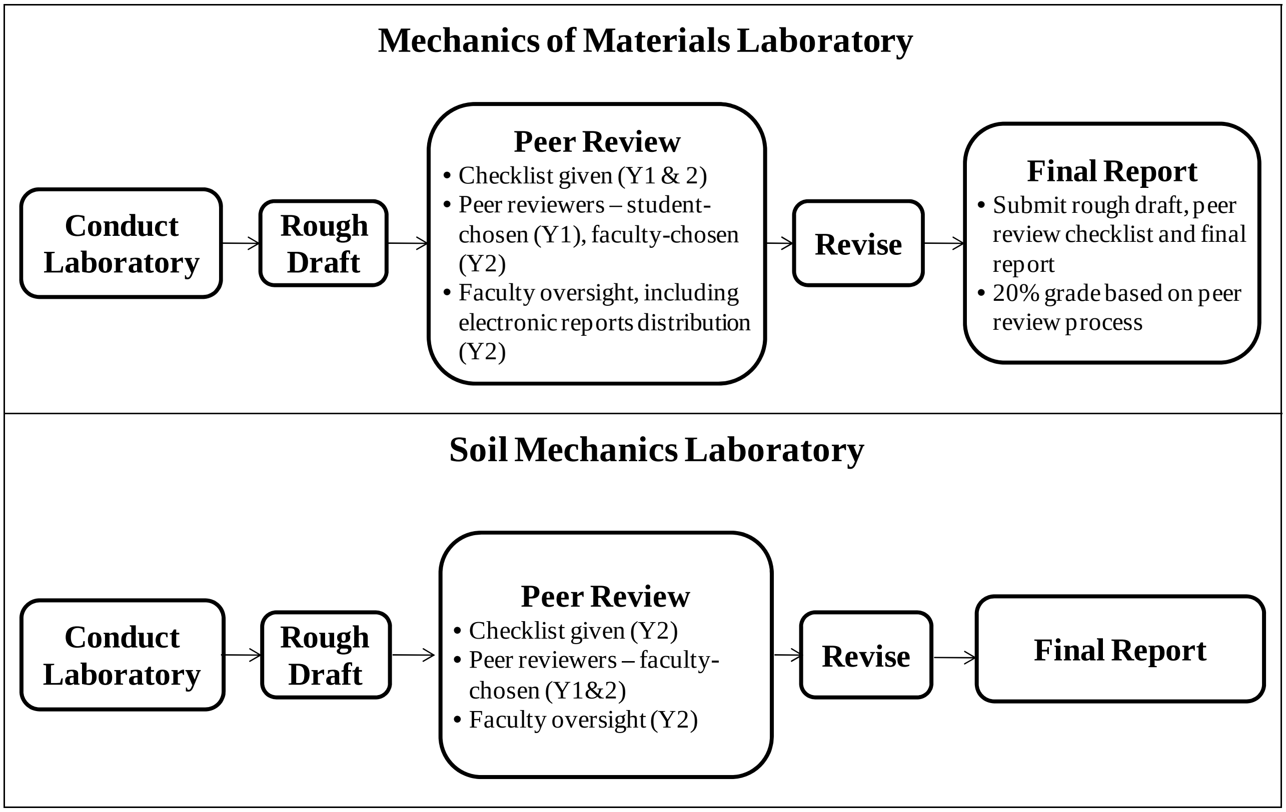


Figure 2. Flowchart Summarizing Peer Review Process in Mechanics of Materials and Soil Mechanics Laboratories for the Year 1 (Y1) and Year 2 (Y2)

Although peer review was implemented in two classes, the requirements of the lab reports in the two courses were different. The outlines of the lab report content for the two courses are presented in Table 1. Because Mechanics of Materials is the first laboratory course that all CEE engineering students take, it required shorter reports with focus on the basics of technical writing and presentation of experimental results in graphical and tabular forms. The Soil Mechanics report outline was built upon the skills developed in Mechanics of Materials. Soil Mechanics reports simulated engineering report preparation in the industry. Each lab experiment found a solution to an engineering problem experienced by a fictional client. In addition to the sections in Mechanics of Materials, the Soil Mechanics reports included a cover letter, table of contents and recommendations and appendices. No changes were made to these lab formats during the two years that the peer review was implemented. The peer review implementation process in the two courses over the two years is described below.

Table 1. Outline of Laboratory Report Requirement for Mechanics of Materials and Soil Mechanics

| Mechanics of Materials | Soil Mechanics |
|---|---|
| Introduction | Letter of Transmittal |
| Experimental Methods | Cover Page |
| Results and Discussion | Table of Contents |
| Conclusion | List of Tables and Figures |
| List of References | Introduction |
| Data Sheet | Methodology |
| | Results and Discussion |
| | Conclusion and Recommendation |
| | List of References |
| | Appendix (showing data and analysis) |

***Mechanics of Materials***

Mechanics of Materials laboratory is a sophomore-level, two credit course. During the ten week quarter, students complete five laboratory reports and two homework assignments. In addition, a quiz is given at the end of the term to evaluate student knowledge.

During the first year, students were allowed to select their own peer review teams. They were also given a peer review checklist (Appendix A) to assist them in the review process. For the first report, a longer duration was given for preparing a rough draft (a week and a half). For subsequent reports, students only had a week to complete the rough draft. Typically, four days were given between when the rough draft and final report were due. When submitting final reports, students were asked to include their rough draft and the peer review checklist completed by their reviewer. Twenty percent of their final grade was based on the peer review process: preparing a good rough draft (five percent), conducting a thoughtful, thorough review (ten percent) and using the peer review to improve their report (five percent). Little faculty oversight was provided for the distribution of rough drafts and the peer reviews, which proved to be problematic. Some students turned in poor rough drafts to their peer reviewers, or would provide their drafts after the due date. This situation often caused anxiety for the peer reviewer, who was concerned about how their grade would be affected since they could not conduct a thorough review. Students usually contacted the faculty in these cases and were assured that they would not be penalized if their partner did not complete a rough draft, or did not provide it in a timely fashion. However, it was clear that in future cases, more oversight was needed.

The following year the peer review process was again used in the Mechanics of Materials course with a similar structure – reviews were conducted for all five laboratory reports, more time was given for the first rough draft, a peer review checklist was provided and twenty percent of final report grades were based on the peer review process. However, the faculty monitored the process more closely. Peer review teams were assigned by the faculty and were rotated throughout the quarter arbitrarily. Throughout the quarter, students worked with five different people. Usually, strong students would work with both weak and strong students and vice versa. Due dates were provided for the completing the rough draft and final report. Drafts were uploaded to an online course management system (Angel). The faculty then emailed the drafts to peer review teams. In this way, the faculty knew first hand if rough drafts were not completed in time or to an appropriate level.

***Soil Mechanics***

Soil Mechanics is a junior level, five credit course. The course has four lecture hours and one three-hour lab session each week. There are seven lab experiments during the quarter.

During the first year students were paired up by the faculty member at the beginning of the quarter; they were required to peer review each other's report before the final submittal of all reports. Students had a week between the lab experiment and the final submittal. There was no oversight by the faculty on intermediate deadlines or exchange of drafts for the peer reviews. No grade was associated with the peer review process.

The second year, it was once again required that all reports be peer reviewed before the final submittal to the faculty. However, based on student feedback, the implementation process was modified slightly. Students were paired up by the faculty member with randomly selected individuals for each lab report. Although the reports were still due in a week after the lab experiment was completed, an intermediate deadline was set for the peer review. In addition, students were required to complete a checklist (Appendix B) when carrying out the peer review. Again no grade was associated with the peer review process.

Table 2 summarizes the similarities and differences described above for the two courses in the two years. Variations included the method in which peers were assigned, whether or not a checklist was provided, if the review process was part of the final grade and the amount of faculty oversight involved.

Table 2. Peer Review Implementation Characteristics for Mechanics of Materials and Soil Mechanics for the Two Years

| | Mechanics of Materials | | Soil Mechanics | |
|---|---|---|---|---|
| | year 1 | year 2 | year 1 | year 2 |
| Students selected their own peers | ✓ | | | ✓ |
| Students worked with same peer throughout the quarter | | | ✓ | |
| Peer review checklist provided by faculty member | ✓ | ✓ | | ✓ |
| Peer review was part of the grade | ✓ | ✓ | | |
| Faculty oversight for intermediate deadlines for peer review submittals and feedback return | | ✓ | | ✓ |

## Assessment Results for the Peer Review Process

As mentioned earlier, a pre-survey was administered in Mechanics of Materials and post-surveys were administered at the end of both the Mechanics of Materials and Soil Mechanics courses to assess student writing practices and student perceptions of the peer review process. Students were asked to rank their experience on a scale of 1 to 5 (1 being strongly disagree and 5 being strongly agree). In addition to the questions given in the post-survey, students in both courses were also asked "What did you like or dislike about the peer review? What improvements do you suggest for future years?"

### *Quantitative Assessment*

Table 3 presents the pre-survey results conducted in the Mechanics of Materials laboratory class for the two years in which the peer review process was implemented. The data suggest that students understand the importance of technical writing. As a department, we try to emphasize this point in all courses. Additionally, students are told the same information by their supervisors at internships, department guest speakers and at discussions in student club meetings. Pre-survey results also show that students recognize weakness in their own writing skills, rating their own proficiency as 3.38 and 3.43, respectively, for the two different years. In general, students indicate that they do not ask peers to review their work.

Table 3. Technical Writing and Peer Review Pre-Survey Results

| Rate your agreement with the following statements:<br>1 = strongly disagree – 5 = strongly agree | Year 1<br>(n=11) | Year 2<br>(n=7) |
|---|---|---|
| I consider technical writing to be an important skill for a successful engineer | 4.67 | 4.57 |
| I proofread my own writing before submitting it | 3.58 | 4.71 |
| Before submiting my writing, I often have someone else proofread it | 2.25 | 2.71 |
| Rate your own technical writing skills (1 = weak, 5 = strong) | 3.38 | 3.43 |

Table 4 presents the post-survey results for the Mechanics of Materials laboratory course. Overall, student responses are slightly favorable (greater than 3.5) and suggest that they found the reviews helpful in improving their writing. Of the nineteen students surveyed over the two years, twelve indicate they would like it if peer reviews were implemented in other courses, four had no opinion and three would not like peer reviews to be used again. When asked if they would use peer reviews in the future if they were not required to do so, responses varied significantly, with ratings of 3.73 and 2.63, for years 1 and 2, respectively. However, review of individual responses from year 2, shows many students commenting that they would be uncomfortable asking their peer to review work due to everyone's busy schedules. This result suggests that in the future we may want to emphasize more the value for the reviewers of conducting the reviews. It may also be useful to quantify the amount of time required to review a colleague's papers, which can be quite short if the students' reviewing skills are well developed.

Table 4. Mechanics of Materials Technical Writing and Peer Review Post-Survey Results

| Rate your agreement with the following statements:<br>1 = strongly disagree – 5 = strongly agree | Year 1 (n=11) | Year 2 (n=8) |
|---|---|---|
| My peers were effective in reviewing my report | 3.55 | 3.81 |
| I was effective at reviewing my peers' reports | 3.91 | 3.63 |
| My technical writing skills have improved as a result of having a peer review of my technical writing | 3.64 | 3.63 |
| My technical writing skills have improved as a result of reviewing my peers' technical writing | 3.55 | 3.50 |
| Overall, my laboratory reports improved as a result of the peer review process | 3.64 | 3.88 |
| In the future, I will have my writing peer reviewed even if I am not required to do so | 3.73 | 2.63 |
| Would you like it if peer review is implemented in other engineering laboratory classes?<br>(y = yes, n.o.= no opinion, n = no) | 6 - y<br>4 - n.o.<br>1 - n | 6 - y<br>0 - n.o.<br>2 - n |

***Soil Mechanics***

Table 5 summarizes the findings of the post-survey for Soil Mechanics for the two years. Overall, student satisfaction of the peer review process was lower for Soil Mechanics than for Mechanics of Materials. There are several possible reasons for this: 1) In Mechanics of Materials a grade was associated with the peer review process. Therefore, students took the process more seriously and benefitted by it. There was no penalty for poor peer-review-ready drafts in Soil Mechanics, which may have adversely affected the overall student perception. 2) Students may have felt that they were better writers after taking Mechanics of Materials and having gone through the peer review process and the percentage gain was not the same through the peer review process in Soil Mechanics, 3) The longer length of the Soil Mechanics reports compared to that of Mechanics of Materials may have contributed to longer duration for the peer review which may have resulted in overall student dissatisfaction and 4) The larger size of Soil Mechanics class compared to that of Mechanics of Materials may have impacted the numbers. Of the 35 students surveyed over the two years, nine indicated they would like it if peer reviews were implemented in other courses, fourteen had no opinion and six would not like peer reviews to be used again.

Table 5. Soil Mechanics Technical Writing and Peer Review Post-Survey Results

| Rate your agreement with the following statements:<br>1 = strongly disagree – 5 = strongly agree | Year 1 (n=20) | Year 2 (n=15) |
|---|---|---|
| My peers were effective in reviewing my report | 3.2 | 3.14 |
| I was effective at reviewing my peers' reports | 3.4 | 3.73 |
| My technical writing skills have improved as a result of having a peer review of my technical writing | 2.95 | 3.33 |
| My technical writing skills have improved as a result of reviewing my peers' technical writing | 3.2 | 3.4 |
| Overall, my laboratory reports improved as a result of the peer review process | 3.25 | 3.33 |
| In the future, I will have my writing peer reviewed even if I am not required to do so | 2.8 | 2.87 |
| Would you like it if peer review is implemented in other engineering laboratory classes?<br>(y = yes, n.o.= no opinion, n = no) | 5 - y<br>9 - n.o<br>1- n | 4 - y<br>5 - n.o<br>5 - n |

In Soil Mechanics, in order to study the effectiveness of the process, the peer reviewers were required to grade one of the reports using the same scoring rubric used by the faculty. The score earned from the peer reviewer on the initial draft was compared to the final score earned from the faculty. In 56% of the cases, the final score given by the faculty was 7-20% higher than the score earned in the draft. Although several factors could have contributed to this increase in score, closer scrutiny showed that weak students who were partnered with strong writers showed the highest improvement in score.

**Qualitative Assessment**

While the quantitative data for Mechanics of Materials (Table 4) only show slightly favorable student responses, the qualitative data indicate that more than 42% of the students had positive feedback on the peer review process; 37% were neutral, 10% were negative and 10% had no comments at all. Although the quantitative data for Soil Mechanics (Table 5) is not too promising for peer review, the qualitative student feedback covered a broad range of opinions. Overall, more than 34% of the students had positive feedback on the peer review process; 23% mentioned that their busy schedules and other time constraints made the peer review process hard; 17% had negative comments about the process; 17% were neutral and 11% had no comments at all.

Considering the qualitative nature of writing, it is worthwhile sharing individual responses from students for both courses in the two years. Some of the positive, neutral and negative comments are compiled below.

- I feel the peer review really helped to keep me on top of my work. It was also nice to see what other people included and compare it to what I wrote about. (Mechanics of Materials)

- I liked having the peer reviews, not only for the editing process but because it gave me an extra deadline. That gave me time also to review my lab before submitting a final. This was my first time writing formal lab reports and it was very beneficial having the peer review process for me. (Mechanics of Materials)

- I would say that the reviews helped a lot. It allowed for me to not wait until the last minute to have the whole report done. It also forced me to review it a few times myself. (Mechanics of Materials)

- I really felt that by grading peers' reports, my own report writing skills improved - I think (my reviewer's) thoughtful comments really helped me out. He took time to go over my lab and I really appreciated it. (Soil Mechanics)

- Given that this was my first technical writing, development was hit or miss. But I am at least aware now of the expectations for engineers. (Mechanics of Materials)

- Sometimes not enough time for feedback. Suggestion: adequate time to review and return. (Mechanics of Materials)

- Some people have time constraints; it did not improve my writing. (Soil Mechanics)

- My grade before and after the review remained the same - it did not really help or hurt. (Soil Mechanics)

- Some people did not review very well, did not make very many changes. Some were not that complete when I was reviewing them, so I could not write that much. (Mechanics of Materials)

- Little feedback. Feedback that was given was poor. (Mechanics of Materials)

- Often not enough time to produce quality work in the amount of turnaround time from when lab was performed to when peer review was due. (Soil Mechanics)

- I felt it was an unnecessary process that did not benefit me when faculty make expectations so clear. (Soil Mechanics)

Clearly, student opinions of the process varied greatly. While some appreciated the peer reviews and believed it improved their writing, others did not. Some students felt that time constraints were significant. Others were frustrated by the quality of the work they were asked to review, or by the quality of the reviews they received.

**Lessons Learned**

The following lessons learned through the peer review exercise may be beneficial to those who plan to implement it in their classes.

- Attaching some grade for completeness of the report and thoughtful peer review would make both parties accountable for the process. With no grade consequences, students may tend to submit reports and/or carry out peer reviews which are of mediocre quality simply to satisfy the course requirement.

- When grades are associated with the peer review process, faculty oversight is important. Otherwise, students become concerned that they will be penalized if their partner submits incomplete reports.
- Setting intermediate deadlines for the peer review process greatly smoothens the process. Without these deadlines, students have a hard time managing their time effectively.
- Distributing a checklist for the peer reviewer indicating the items for which to look out when reviewing a document helps the peer reviewers immensely. This guidance helps students to learn about technical writing and to grow as peer reviewers.
- Pairing weak writers with strong writers often resulted in the most benefit. Weak writers appreciated the opportunity to read a well written document and were grateful for the feedback they received on their reports.
- Scheduling peer reviews must be carefully done to balance student and faculty workloads.
- While many students appreciated how the peer review process improved their writing, few commented on how serving as a reviewer helped to develop their communication skills. Survey results indicate that few would use the peer review process if they were not required to do so. In the future, it may be beneficial to discuss more explicitly the value of being a reviewer with the students.

**Conclusion**

Peer reviews were implemented for two consecutive years in two Civil Engineering (CE) Laboratories at Seattle University: Mechanics of Materials and Soil Mechanics. Specific processes varied between courses and years and included how peer reviewers were assigned, amount of faculty oversight, inclusion of peer checklist, and grading assigned for the peer review process. A pre-survey was administered to determine student technical writing habits before taking CE laboratories and post-surveys were used to assess student perceptions of the peer review process. In general, students indicate they understand the importance of technical writing and recognize a need to improve their own writing skills. Post-survey results in both courses provide mixed student feedback. Some students appreciated the process, while others felt it was too time consuming or that their peers did not adequately review their reports. Students also said they would not be likely to use peer reviews if they were not required to do so; however, many attributed this response to their busy schedules. Based on our experience, it is clear that reviews improve student writing, particularly when well-organized, including a peer review checklist to guide the reviewing process, faculty oversight provided for intermediate deadlines, a grade is associated with the peer review and peer review teams are carefully selected.

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**Appendix A -** Mechanics of Materials Lab I Peer Review Form

Reviewer________________________

Laboratory Write-Up Strengths:

Laboratory Write-Up Weaknesses:

Checklist:

| **Report Content** | **OK** | **Problems** |
|---|---|---|
| **Grammar/Spelling/Style** | | |
| Grammar/spelling | | |
| Contractions/colloquialisms | | |
| Stapling of landscape pages | | |
| **Table/Figure** | | |
| Positioning - Table caption above/ Figure caption below | | |
| Referred to in text | | |
| Captions complete ("stand-alone") | | |
| Numbered in order | | |
| Units - figures and tables | | |
| **Miscellaneous** | | |
| Sentences do not begin with numbers or symbols | | |
| Numbers less than 10 written in words | | |
| Significant digits reasonable | | |
| 0 placed before decimals | | |
| Data are plural | | |
| y-axis data plotted versus x-axis data | | |

## **Appendix B** – Soil Mechanics of Materials Lab I Peer Review Form

**Soil Mechanics**
**Peer Review Check Sheet**

**Report of:_______________** **Reviewer:_____________**

| Item | Check | Comments |
|---|---|---|
| **Style/Grammar/Style** | | |
| Sentences are complete | _____ | ________________________________ |
| No repetition within abstract & LOT | _____ | ________________________________ |
| ASTM # included in methodology | _____ | ________________________________ |
| Sentences don’t begin with #s/symbols | _____ | ________________________________ |
| Numbers < 10 written in words | ____ | ________________________________ |
| 0 placed before decimal | _____ | ________________________________ |
| Professional language (not colloquial) | ____ | ______________________________ |
| **Tables/Figures** | | |
| Table Caption above/Fig cap. below | _____ | ________________________________ |
| Fig/Table numbered in order | _____ | ________________________________ |
| Table/Fig referred to in text | _____ | ________________________________ |
| Units included, when needed | _____ | ________________________________ |
| Appropriate titles chosen | _____ | ________________________________ |
| Landscape tables/fig filed correctly | _____ | ________________________________ |
| **Appendix** | | |
| Data Sheet included | _____ | _______________________________ |
| Sample Calculations shown | _____ | ________________________________ |
| Reasonable significant digits | _____ | _______________________________ |
| **Miscellaneous** | | |
| Appropriate Margin all around | _____ | ________________________________ |
| Pages numbered (Roman/Arabic) | _____ | ________________________________ |
| No page number for LOT/title page | _____ | ________________________________ |
| Correct lab title/date | _____ | ________________________________ |

**General Comments on strength and weaknesses of report and ideas for improvement:**