Understanding Revision Planning in Peer-Reviewed Writing

Alok Baikadi
University of Pittsburgh
3939 O'Hara St
Pittsburgh, PA 15213
baikadi@pitt.edu

Christian Schunn
University of Pittsburgh
3939 O'Hara St
Pittsburgh, PA 15213
schunn@pitt.edu

Kevin Ashley
University of Pittsburgh
3939 O'Hara St
Pittsburgh, PA 15213
ashley@pitt.edu

ABSTRACT

Revision is a core writing skill that presents challenges to both novice and expert writers. Within the context of peer review, peer feedback has the potential to provide rich guidance for revision, especially when making content-level changes. However, authors must review and evaluate each piece of feedback for meaningful critiques that can be applied to further drafts. In this work, we analyzed several factors that influenced students' decisions to fix or ignore comments they received. We found that feedback on content dimensions, as well as critical remarks by both the reviewers, and by the authors regarding papers they reviewed, were correlated with the amount of revisions made between drafts.

Keywords

peer review, revision, writing instruction

1. INTRODUCTION

Revision has long been seen as one of the cornerstones of effective writing [6]. Practicing revision has been shown to not only improve the produced writing, but also help on first drafts of future writings [9]. One of the discriminators between expert and novice writers is how they approach revision. While both groups often make many surface-level edits, such as spelling, grammar, and stylistic revisions [4, 14, 17, 2], expert writers often make a higher proportion of content-level edits than do novices [3].

By using a peer-review approach, students were able to employ more strategic revision strategies given peer feedback [10], make fewer surface-level changes [15], and add more details in their writing [12], especially when peers provide justification for their feedback [7]. Once feedback is received, it is not always implemented in future drafts [5, 2]. Sometimes students indicate an intention to implement meaningful changes but do not follow through with the intent [4]. Checklists [16] and revision memos [1] have been used to focus students' revisions on important aspects of their writing.

Within peer-review, it has not been clear how often students forget about the feedback received during revision, rather than make a choice to disregard the feedback. An accurate model of revision behavior could allow a teacher or intelligent system to intervene for students who require additional support. Diagnostic information could also be presented to the teacher as to what kinds of comments are being made, how they are being received, and what sorts of revisions to expect in future drafts. An effective model could also be used to provide hints to students, about how their feedback may be received as reviewers and which comments provide meaningful feedback for revision as an author.

In this work, we investigated this decision within a web-based peer-review application. We present a revision planning application designed to scaffold the process of evaluating feedback received in the peer-review process. We analyzed their responses within the system in order to better understand why some comments may be addressed while others are ignored. Critical comments about the content of the paper, rather than the surface aspects, were more likely to be included in their revision plan, and were more highly correlated with changes in the second draft.

2. REVISION PLANNING CORPUS

Web-based, computer-supported peer review has been shown to be an effective tool for improving students' writing skills. Students still need support, however, in organizing the reviews they receive and planning how to revise their own papers. This paper describes a revision environment that helps students to cluster and prioritize reviewers' suggestions, develop a plan for revision their papers, and make note of lessons learned about writing for future use. We report here about students' experiences in using the tool in an undergraduate Cognitive Psychology course.

2.1 SWoRD Peer Review

Scaffolded Writing and Rewriting in the Disciplines (SWoRD) is a web-based reciprocal peer review system. Over the past 12 years, it has been used by over thirty-five thousand students across grade levels and across a variety of academic disciplines. The peer review process within SWoRD takes place in three phases: An Authoring phase, a Review phase, and a Revision phase. In the first phase, students submit a response to an instructor-provided writing prompt. Students may either enter text into the web interface, or upload a pre-existing document in order to submit their assignments. During the Review phase, students are presented

with the grading rubric and comment prompts the instructor has provided along with the submitted document. The student reads the document and provides written feedback for each evaluative dimension, as well as numerical scores on a seven-point rating scale. In the final phase, students receive the feedback and scores generated by their peers. The process is then repeated for the second draft.

2.2 Revision Planning

During the course of peer review, students have the opportunity to learn from both giving and receiving feedback. During the review process, students are asked to critically evaluate a peer's submission on the same rubric with which their own writing will be judged. While reviewing, students may notice aspects of their peers' submissions that they can incorporate into their own work. Many revisions occurred when the student both recognized it in a peer's work, as well as received feedback on the same topic from their peers [13].

To support this process, the Revision Planning system has two components. The Lessons Learned page, shown in Figure 1, is available to the student during the reviewing process. It encourages them to make observations on the papers they are reading, and how that may be applied to their own document. They are able to identify the observation as a good idea that they'd like to consider for their revisions, or a problem that they would like to avoid.

The Revision Planner, shown in Figure 2, allows students to consider how they would address each comment they receive from their peers. For each comment, they can elect to ignore it or fix it. If they choose to fix it, they can then assign a priority and make notes on what the revision will be. If they choose to ignore it, they can select a reason from a drop-down menu, or add text to explain why it is being ignored. Both the Revision Planner and the Lessons Learned are visible during revision. The system can also generate checklist that the students can use during their revisions.

2.3 Data Collection

The data were collected from 75 college students in an introductory Cognitive Psychology course, all of whom had completed a required writing seminar prior to enrollment. The students were asked to write a 1,000 word article imitating a newspaper style that connects topics discussed in class with their everyday lives. The rubric included several dimensions regarding the communicativeness of the article, such as its interestingness, word choice, and quality of writing, and several about the course content, such as the relevance and accuracy of the concepts introduced in the course. Of the 75 students, 60 completed the Revision Plan, and 44 completed the Lessons Learned. A second draft was submitted, and subjected to the same peer review process, without additional revision planning support.

Each student was asked to review four peer submissions during the revision phase. In addition, students were allowed to perform bonus reviewing for extra credit. For each review (n=297), we collected 10 numerical scores, which were separated among the five evaluation dimensions. Students were required to write at least one textual comment for each dimension, though they could provide up to five different textual comments for a single dimension. For each textual

comment the student received (n=1822), we recorded the decision to "Fix" or "Ignore" the comment, a discretized reason for marking the comment as "Ignore" when provided, as well as the text of the intended revision and priority.

3. REVISION PLANNING BEHAVIOR

Using the data described above, we investigated four main research questions: (1) what factors influenced the students' decision to fix or ignore a comment that they received, (2) what were the reasons that students gave for ignoring a comment, (3) how is the process of revision planning within Anonymous related to the amount of revisions between the first and second drafts, and (4) how are the observations made on the Lessons Learned page related to the amount of revisions between the first and second drafts.

3.1 Fix and Ignore Decisions

For each comment, we calculated a score given by the reviewer by averaging all scores for the comment's dimension. If there were multiple comments within the same dimension, they received the same score. The score serves as a proxy for how critical a comment is. A dimension type (content or communication) was derived by grouping the three communication-related dimensions together, and grouping the other two dimensions as content. Prior work [17] has indicated that content feedback is more likely to result in content revisions. The length of the comment was computed in number of characters, following the intuition that longer comments are more likely to contain useful feedback.

On average, students elected to mark only 44% of their comments as "Fix" (sd=0.21). We performed a logistic regression analysis, shown in Table 1, to determine which factors influenced the decision to fix or ignore a comment. All three factors were shown to have a significant main effect, and there was a marginally significant interaction between the score and the dimension type.

Table 1: Logistic Regression for Fix Decisions

Variable	Coefficient	z-Value	p-Value
Score	0.74	-5.61	< 0.001
Content Dimension	3.71	238	0.018
Comment Length	1.00	9.73	< 0.001
Score x Dimension	0.85	-1.74	0.082

On average, students elected to fix approximately 40% of their comments in the Communication dimensions, compared to 48% of their comments in the Content dimensions. Comments marked as "Fix" were on average longer (mean=283) than those marked as "Ignore" (mean = 188). Figure 3 shows the proportion of comments fixed by score and the type of dimension.

3.2 Ignore Reasons

There were seven categories of reasons students could select when they ignored a comment: no critique was given, the student disagreed with the comment, the comment was already mentioned elsewhere, the comment is only praise, the comment is only a summary, the comment was confusing, and other. Figure 4 shows the distribution of categories that were provided if any was given. Since the "Summary",

Figure 1: Lessons Learned Page
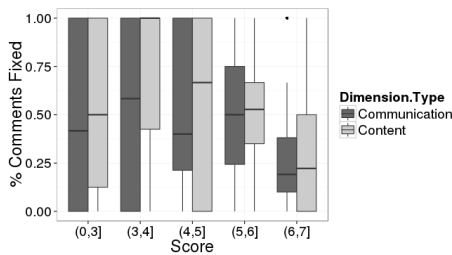

Figure 2: Revision Planning interface

Figure 3: Percent of Comments marked as Fix by Score and Dimension Type

"Confusing", and "Other" categories occurred relatively infrequently, we omitted them from further analyses.
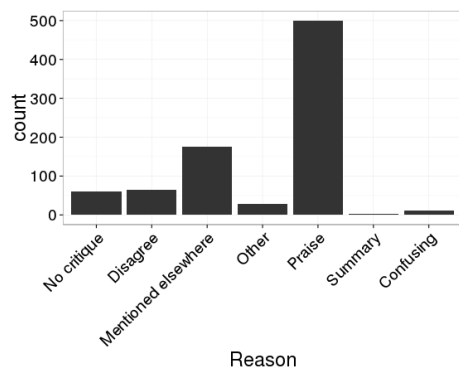

Figure 4: Distribution of Ignore Reasons

Table 2 shows the results of a multinomial logistic regression analysis, relative to the "Praise" category, to determine which factors influenced the category. There was a significant effect of the score for distinguishing all categories. In addition, there was a significant effect of dimension type for the "Mentioned Elsewhere" category, and a significant effect for the comment length on both the "Disagree" category, and the "Mentioned Elsewhere" category.

Table 2: Logistic Regression for Ignore Reasons

Reason	Content	Score	Comment Length
No Critique	0.62	0.66 **	0.99
Disagree	1.38	0.35 ***	1.01 ***
Elsewhere	0.46 *	0.32 ***	1.01 ***

3.3 Revision Planning and Revision

In order to measure changes in the drafts, all submissions were first converted to a plain text format. Both drafts were then segmented using the Stanford Parser [11] and compared using CompareSuite, a software package for analyzing text documents. Edits were compared at the sentence level by calculating how many sentences were added, deleted, or modified [8]. These numbers were then compared against the number of sentences in the first draft to calculate the amount of change between drafts. There was a weak correlation (r=0.20) between the proportion of comments labeled as "Fix", and the amount changed. However, there was a moderate relationship with the proportion of Content comments labeled as "Fix" (r=0.37), while there was no relationship (r=0.10) with the proportion of Communication comments labeled as "Fix".

3.4 Lessons Learned and Revision

For students who completed the lessons learned (n=44), we also investigated how the different types of observations effected the revisions. Students made an average of 2.8 (sd=1.96) observations (See Figure 5). Pearson correlations showed that neither the number of good observations (r=-0.14) nor the total number of observations (r=-0.039) was correlated with the amount of revisions. However, the number of critical observations was moderately correlated with the amount of revision (r=0.31).

4. CONCLUSIONS AND FUTURE WORK

In this work, we analyzed several factors that influenced students' decisions to fix or ignore a comment they received. The content dimensions offered the most insight into the revision behavior of the students. Content comments were more likely to be marked as a comment to fix, and when they were fixed were more highly correlated with the amount of
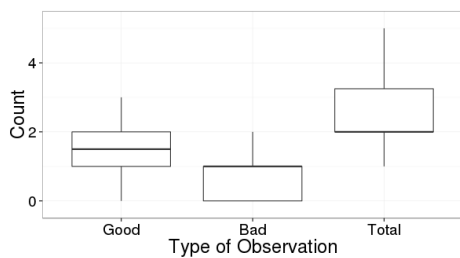
Figure 5: Distribution of Lessons Learned

revision done between drafts. While we did not analyze the comments made by the students, the students were specifically instructed to give feedback on the breadth and accuracy of the domain content in the content dimensions. In addition, lower scoring comments were more likely to be marked as fix or marked as "Mentioned Elsewhere", especially in the content dimensions. This latter selection indicates that the students intended to fix these issues, but had recognized them either through their own experience or through other comments, and were therefore more willing to ignore the specific feedback in those comments. Comments that were highly scored were more likely to be praise or otherwise lack critique. Relatively few comments were ignored because the students disagreed with the feedback received, and those tended to be at the extremes of the scores. The fact that few comments were ignored due to a disagreement with the critique, and the fact that critical observations made from other peers' submissions were more highly correlated with the amount of revision between drafts suggests that students benefit more from critical analysis of the papers they have both read and written.

One of the discriminating features between novice and expert writers is how they approach revision, particularly in terms of how often they revise for deeper meaning. While our results show correlations to the amount of revision done, further analysis will need to be done regarding the quality of the revisions. While comment length was surprisingly informative, it is an extremely shallow measure of the comment text. There are also many other factors that could inform the students' decisions on how to approach the comments they get, such as the helpfulness rating, and the relative strength of the writing skills between the author and reviewer. In terms of student revision process, a more fine-grained analysis of whether students fixed the comments they said they would, could be instrumental in supporting the effectiveness of the scaffolding mechanisms. It was also somewhat surprising that critical observations of peers' papers in the Lessons Learned were also correlated with more revision. One question raised by this observation is whether students learn more from giving critical feedback of peers' work than they do from giving positive feedback.

5. ACKNOWLEDGMENTS

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