

Impact of Revision Planning on 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 reviewing, 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 the impact of revision planning and comment feedback on subsequent essay performance. We found that the amount of feedback implemented, as well as learning gained from review are predictive of improved performance on future writing.

Keywords

peer review, revision, writing instruction

1. INTRODUCTION

Revision has long been seen as one of the cornerstones of effective writing [7]. 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 [2, 5, 15, 18], expert writers often make a higher proportion of content-level edits than do novices [4].

There are, however, many factors that may influence how many surface- or content-level changes are made during revision. Students' revision is often of higher quality when given feedback [4], especially if the feedback is substantial [9]. However, students will make more surface-level edits when given surface-level feedback [15]. They are also responsive to the grading rubrics that are presented to them by the teacher, often considering the teacher to be the final judge of the intended audience [18]. Further, students are more likely to engage in content-level revisions when provided with sufficient domain knowledge, and training in reading for meaning [12].

Peer-review has been shown to have beneficial effects for revision. Students were able to employ more strategic revision strategies given peer feedback [11], made fewer surface-level changes [16], and add more details in their writing [13], especially when peers provide justification for their feedback [8]. Students are also more likely to learn critical revision skills by observing a peer coping

with the process than by observing an expert performing the same task [19].

Yet, once feedback is received, it is not always implemented in future drafts [6]. Sometimes students indicate an intention to implement meaningful changes but do not follow through with the intent [5]. One approach is to use checklists [17] to guide the students in focusing on important aspects of the writing. Another is to allow students to create revision memos, encouraging students to focus on intended revisions that they had identified [1].

While students do not always implement the feedback they receive, it has not been clear whether this was because they had forgotten about the feedback, or whether they had chosen to ignore it. In this work, we employed a revision planning application designed to scaffold the process of implementing feedback received in the peer-review process in several high school classrooms. We then analyzed the impact of tool usage and implementation of feedback on future writing. The results show that the degree to which students implemented the feedback they received is predictive of future writing success. In addition, students with access to the revision planning intervention were able to show gains in both the amount of feedback addressed, and in quality of a future writing assignment.

2. SWoRD PEER-REVIEW SYSTEM

Web-based, computer-supported peer review has been shown to be an effective tool for improving students' writing skills. Students learn as they read and review each other's papers based on instructor provided-criteria. 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 a high school Advanced Placement course.

Scaffolded Writing and Rewriting in the Disciplines (SWoRD) is a web-based reciprocal peer review system developed at the University of Pittsburgh. It was originally developed especially for large undergraduate courses in academic disciplines where class size would otherwise discourage instructors from employing many writing assignments. 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. Research shows that students learn

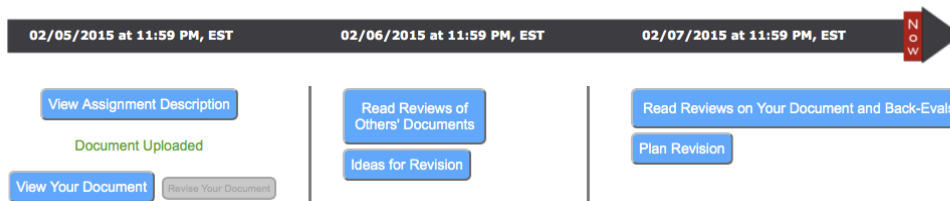


Figure 1 SWoRD Peer Review Timeline

as much, if not more, from giving good feedback as they do from receiving it [14]. Therefore, the SWoRD system is designed to support both the acts of giving and receiving feedback.

The peer review process within SWoRD takes place in three phases: An Authoring phase, a Review phase, and a Back-Evaluation phase. Figure 1 shows the peer-review process from the students' perspective. In the first phase, students are provided with writing prompt to which they will respond. The instructor provides the prompt and set deadlines. Students may either enter text into the web interface, or upload a pre-existing document in order to submit their assignments. Once documents have been uploaded, students can begin requesting documents to review.

The Review phase takes place once the submission deadline has passed. The instructor provides a grading rubric that contains several rating dimensions and prompts for written comments. The instructor then selects how many documents each student is asked to review, and the system assigns the reviews from the existing pool of documents. In order to ensure that each submission receives an adequate number of reviews, students may elect to do additional reviewing for extra credit. When reviewing a document, 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 (1: Disastrous to 7: Excellent). Once students have submitted their scores, the system calculates a numerical accuracy score, taking into account consistency of each student's scores with the mean of the other raters for the same documents. This is provided to the student as reviewer feedback once all the scores have been submitted.

In the final phase, students receive the feedback and scores generated by their peers. They can then evaluate the helpfulness of the feedback received, and provide extra feedback to the reviewers for future reviewing. As with reviewing evaluation dimensions, helpfulness is rated on a seven-point scale. The whole peer-review process can then be repeated for multiple drafts of the same paper.

2.1 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 criterion 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. Prior work [14] has shown connections between changes made in a document and the documents reviewed. The strongest connections came when the student both recognized it in a peers' work, as well as received feedback on the same topic from their peer reviewers.

To support this process, the Revision Planning system has two components. The first component, Ideas for Revision, is available to the student during the reviewing process. It encourages them to make observations on the papers they are reading, and make note of changes that could be applied to their documents. They are able to identify the observation as a good idea that they'd like to consider for their own work, or a problem with the peer's paper that they would like to avoid in their next draft. Figure 2 shows the Ideas for Revision page.

The second component, the Revision Planner, 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 fix will be. If they choose to ignore it, they can select a reason from a drop-down menu, or add more text to explain why it is being ignored. Both the Revision Planner and the Ideas for Revision are visible during revision in their full capability. In addition, the system can generate checklist that the students can use to focus on the aspects of their document they have decided to improve. Figure 3 shows the Revision Planner page.

3. PEER REVIEW CORPUS

10 AP English Language and Composition teachers (n=941 students) fully participated in the study. 40% of the schools were from Title I schools, 40% had at least 30% or more students of color, and 50% had a high proportion of economically disadvantaged students.

All included teachers taught at least two sections of AP English Language and Composition such that sections could be randomly assigned to one of two conditions: all tools on vs. all tools off. All classes implemented an initial peer review essay assignment with a required revision and then a transfer essay assignment. Across teachers, they could offer additional intermediate essay assignments, but they had to keep this constant across their sections. In the Tools-On condition (n=483 students), students experienced all four tools turned on in all the assignments prior to the transfer essay: thesis prompt, instant feedback [3,10],

What I observed	Changes to my documents
<input type="text"/>	<input type="radio"/> Idea to consider <input type="radio"/> Problem I also have Select Priority <input type="text"/>
	<input type="text"/> <input type="button" value="Delete"/>
<input type="button" value="Add a note"/>	

Figure 2 Ideas for Revision Page

Revision Plan for Paper 2 - Problem Solving through Language Comprehension

[Show more](#)

Save
Done
E-mail my Plan
Printable Checklist

Location	Dimension	Comment	Plan
	The author's focus	I think you did a good job of meeting your writing goals. You provided enough information to fully describe the experiment, but I do not think you included any information that is irrelevant.	<input type="radio"/> Fix <input checked="" type="radio"/> Ignore Select Priority: Select a reason: No specific things to address.
5th paragraph.	Your focus	Sometimes I have trouble with awkward wording and run on sentences. Usually, reading my paper aloud helps to identify sentences that could be written better. For example, you wrote, "In today's society there is this idea that the younger generation of professionals are smarter because they have the most modern as well as recent education." This could be better written as, "Today, there is a perception that the younger generation of professionals are smarter than the older generation because they have a more modern and recent education."	<input checked="" type="radio"/> Fix <input type="radio"/> Ignore High

Figure 3 Revision Planning interface

ideas to consider, and revision planning. In the Tools-Off condition, the baseline version of SWoRD was used instead.

The writing assignment consisted of essays writing assignments drawn from practice AP English Language and Composition exams, requiring students to analyze the rhetorical strategies employed in a given text. For the initial essay, students were required to write two drafts. Both drafts were subject to peer-review. The grading rubric asked students to evaluate the accuracy and quality of rhetorical devices identified, evaluate the textual evidence used in the analysis, and comment on the use of academic English grammar and style. For the transfer essay, only one draft was required. Some teachers elected to include peer review and a second draft of the transfer essay, but it was not required.

3.1 Data Annotation

For each teacher (except for one who had not finished the transfer essay by the time expert coders completed their tasks), we randomly sampled 15 students from each of the conditions (i.e., 30 students per teacher), and then collected all the first draft essays from the initial and transfer assignments (i.e., two essays per sampled student). Writing experts (instructors of First Year Writing at a local university) were recruited and trained in using the same evaluation rubric to grade all of these sampled essays; they were blind to condition and whether the essay was the first or transfer essay. Each essay was scored by two experts. A third expert was also used if there was a discrepancy of grades of more than 2 points. For analysis, we used the mean score across raters.

From these essays, we further subsampled 10 students per teacher condition by selecting the highest 5 and lowest 5 quality essays as judged by the experts (n=200). For this subset of essays, undergraduate work-study students coded the comments (n=6483) for whether the comment was implemented in the second draft of the first essay, or not (Cohen's Kappa = 0.779).

4. RESULTS

Considering all students for whom both essays were scored, and comments were annotated for implementation, there was an effect from the percentage of implemented critique comments on transfer essay score (Beta=0.359, p<0.05), controlling for performance on the initial essay score (i.e., controlling for initial writing ability). Figure 4 shows the scatter plot.

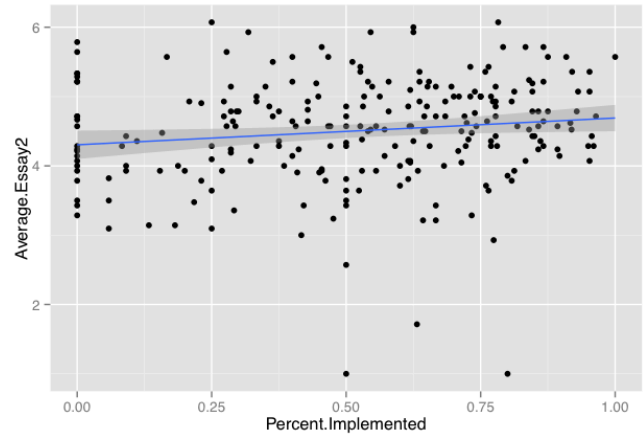


Figure 4 Scatter plot of transfer essay scores as a function of percentage of critique comments implemented.

Using the revision planning tool appeared to influence the amount of revising that students did, with students being more likely to implement comments in the Tools On condition (p<.005). This effect was larger for lower ability authors (i.e., students with a first draft score lower than the class mean), as shown in Figure 5. The condition x writer ability interaction, was statistically significant (p<.001).

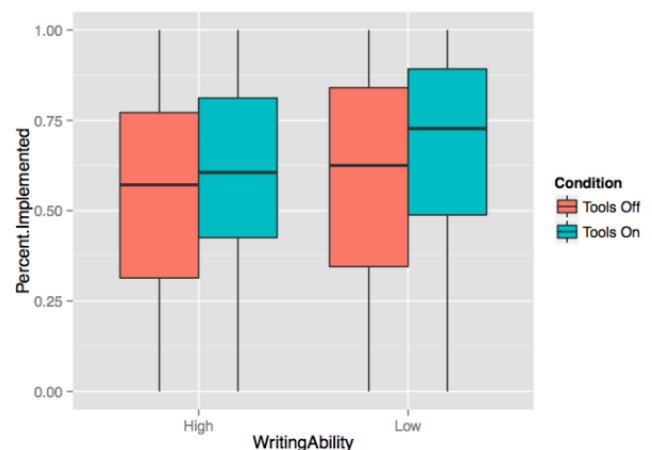


Figure 5 Box plots of the proportion of comments implemented as a function of condition and writer ability.

Considering all students for whom essays were scored, there was no overall effect of condition on the transfer essay, in a univariate

analysis on transfer essay overall score [$F(2,167)<1$], using condition as a fixed factor and essay 1 score as a covariate.

However, if the analysis is restricted to only the 5 teachers for which there was a higher rate of use of the Ideas for Revision and Revision Planning tools, then the same analysis was statistically significant [$F(1,147)=2.67, p=.03$]; see Figure 6. Note the same result held whether or not Essay 1 score was included as a covariate. In addition, another follow-up regression analysis (including all the students with scored essays), we predicted transfer essay score using Essay 1, # of Ideas for Revision, and # of Revision Plans as predictors. # of Revision Plans was not a significant predictor ($\text{Beta}=.19, t=1.5, p=.14$), but # of Ideas for Revision was statistically significant ($\text{Beta}=.25, t=2.0, p=.05$). In other words, we have additional evidence that these tools were useful for improving writing, that considering amount of tool use as a useful filter on which teachers to consider, and it appears that amount of insights gathered from reviewing in particular was most helpful.

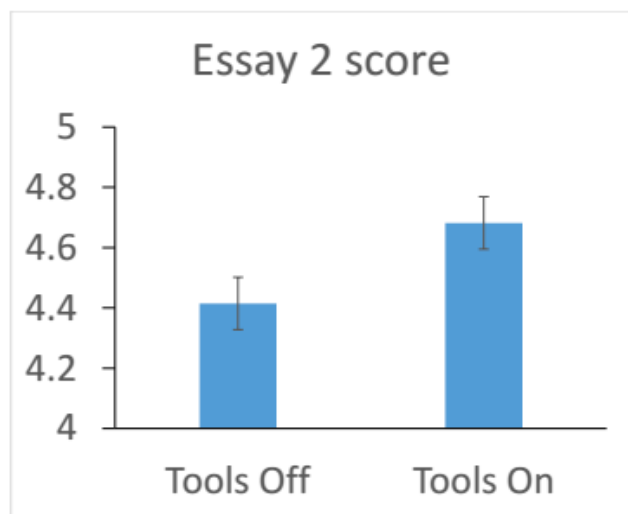


Figure 6 Mean transfer essay score (with SE bars) as a function of condition for the 5 teachers whose students made more use of the Ideas for Revision and Revision Planning tools.

5. CONCLUSIONS AND FUTURE WORK

In this work we have presented a revision planning intervention which allows students to respond to feedback received, and note observations made during the reviewing process. We deployed the intervention in several AP English Language and Composition classrooms and evaluated the impact of the intervention on both second draft revisions and future writing. Students who used the revision planning intervention addressed more comments in the second drafts of their essays. When the analysis focused on classrooms in which revision planning was a more common activity, students who had access to the intervention also wrote higher quality subsequent essays, as judged by subject matter experts.

There are several promising directions for future work. While we investigated the amount of feedback to which the students attempted to respond, further investigation is required to understand both the quality of the feedback and the quality of the revision. Students may be addressing many comments which are incidental or even detrimental to the quality of the writing, or of future writing. Secondly, the feedback received within a single review is often focused on short-term improvements for the writing at hand, rather than long term development. The Ideas for Revision

intervention, however, allows students to record more general observations that may be transferred to future writing. Extracting these themes from either the feedback received or Ideas for Revision observations may enable students to reify long term goals for improvement in writing.

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 reviewing, especially when making content-level changes. We have shown that authors who implement more of the feedback received and who note observations made while reviewing peer work are able to produce higher quality writing in future assignments.

6. ACKNOWLEDGMENTS

We thank participating teachers and students. This work funded by the Institute of Education Sciences, under grant R305A120370.

7. REFERENCES

- [1] Bardine, B.A. and Fulton, A. 2008. Analyzing the Benefits of Revision Memos during the Writing and Revision Process. *The Clearing House*. 81 (4). 149–154.
- [2] Bridwell, L.S. 1980. Revising Strategies in Twelfth Grade Students' Transactional Writing. *Research in the Teaching of English*. 14 (3). 197–222.
- [3] Falakmasir M. H., Ashley K. D., Schunn C., and Litman D. 2014. Identifying Thesis and Conclusion Statements in Student Essays to Scaffold Peer Review. In *Proceedings, 12th International Conference on Intelligent Tutoring Systems*, Lecture Notes in Computer Science, v. 8474. pp. 254-259.
- [4] Fitzgerald, J.1987. Research on Revision in Writing. *Review of Educational Research*. 57 (4). 481–506.
- [5] Fitzgerald, J. and Markham, L.R. 1987. Teaching children about revision in writing. *Cognition and Instruction*. 4 (1). 3–24.
- [6] Fitzgerald, J. and Stamm, C. 1990. Effects of Group Conferences on First Graders' Revision in Writing. *Written Communication*. 7 (1). 96–135.
- [7] Flower, L. and Hayes, J. 1981. A cognitive process theory of writing. *College Composition and Communication*. 32 (4). 365–387.
- [8] Gielen, S., Peeters, E., Dochy, F., Onghena, P., and Struyven, K. 2010. Improving the effectiveness of peer feedback for learning. *Learning and Instruction*. 20 (4). 304–315.
- [9] Hillocks, G.J. 1982. The Interaction of Instruction, Teacher Comment, and Revision in Teaching the Composing Process. *Research in the Teaching of English*. 16 (3). 261–278.
- [10] Nguyen, H., Xiong, W., and Litman, D. 2016. Instant Feedback for Increasing the Presence of Solutions in Peer Reviews, *Proceedings Conference of the North American Chapter of the Association for Computational Linguistics: Demonstrations (NAACL-HLT)*, San Diego, CA.
- [11] Keen, J. 2010. Strategic revisions in the writing of Year 7 students in the UK. *The Curriculum Journal*. 21 (3). 255–280.
- [12] McCutchen, D., Francis, M., and Kerr, S. 1997. Revising for Meaning : Effects of Knowledge and Strategy. *Journal of Educational Psychology*. 89 (4). 667–676.
- [13] Morris Kindzierski, C.M. 2009. "I Like It the Way It Is!": Peer-Revision Writing Strategies for Students With

- Emotional and Behavioral Disorders. *Preventing School Failure: Alternative Education for Children and Youth*. 54 (1). 51–59.
- [14] Patchen, M. *Peer Review of Writing: Learning From Revision Using Peer Feedback and Reviewing Peers' Text*. Doctoral Dissertation, University of Pittsburgh, 2011.
- [15] Patthey-chavez, G.G., Matsumara, L., and Valdés, R. 2014. Investigating the process approach middle to writing instruction in urban schools. *Journal of Adolescent & Adult Literacy*. 47 (6). 462–476.
- [16] Peterson, S. 2003. Peer Response and Students' Revisions of Their Narrative Writing. *Educational Studies in language and Literature*. 3 239–272.
- [17] Smede, S.D. 2000. Interior Design: Revision as Focus. *The English Journal*. 90 (1). 117–121.
- [18] Yagelski, R.P. 1995. The role of classroom context in the revision strategies of student writers. *Research in the Teaching of English*. 29 (2). 216–238.
- [19] Zimmerman, B.J. and Kitsantas, A. 2002. Acquiring writing revision and self-regulatory skill through observation and emulation. *Journal of Educational Psychology*. 94 (4). 660–668.