Can You Hear Us Now?: A comparison of peer review quality when students give audio versus written feedback

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Abstract

MOST INSTRUCTORS TEACHING WRITING courses seek ways to improve student writing and facilitate more active student engagement in the revision process. One way to do this is through teaching students to provide high-quality peer reviews. In this study, we followed first-year composition students for one semester and assessed the quality of their peer reviews when they gave audio versus written feedback to their classmates. Audio feedback was digitally-recorded using iPods or similar technology. In general, we found that the quality of audio reviews was higher than written reviews. Students, however, preferred giving and receiving written feedback. Our results suggest that instructors should adopt audio peer review when possible, but may need to help students recognize its value.

Introduction

In 2004, Duke University gave every one of its 1,650 first-year students an iPod as part of an initiative to foster creative classroom uses of the technology. The students were ecstatic, but many educators were skeptical (French, 2006). Like many of our colleagues, we wondered why the university would spend half a million dollars to distribute a gadget that would undoubtedly get more use acquiring and playing music than downloading lectures or tutorials. On the other hand, we were intrigued by this technology's potential to connect us in new ways with the "wired generation" (Hanman, 2005).

The first academic uses of iPods included recording lectures, field notes, and interviews; listening to audiobooks, music, or vocabulary lists; and storing and

DOI: 10.37514/WAC-J.2008.19.1.03

transferring files (Center for Instructional Technology, 2005). As writing instructors, we wondered if iPods might also offer us an effective way to provide students with feedback on their writing, so we decided to experiment with different ways of offering students digitally recorded audio feedback. We tried creating podcasts of our comments, embedding audio clips into text files, and creating MP3 files that we could either post on-line (in Blackboard, the web-teaching platform used at Duke) or email directly to students. We also experimented with recording files using iPods versus using a laptop or desktop with an attached microphone. As we became more familiar with the technology, we noticed that providing students with audio feedback was much more time-efficient than giving written comments, and seemed to be higher-quality. But we questioned if audio feedback would be an effective way for students to offer high-quality comments to each other.

Although plentiful research exists on the effectiveness of peer reviews in improving student writing, few studies have tested the relative merits of audio versus written feedback among peers in a college classroom. One reason is that much of the research on the effectiveness of peer review predates the digital revolution (Nortcliffe & Middleton, 2007). In addition, most studies on the effectiveness of audio feedback have focused on teacher rather than peer feedback (Nortcliffe & Middleton, 2007; Russell & Pearson, 2004; White, 2007). One exception is a study by MacLeod (1999) in which the author used an online teleconferencing tool that had both written and audio functions to facilitate peer review. Although students reported that they liked this technology, the author did not assess the quality of the peer reviews, and did not compare written and audio comments.

With the increasing availability of technology such as iPods with recording devices, or Wimba voice mail on Blackboard sites, modes of digital audio response continue to become much more accessible. Although many colleges and universities are embracing these new technologies, very little published research exists on their effectiveness at achieving learning goals. Given this context, we designed a comparative study to assess the quality of peer reviews when students gave each other audio versus written feedback. Since reviews are ultimately only as useful as writers perceive them to be, we were also interested in knowing which mode of response students preferred from their perspectives as both writers and reviewers. Based on our experiences and observations, we posed the following hypotheses:

HYPOTHESIS 1: *Peer reviewers who give audio feedback focus more on higher-order concerns than reviewers who give written feedback.* As instructors, we noticed that when

we recorded our feedback, we focused less on lower-order writing concerns (such as spelling, punctuation, and grammar) than on higher-order writing concerns (such as the structure of arguments, overall organization, and use of sources). In addition, we could explain the nuances of our comments more completely when recording audio clips than when typing written comments. The use of audio allowed us to communicate more effectively about the equivocal nature of writing choices, which then allowed students to decide themselves what to do about that uncertainty. We also noticed that we spent less time dealing with lower-order concerns when we used audio. Talking about grammatical errors or missing commas, for example, is simply not as interesting for the reviewer, whereas "fixing" these mistakes in writing is easy and expedient. Despite these experiences, we still wondered whether or not audio feedback would help student reviewers focus more on higher-order writing concerns.

HYPOTHESIS 2: *Peer reviewers who give audio feedback offer more specific comments than reviewers who give written feedback.* In our experience, students seemed to respond better to reviews with comments on specific language or sections within their texts, rather than those with broad generalizations. For example, students may not know what to do with a general comment such as "Your overall organization is confusing," but have less trouble dealing with a specific comment like, "I was unsure what this paragraph had to do with your main claim." Although we instruct peer reviewers to try to be as specific as possible in their comments, we noticed that written peer reviews often contained many generic comments, which were probably not very useful. We wondered if using audio clips would improve the specificity of students' comments about their classmates' writing.

HYPOTHESIS 3: *Peer reviewers prefer giving audio feedback since it is more efficient.* As instructors who have given feedback on student writing using a variety of approaches (including offering comments in writing, in person, and using digitally recorded audio), we both felt that providing audio feedback was the most efficient method. When recording our feedback, we had ample time to explain the nuances of our comments, which would have taken much longer to type. Finally, given the inherent tendency (or perhaps compulsion) of instructors to edit and revise their own written comments, recording our thoughts was more efficient since neither of us had the time nor desire to edit our audio files. We wanted to find out if student reviewers commenting on their classmates' writing also thought that providing audio feedback was more efficient.

HYPOTHESIS 4: *Students prefer receiving written feedback.* Even though we saw advantages in offering feedback using audio comments, we thought students would prefer written comments for three reasons. First, students are most familiar with written feedback, so processing audio comments could move them out of their comfort zone. Second, students must spend more time processing audio feedback; they must listen to the comments (often multiple times), take notes on what the reviewer is saying, and decide how to respond to those comments. Therefore, we thought students who are given a choice might prefer written comments since they take less time to process. Third, we have noticed that inexperienced writers think of "feedback" as suggestions for "fixing" their writing, rather than comments for helping them rethink their ideas and approaches. Therefore, these students often perceive mechanical comments to be the most useful, concrete type of feedback. Since written comments seem more likely to include these lower-order suggestions, students are likely to prefer that kind of feedback.

Methods

We conducted this study at Duke University in the spring of 2007 in three sections of the first-year writing course, Academic Writing (Writing 20). Two sections, entitled *Conservation Biology,* were taught by the first author, a biologist, and one section, entitled *The Duke Student Body and Campus Culture,* was taught by the second author, the Director of The Writing Studio at Duke.

We designed the study so that every student would give and receive peer reviews using both audio and written comments. Students in each section were randomly assigned to one of two groups. For the first writing assignment, students in Group 1 recorded two peer reviews each while Group 2 students wrote both reviews. The groups switched for the second writing assignment, with Group 1 students writing their peer reviews and Group 2 recording theirs. Every student received two peer reviews for each writing assignment, one written and one audio. The instructions for offering feedback were identical (see Appendix) except that one group was instructed to write their comments while the other group was instructed to audio-record theirs.

We collected data in two ways. The first was an anonymous attitudinal survey that asked students about their preferences and perceptions (Table 1, see appendix). We gave the survey during class in the last week of the semester. Thirty-two students responded to our survey, a 91 percent response rate.

We also collected data by quantitatively assessing the quality of the peer reviews. For convenience, we only assessed peer reviews that were submitted to a file exchange site

in Blackboard. Consequently, we assessed 75 peer reviews, 36 of which were audio and 39 of which were written. We excluded email submissions by students, due to the difficulty of accessing those files after the end of the semester. Our sample represents 75 percent of the students in these classes. The audio reviews ranged in length from 2 to 30 minutes (mean = 10 minutes, standard deviation = 6 minutes). The written reviews ranged in length from 213 to 705 words (mean = 496 words, standard deviation = 146 words).

Every peer review in our sample was independently evaluated by two raters. Before the assessment, the raters underwent experiential training using the assessment criteria described below. We determined the level of inter-rater reliability, an indication of the consistency with which different raters assess the same text in the same way, by calculating Pearson's correlation coefficient (Salvia & Ysseldyke, 1998).

Although comprehensively defining what makes a "high quality" peer review is challenging, for this study we focused on two characteristics amenable to quantitative assessment: 1) the number of lower-order versus higher-order concerns addressed in the peer review, and 2) the number of specific versus generic comments made by the reviewer. "Lower-order concerns" (LOCs) are defined as comments on the mechanics of writing, such as spelling, grammar, punctuation, and formatting. "Higher-order concerns" (HOCs) are defined as comments addressing writing issues beyond purely mechanical ones, such as comments about the writer's ideas, arguments, and evidence, as well as organization, coherence, audience, tone, and use of sources. For the second characteristic assessed, we defined "specific comments" as those explicitly referring to language or a location within the students' text, whereas we defined "generic comments" as those not explicitly referring to the text.

Each rater listened to or read the peer reviews and counted the number of HOCs and LOCs and the number of specific and generic comments. If a generic comment was followed by a specific comment on the same topic, only the specific comment was counted. Likewise, if a peer reviewer commented more than once about the same issue, we only counted it once. Finally, we did not count comments that were purely complimentary, such as, "I liked how you defined this term."

Finally, to assess the quality of peer reviews based on the mode of feedback, we calculated the mean number of HOCs, LOCs, specific comments, and generic comments for written reviews and audio reviews, and calculated the 95 percent confidence intervals around those means. We used a two-tailed t-test assuming equal variance to test our hypotheses that the mean scores for written versus audio peer reviews were different.

Results

Inter-rater reliability

The Pearson correlation coefficients were all statistically significant ($p<0.001$), and ranged in value from 0.50 to 0.91 (Table 2). A value of 0.50 indicates moderate reliability, whereas values above 0.8 are considered highly reliable (Franzblau, 1958; Salvia & Ysseldyke, 1998). Therefore, inter-rater reliability here was moderate for generic comments but high for the other three topic areas (Table 2). The low "*r*" value for the generic comments can be explained, at least in part, by the fact that over half of the peer reviews had no generic comments, resulting in low variability in the data.

Peer review quality

Peer reviewers who recorded audio feedback offered significantly more HOCs ($p<0.001$) and LOCs ($p=0.01$) than their classmates who wrote their peer reviews (Figure 1). On average, audio reviews had 4 more HOCs and about 2 more LOCs. Moreover, audio peer reviews had almost 6 more specific comments per review, on average, than written peer reviews ($p<0.001$, Figure 2). We found no difference in the mean number of generic comments in peer reviews based on the mode of feedback.

Attitudinal survey

Most students (72 percent) preferred giving written feedback to their peers instead of audio feedback (Table 1). The most common reason students gave for this preference was that they could organize their ideas better in writing. The following is a representative sample of student responses to Survey Question 1:

- "I could organize my thoughts better on paper."
- "It is more comfortable to write my comments than to speak them."
- "I had time to put my thoughts together instead of feeling pressure to word things correctly the first time."
- "I had to write my comments down anyway before I recorded my comments because I do not review very often."

The reasoning of the students who preferred giving audio feedback (28 percent) was very similar to ours, noting issues of efficiency and the ability to communicate nuances. For example:

- "I am able to convey my thoughts more effectively with audio; [my classmate] can hear my intonations and feelings on things, and it was easier and took less time."
- "It was easier to get your ideas across and to critique without seeming offensive."

We found that 73 percent of our students also preferred to receive feedback in writing. The most common reason that students gave for this was that processing audio feedback was more time consuming. The following are representative student responses to Survey Question 4:

- "When I received audio [feedback], I would end up writing out the comments my reviewer made so I could see and remember them. Therefore, handling audio comments took much more time."
- "It was time-consuming to go through all the audio clips and jot down everything the reviewer had to say. Having it written made it a lot simpler to see what I had to improve on."
- "I prefer written comments because then I have a hard copy that I can quickly look back to."
- A second common reason for this preference was the feeling that written comments are more precise, as indicated in the following student comments:
- "Written comments were more specific and usually corrected minor grammar errors or wording."
- "Written comments make it easier to see exactly where in the paper there were flaws so that I can easily fix these mistakes."
- "It's easier because everything is laid out for you."

Discussion

HYPOTHESES **1** AND **2** WERE SUPPORTED: *Peer reviewers giving audio feedback addressed a greater number of both specific and higher-order concerns than peer reviewers giving written feedback.* We understand that the quantity of comments is only one way of assessing peer reviews but we think it is a meaningful proxy for overall quality. Specifically, we think that peer reviews with a greater number of specific comments about higher-order writing issues provide students with more feedback to work with in the revision process. In addition, offering more of these comments allows students to better understand the struggles of their audience, and may help them to detect patterns in their writing. For these reasons, we think that audio feedback, in combination with effective guidelines for peer review, can be effective at encouraging and facilitating higher quality peer reviews.

HYPOTHESIS **3** WAS NOT SUPPORTED: *Students did not think audio feedback was more efficient.* As instructors, time savings are one of the primary attractions of using recorded audio feedback. We have no doubt that for us, as experienced reviewers, it

takes less time to record meaningful audio comments than it would take to typed our comments. Thus, we were interested to learn that recording peer reviews does not necessarily save students time. We conclude from this that audio feedback may be more efficient for experienced reviewers such as instructors, but may be less efficient for inexperienced reviewers who tend to perform extra steps such as organizing their ideas in writing before recording their comments.

HYPOTHESIS 4 WAS SUPPORTED: *Students prefer written feedback.* Students prefer written comments, remarking in particular that they didn't like the fact that they had to spend more time processing audio comments. We think that additional "time on task" is probably time well spent, and that audio feedback may ultimately be more beneficial since it requires students to process the intent of the comments instead of simply "fixing" what is marked on the text. Students listening to audio feedback have to interpret the reader's comments and decide how to respond; both of these activities require active learning and thus have much greater potential to enhance students' development as writers.

Lessons Learned

Although most students preferred receiving written comments, we think that audio feedback is more beneficial for two key reasons. First, reviewers using audio comments addressed more higher-order writing issues than reviewers who used written comments, providing their classmates with more and better feedback to consider during the revision process. Second, students remarked that they had to spend more time thinking about audio feedback; they indicated that they had to interpret the reviewers' comments and then decide how to respond. Ideally, all forms of feedback should prompt students to make these writing decisions, so we found it particularly interesting that students may *not* be reflecting critically on written feedback.

Our results corroborate previous studies on the effectiveness of written feedback. We know that students often perceive written feedback to be too much, too detailed, and too incomprehensible to be effective (Glover & Brown, 2006), and that students tend to passively "fix" areas marked on their papers. Ideally, audio comments better facilitate active learning, a pedagogical approach known to improve learning and transfer (Michael, 2006), since students must make writing decisions in response to the comments they receive. Additionally, evidence increasingly indicates that students develop better as writers when they have to make writing choices themselves, rather than have someone else edit or rewrite for them (White, 2007). Finally, some evidence suggests that students comprehend and retain information better when they receive it

from more than one sensory channel (Mayer & Moreno, 2003; Paivio, 1986), suggesting that audio comments may complement other modes of feedback. Although beyond the scope of this study, assessing the relative improvement in the quality of a final text, one that students revise based on audio rather than written peer review, offers rich potential for further research.

If audio feedback significantly improves the quality of peer reviews, as our research indicates, we should integrate such strategies in our classrooms. Although embracing new pedagogical and technological tools can prove daunting, we believe any reluctance we might feel is well worth sublimating in order to reap tangible rewards. The model we propose has only three components: 1) modeling effective peer review strategies in class, using audio and/or written comments, to prepare students to provide constructive criticism; 2) requiring pre-review questionnaires for writers, which are shared with peers and instructors, to encourage constructive and focused comments as students learn to respond orally; and 3) reflecting on the effectiveness of the process, as both writers and reviewers, to sustain the efficacy of using audio feedback in our classrooms. We urge our colleagues to consider the possibilities.

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ACKNOWLEDGEMENTS

Support for this research – and for the use of iPods in our classes – was given by the Duke University Office of Instructional Technology. Thanks to Kyle Knight for his help with assessment, Alexandra Block for reviewing drafts of this manuscript, and Barney Caton for statistical advice and careful editing.

APPENDIX

Handout 1*: Pre-Review Worksheet.* To make the most of peer review, we would like you to help focus the reviewers' attention to your specific writing concerns. Please complete this worksheet and include it with your paper that you submit for peer review. Keep in mind that these are the kinds of issues you could address in future solicitations for feedback on your writing (both in other Duke classes and beyond).

1. How would you describe the assignment in your own words? What are you trying to achieve with this paper?
2. How does this assignment fit into the larger goals for the course?
3. Who is the audience for the paper? (For instance, what can you assume your audience already knows?)
4. Have you shared a draft of the paper with anyone already? If so, who was it, and what feedback/advice did you receive?
5. What changes, if any, have you made in light of the feedback you received?
6. What are your top three concerns about this draft? Are you concerned, for example, with the main idea or claim, supporting argument(s) or evidence, organization, use of sources, the grammar, sentence structure, style, introduction, conclusion, or something else? Be as specific as possible.
7. What do you usually struggle with as a writer?
8. What else would you like your reviewers to know about your draft or yourself as a writer (such as particular strengths or weaknesses)?

Handout 2: *Peer Review Guidelines.* The goal of this assignment is to help you learn to give effective feedback to your classmates about their writing. Before you begin your review, your classmate will provide you with the writing context and her or his concerns about the draft (Handout 1). Your peer's concerns and questions should always drive your response.

The peer review process should look something like this:

- Read **Handout 1** and your peer's paper once just to get a sense of the paper, jotting notes to yourself as you go. You will not be returning a marked-up copy of the paper to your classmate, so any notes you make will be to remind yourself about something you wish to comment on later.
- Re-read the assignment, your peer's concerns (from **Handout 1**), and the paper again. This time, look to see if the overall structure and logic of the paper are sound, how the writer uses evidence, and any patterns or errors (again making notes to yourself).
- Write (or speak) your comments, using the guidelines on the following pages to ensure that you are working productively.
- If you are assigned to the group that is providing **written comments,** please write your comment in the form of a letter to the author. Save your file as "WP1.2.PR for (classmate's name) by (your name).doc" and upload it to Blackboard's Discussion Board Forum 5 before class on Friday, March 2.
- If you are assigned to the group that is providing **audio comments,** you may wish to jot down notes to yourself, then organize your thoughts before you begin to record your comments. In your recording, you should use the same tone that you would in a written letter. Instructions for creating an audio file can be found in **Handout 4.** Save your MP3 audio file as WP1.2.PR for (classmate's name) by (your name).mp3 and upload it to Blackboard's Discussion Board Forum 5 before class on Friday, March 2.
- For each review that you do, plan to spend about an hour. This includes the time it takes you to read the draft, think about your comments, and write or record your letter, but does not include the time it takes you to upload your documents. If you are not spending at least an hour with the text, you may not be considering it fully enough.

Guidelines for Offering Feedback

- ***Be mindful of your tone as you respond to your peer's writing:*** There's certainly no need to go overboard with niceties, but consider integrating a couple of positive

comments for things that seem to be working well, especially at the beginning of your comments. You might want to use language such as: "I like how you …" or "I'm impressed by …" Essentially, think about ways to achieve something like the balance between being honest and congenial that you'd aim for if you were talking face-to-face. A tone that works particularly well is one that is both friendly and supportive.

- ***Ask questions:*** Your job as a reviewer is not to fix the paper, but rather to help your classmate understand how the writing affects readers. Given this approach, it can be very helpful to ask questions, just as you might do if you were talking face-to-face. It will be helpful for the writer to reflect on these questions when making writing choices.
  - *Questions about claims.* You might ask, "What in the readings or evidence prompted you to develop this claim? Why are you interested in this aspect of the topic? How does the evidence support your claim? How many pieces of evidence do you have (and does the quantity of evidence say anything about the strength of that evidence)? Do you have additional evidence that isn't included in this draft?"
  - *Questions about evidence.* If the writer needs more evidence, you might say that you would like to hear more about a particular point, that you didn't understand a certain point, and/or that you have additional unanswered questions.
  - *Questions about organization.* If you think a certain paragraph doesn't belong, you can describe your response as a reader; for example, "When I got to this paragraph, I wondered what it was doing here – it seemed like you had been talking about A, but all of a sudden, here's this paragraph about B! Can you help your reader understand how this paragraph should fit in?" The student may need better transitions, or may have left out something important that will clarify matters, or he or she may see that the paragraph doesn't really belong. But let the writer make those decisions – if you say, "Take that one out!" you are making the writing decision for her/him.
  - *Questions about sentence structure.* How might you help your classmate learn to revise a sentence without changing it? Make up a similar sentence and carry out your revisions on it, explaining what the problem is, what options there are for revising it, and why you selected the option you did. Offer several different options, not just one, so that the writer sees that he/she has many choices.
  - *Questions about word choice.* Ask why the writer chose the word; tell what the word means to you and why it seems odd to you in this context. You could say, for example, "In your opening paragraph, I wonder how you chose the word 'bellicose.' When I read this word, I think of someone who is aggressive and warlike; is that what you meant?"

- ***Look for patterns:*** When addressing sentence-level issues, look for patterns of error, rather than going through the draft and pointing out errors in the order in which they occur. The same sort of big-picture reflection will be helpful with non-sentence-level issues, too. If you notice wordiness, see how often it occurs; if you see one transition that troubles you, check out the others. You can then try to offer the writer new ideas about this general issue, instead of just commenting on one sentence here and another one there.
- ***Beware of taking over:*** Avoid the following, as easy and tempting as they may be:
  - Revising the writer's thesis or claim
  - Presenting new evidence for the writer to include
  - Rewriting individual sentences
  - Telling the writer to use a different word (and suggesting what the new word should be)
  - Telling the writer to remove a paragraph or to move it to a specific place
- ***Organize your comments:*** Consider outlining or clearly grouping your comments, realizing that a certain approach may work well in one instance, but not necessarily another. Here are some strategies:
  - Organize your comments by first addressing the writer's concerns (in an orderly way) and then moving on to additional concerns you noticed.
  - Emphasize the more significant writing issues (such as how effective the claim is, how powerful the evidence) at the beginning of your feedback, and ending with more minor issues (word choice, spelling errors, etc.).
  - Make your comments chronologically: Feel free to note specific paragraphs or sentences where problems occur; for example, you could say, "In the second paragraph you…"
- ***Use your time effectively:*** You should plan to spend about an hour reading, thinking about, and responding to the paper. To use this time most effectively, consider the following strategies:
  - Consider holding off making any comments until you've read through the whole paper at least once. This allows you to get a sense of the overall writing, to make sure your comments focus on the real issues, and may save you having to go back to amend earlier comments. (Taking notes as you read, of course, is still a good idea!)
  - Consider letting the writer's stated concerns/goals guide your approach to the organization of your commentary. This gives you a focus while reading, as well as a set of topics on which to center your comments. (Of course, if you identify

issues that you perceive to be of more concern than those your classmate raises, you should certainly comment on those.)

- ***Consider your language choices:*** Because your classmate isn't with you and you can't see her/his reactions, be sure to write in a respectful and fairly neutral style. It's important to avoid evaluative claims; instead of saying, "Your paper is really successful," it would be more appropriate to say, "After seeing your presentation of the evidence, I was convinced of your argument." Be especially careful about anything that might sound overly harsh, offensive, or patronizing.
- ***Make your organization explicit:*** If you are responding in writing, consider simple visual strategies (bullet points, numbering, boldface, etc.) to keep your content clear and to emphasize your main points. If you are recording your comments, you may want to use language such as: "First I'll make some suggestions related to your organization. Second, I will discuss ways you might make your claims more effective. Finally, since you asked about commas, I will point out a few places where you make the same error and include a link to a handout that should help."
- ***Know the limitations of this type of work:*** In the time you spend with this paper (roughly an hour), you may find that you could discuss a large number of different writing issues. Keep in mind, however, that your classmate may be overwhelmed (and dismayed) if presented with a list of fifteen things to look at or work on. Therefore, it is essential that you prioritize your comments. Use signals such as, "If you only had time to work on one thing, I think you could increase clarity the most by considering …" or "The three areas that gave me the most trouble as a reader were …"
- ***Refer the writer to other resources:*** As a peer reviewer, no one expects you to be the expert on all issues related to writing. If you sense that there is a problem with the writing but are unsure, feel free to refer your classmate to a handout from class, a chapter from one of our texts, the Writing Studio Web site, or the course instructor. It is particularly helpful to point out several places in the paper where the error/problem occurs, and then let the writer try to resolve the issue using the resources you suggest.
- ***Emphasize the fact that you are just one reader:*** Keep in mind for yourself, and emphasize for the writer, that you are just one a reader; consider prefacing your comments with phrases such as, "As one reader …" or "From my perspective … " You are not offering the definitive summary of what does and does not work in the paper.

TABLE 1

Student responses to the attitudinal survey (n=**32**). Bold values show the majority response.

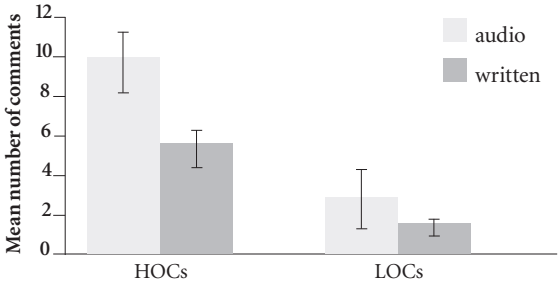
SURVEY QUESTION	PERCENTAGE PREFERRING AUDIO	WRITTEN	NEITHER
As a peer reviewer			
1. Which mode of response did you prefer to use	28	**72**	0
2. Which mode of response helped you provide more helpful feedback?	39	**61**	0
3. Which mode of response was more efficient to use (in terms of the time and effort it took to do a good job)?	40	**60**	3
As a writer			
4. Which mode of response did you prefer to receive from your classmates?	27	**73**	5
5. Which mode of response was more helpful when revising your draft?	21	**79**	0
6. Which mode of response was more efficient to use (in terms of the time and effort it took to do a good job)?	21	**79**	0
As both writer and reviewer			
7. Which mode of response tended to focus more on higher-order concerns (claims, evidence, organization) than lower-order concerns (grammar, punctuation, documentation format)?	**68**	32	5

TABLE 2

Inter-rater reliability, showing means (μ) and standard deviations (σ) of scores for each rater, based on assessment of 75 peer reviews. All Pearson correlation coefficients (*r*) were statistically significant ($p<0.001$).

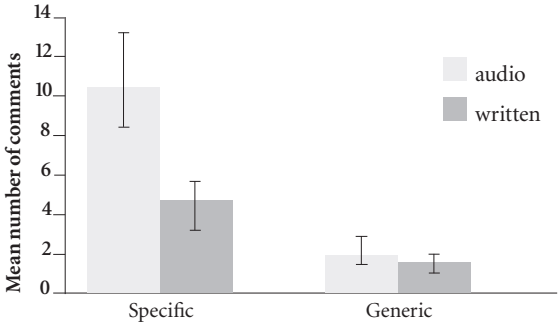
	RATER 1		RATER 2		
Topic area	μ	σ	μ	σ	*r*
HOCs	8.2	5.8	7.2	5.7	0.83
LOCs	2.5	5.9	0.9	2.0	0.86
Specific comments	8.5	8.3	6.5	6.2	0.91
Generic comments	2.2	2.1	1.6	1.5	0.50

FIGURE 1



Mean number of comments that focused on higher-order concepts (HOCs) and lower-orders concepts (LOCs) in audio versus written peer reviews. Error bars represent the 95 percent confidence intervals around the means. The mean number of HOCs for reviews using audio was significantly higher than the mean for written reviews ($t=4.98$, $p<0.001$). Similarly, there were more LOCs in audio reviews than in written reviews ($t=2.54$ $p=0.01$).

FIGURE 2



Mean number of specific and generic comments in audio versus written peer reviews. Error bars represent the 95% confidence intervals around the means. The mean number of specific comments given in audio reviews was significantly higher than the mean for written reviews ($t=5.24$, $p<0.001$) but there was no difference in the mean number of generic comments ($t=1.13$, $p=0.26$).