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# Audio Feedback: Student and Teaching Assistant Perspectives on an Alternative Mode of Feedback for Written Assignments

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**Abstract**

Competence in written scientific communication is an important learning outcome of undergraduate science degrees. Writing helps students learn, encourages them to think creatively and critically about their learning, and trains them in communicating their insights as disciplinary experts. However, challenges exist in incorporating writing assignments into large undergraduate science classes, including lack of student engagement and difficulty in providing effective and personalized formative feedback to large numbers of students. Engagement and feedback are especially important for developing writing skills, which require active, reflective, critical attention on the learner's part: it would be very useful if one mechanism could enhance both.

We recently integrated audio feedback into the stages of a term-long, multi-part scientific literacy assignment in a large undergraduate biology class at the University of Toronto Mississauga, using it for formative purposes at early stages of the assignment. In order to determine the utility and effect of the audio feedback, we collected data from both teaching assistants (TAs) and students. In general, students felt audio feedback was constructive and engaging, and both TAs and students commented that audio feedback was more personal than written feedback. However, TAs noted that it took longer for them to give audio feedback compared with written feedback, and that they encountered technical issues with emailing audio feedback to the students. Overall, the response to audio feedback from both students and TAs suggested that this approach is logistically feasible and might aid in overcoming the disengagement that is often found in large introductory courses.

La compétence en communication scientifique écrite est un résultat d'apprentissage important dans le cadre des diplômes en sciences au niveau du premier cycle. L'écriture aide les étudiants à apprendre, les encourage à réfléchir avec créativité et sens critique à propos de leur apprentissage et leur donne la formation nécessaire pour communiquer leurs idées en tant qu'experts dans leur discipline. Toutefois, il existe un certain nombre de défis dans le cas de grandes classes de sciences au niveau du premier cycle quand il s'agit d'y incorporer les travaux écrits, entre autres la participation des étudiants et les difficultés à donner à un grand nombre d'étudiants des rétroactions formatives personnalisées. La participation et les rétroactions sont des éléments particulièrement importants pour que les apprenants développent des compétences en écriture, qui exigent de leur part une attention active, réflective et critique. Il serait donc très utile si un mécanisme pouvait inclure ces deux éléments.

Nous avons récemment intégré la rétroaction audio dans les diverses étapes de travaux de longue haleine à parties multiples portant sur des connaissances scientifiques dans une grande classe de biologie de premier cycle à l'Université de Toronto Mississauga, avec un objectif formatif dès les premières étapes des travaux. Afin de déterminer l'utilité et les effets de la rétraction audio, nous avons recueilli des données auprès des chargés de cours et des étudiants. En général, les étudiants ont déclaré que la rétroaction audio était constructive et favorisait la participation, et tant les chargés de cours que les étudiants ont indiqué que la rétroaction audio était davantage personnelle que la rétroaction écrite. Toutefois, les chargés de cours ont fait remarquer que cela leur prenait davantage de temps de donner une rétroaction audio qu'une rétroaction écrite et qu'ils avaient eu des problèmes techniques pour envoyer par courriel à leurs étudiants les rétroactions audio. En général, la réaction à la rétroaction audio tant de la part des chargés de cours que des étudiants suggère que

cette approche est logistiquement réalisable et pourrait aider à relever le défi d'absence de participation souvent présent dans les cours d'introduction offerts à un très grand nombre d'étudiants.

**Keywords**
writing assignments, writing pedagogy, large class instruction, teaching assistant training, audio feedback, recorded feedback, formative feedback, introductory biology

Large courses are a reality of the current university environment, but they raise challenges for instructors and students alike with regard to developing writing skills and to keeping students engaged. In large courses, more than 700 students following Kerr (2011), it can be difficult for instructors to provide students with personal support and formative feedback on their work. This can lead to instructors being reluctant to assign written work to large classes (Cuseo, 2007), despite writing being crucially important for helping students grasp course content and develop their abilities to communicate, think and work as disciplinary experts (Bean, 2001; Emig, 1977; Hyland, 2000; Vygotsky, 1962).

Receiving and assimilating feedback, especially personalized formative feedback, is an important part of the writing and learning process (Gibbs & Simpson, 2004; Race, 2010). However, developing writing skills requires a high degree of reflective engagement in learning on the student's part, and it is challenging to keep students in large classes engaged (Reid, 2012).

Audio feedback could potentially be useful for giving formative feedback along with increasing engagement. Although logistically problematic in the past (particularly for large courses), the use of audio feedback has increased as recording devices have become more ubiquitous and electronic transmission of audio files has become simpler (France & Wheeler, 2007; Middleton, 2011; Rotheram, 2007). Using this feedback on writing assignments, along with or instead of traditional written feedback, can help to both alleviate student disengagement and encourage students to take feedback more seriously (Bauer, 2011; Cann, 2014; Cavanaugh & Song, 2014; Cooper, 2008; Ice, Swan, Diaz, Kupczynski, & Swan-Dagen, 2010; Ice, Curtis, Phillips, & Wells, 2007; Johanson, 1999; Sipple, 2007; Wood, Moskovitz, & Valiga, 2011). Audio feedback has been shown to be useful in encouraging students to grasp nuance and detail in critiques (Bauer, 2011; Cann, 2014; Cavanaugh & Song, 2014; Ice et al., 2007; Sipple, 2007), and to enhance student retention and application of formative feedback (Bauer, 2011; Ice et al., 2007; Merry & Orsmond, 2008; Sipple, 2007); research shows it to be effective (Brearley & Cullen, 2012; Macgregor, Spiers, & Taylor, 2011; Orsmond & Merry, 2011), well-liked (Rotherham, 2007), and well-used, with students being more likely to open an audio file versus picking up written comments (Lunt & Curran, 2009). These latter observations regarding student perspectives are ones that we were particularly interested in testing in the context of a large, introductory science course.

To do so, we redesigned an existing writing assignment for a large compulsory undergraduate biology class, Biology 152 (BIO152), at the University of Toronto Mississauga (UTM). A dual approach to feedback was incorporated into the stages of a term-long scientific literacy assignment (SLA): audio feedback was used for formative purposes at early stages of the SLA along with written rubrics, whereas written feedback was used for summative purposes at later stages. (We were limited in terms of resources and felt it best to give students the benefit of the audio feedback earlier rather than later, so that they could capitalize on it.)

The current study is novel in that it is the first report using audio feedback in a large introductory biology class; it used both written and audio feedback at different stages of the assignment; it includes a comparison of Teaching Assistant (TA) and student perspectives; and it was done in an on-site (not online) course. The current study is also innovative in its focus on the evaluation of the impacts of audio feedback on student perceptions of feedback, which can influence student learning. Feedback is strongly linked with student success and retention (Bloxham & Boyd, 2007; Yorke, 2003); for this reason, significant resources are put into providing students with useful feedback. Feedback plays a role in the approach students take to their own learning, and students' perspectives on the feedback that they receive can affect their

motivation to improve (Weaver, 2006). Despite this importance, however, the impact of feedback has not been broadly measured (Price, Handley, Millar, & O'Donovan, 2010). The purpose of this study was to explore student and TA attitudes regarding the utility of audio feedback, including perceived usefulness of feedback, level of detail addressed, personalization, and effects on engagement, and motivation.

## Method

### The BIO152 Course

The scientific literacy assignment (SLA) for which audio feedback was implemented was part of the BIO152 course at UTM. This course is an appropriate site from which to expand our understanding of the utility of audio feedback in promoting student engagement as (a) it is a compulsory first year course for students in any Biology program at UTM, (b) it is a large class (821 students in 2014), thus involving more participants than most research on audio feedback, where the classes were never larger than 200 students and generally involved fewer than 50 participants (Cann, 2014; Still, 2006), and (c) it is neither an online course (Ice et al., 2007; Wood et al., 2011), nor a specifically ELL (English Language Learner) focused course (Johanson, 1999) – the types of courses in which much of the prior research has been conducted. That said, BIO152 does have a large ELL population (approximately 50% of the class), thus the results of this research are relevant to work on ELL pedagogy as well.

### The Scientific Literacy Assignment (SLA)

Figure 1 presents an infographic summary of the SLA, which involves four submissions of student work. The first submission consists of a cover page and initial reference list. At this stage, students select their topics, with the instructions specifying that their topics must be grounded in biology and must be in the form of a closed yes/no question. Sample student topics include: "Does Cell Phone Use Cause Cancer?" and "Does Red Wine Consumption Reduce the Risks of Cardiovascular Disease?" To ensure that the question is not too one-sided, students are required to find references supporting both yes and no answers to their question. The second submission consists of a referenced outline. The third submission involves uploading a draft version of the full paper to TurnItIn®, while the fourth submission is the final paper. All portions of the SLA are submitted electronically to the Blackboard (Bb) Learning Management System (LMS) and TurnItIn®.

In class, students receive an active-learning lecture on thinking like a scientist; a workshop on searching the scientific literature; a workshop on analyzing scientific literature; and a workshop on avoiding plagiarism. Students are also supported through eight dedicated drop-in sessions, at which Academic Skills Centre staff and Scientific Literacy Assignment TAs (SLA-TAs) meet with students for short consultations to discuss upcoming assignments (and they have the option of booking full-length appointments at the Academic Skills Centre as well). Support is also offered through an online discussion board.
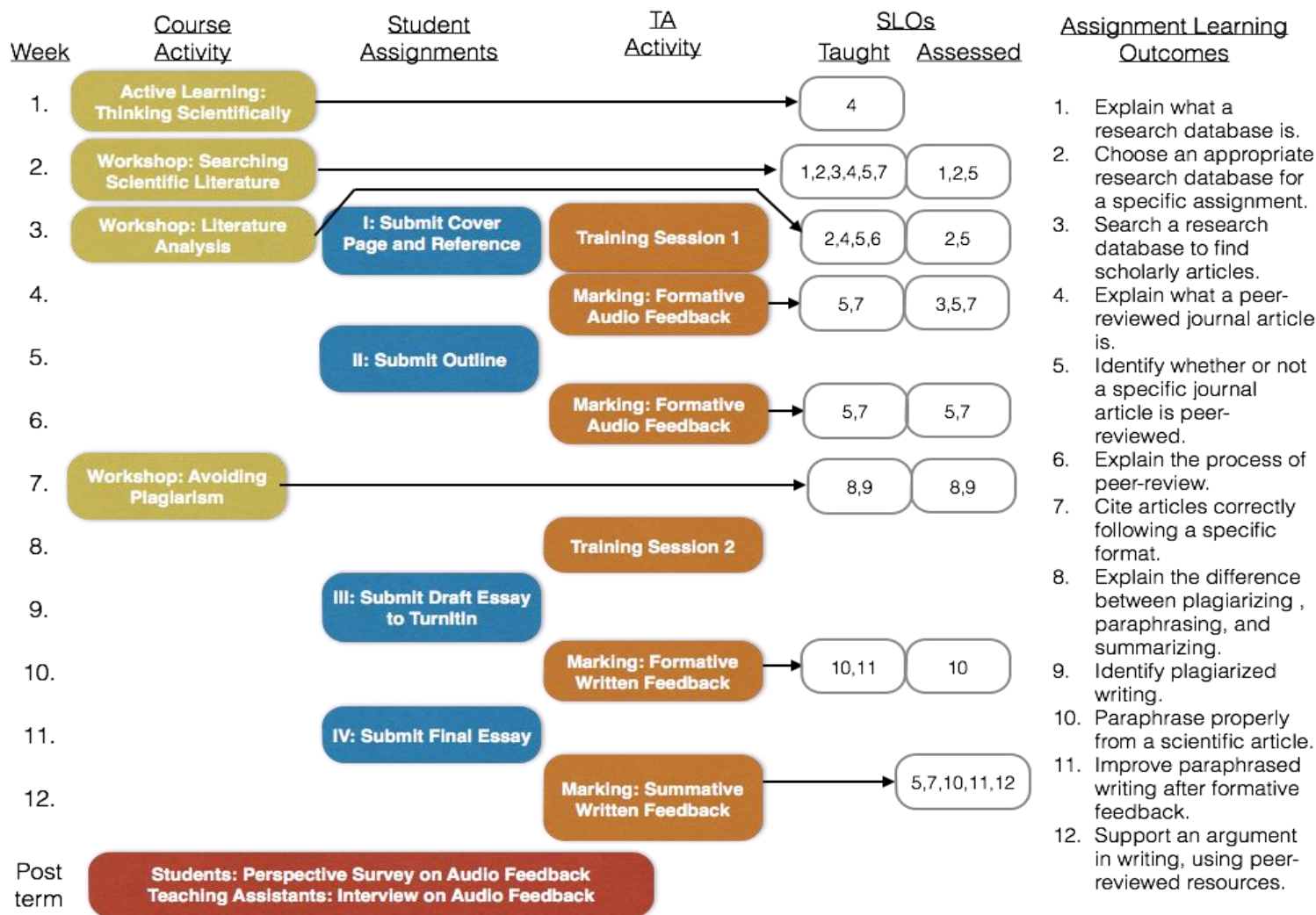
*Figure 1.* This infographic depicts the learning outcomes, assignments, course activities and TA activities associated with the Scientific Literacy Assignment (SLA) for the BIO152 course. The numbers under the SLO tags "Taught" and Assessed" refer to the Assignment Learning Outcomes described at the far right.

**TA Training**

In the 2014/2015 school year, there were six SLA-TAs hired for this 12-week course, including a lead SLA-TA. Writing-intensive training for the lead SLA-TA was done through the Writing TA Training program. This 12-hour training focused on using rubrics productively, assessing and providing feedback on written work, working with ELL students, and giving instruction in writing. The lead SLA-TA was then involved in designing and running training sessions for the entire SLA-TA group, and also acted as a mentor to the other SLA-TAs. Two 2-hour SLA-TA training sessions were implemented during term, taking place within two weeks of assignment submission due dates, thus incorporating a just-in-time approach to SLA-TA training.

**Scientific Literacy Assignment Feedback**

SLA-TAs' vocal recorded responses to student work were given following the first and second stages of the project (see Figure 1). The audio feedback was recorded using Adobe Reader 9 and was sent via email to students. Written rubrics were also given for these stages, via the LMS. As shown in Figure 1, the audio responses provided formative rather than summative feedback, on the principle that students would be more likely to assimilate feedback that was immediately, explicitly and directly related to future work. To ensure that students would be able to apply what they learned to each new stage of the assignment, TAs were instructed to give suggestions on strategies for future submissions—thus incorporating an explicit "feedforward" aspect to the feedback.

The audio feedback on the first stage of the project dealt with topic selection, while the audio feedback on the second stage dealt with essay structure, the student's use of references and the clarity of their argument. Sentence-level and grammatical issues were not addressed by the audio feedback, as research has shown these issues are better dealt with through written feedback or in person (Cavanaugh & Song, 2014; Ice et al., 2010; Johanson, 1999; Merry & Orsmond, 2008; Still, 2006).

**Student Perspective Survey**

At the end of term, all students in BIO152 were invited through the course's LMS to contribute to a student perspective survey on a voluntary basis. As the survey involved valuable critical reflection on the learning experience, students were granted a bonus mark for completing it, whether or not they consented to their anonymized results being used for research. The survey consisted of 5-point Likert scale questions, background questions, and open-answer questions. All student survey response data was anonymized, and qualitative responses were open-coded to identify key words and themes (Creswell, 2007).

**SLA-TA Interviews**

As part of their course feedback and professional development, SLA-TAs were invited to participate in an interview; the invitation also gave them the option of denying permission for the use of their interview transcripts in research. The ~15-minute long interviews were recorded and transcribed; the questions assessed the TAs' prior experience with providing audio feedback,

their view of its effect on students, and how they felt it affected their own work. All TA interview responses were anonymized and open-coded to identify keywords and themes (Creswell, 2007).

## Research Ethics

This project was approved by the Social Sciences, Humanities and Education Research Ethics Board at the University of Toronto under research protocol 30708.

## Results

### Student Perspective Survey: Likert-Scale Responses

All students were enrolled in the introductory biology course, BIO152, at UTM. 518 students completed the student perspective survey, and of these, 498 students provided consent for their survey responses to be used in this study. This resulted in a final consenting student response rate of 60.7% ($n$=821 total enrolled students). For analysis of Likert-scale responses, students that did not answer all Likert-style questions ($n$=6) were removed from the analysis: references to "students" below include only those students who responded to the full survey. 98% of students had not received any prior feedback in an audio format from other courses, including high school courses. Likert-scale responses from the student perspective survey are depicted in Figure 2.

The majority of students indicated that they felt that audio feedback had a positive impact on their learning (70%), was easy to retrieve (72%), and was more personal than written feedback (71%). In response to the statement "I'd prefer audio feedback (compared with written feedback) from my TA," 56% agreed or strongly agreed, and 21% disagreed or strongly disagreed. When asked specifically about essay assignments, there was an even stronger positive assessment of audio feedback: in response to the statement, "In the future, I'd prefer to receive audio feedback on my essay assignments," 68% of students agreed or strongly agreed, and 16% disagreed or strongly disagreed.

### Student Perspective Survey: Open Response

Eighty-one percent of respondents answered "yes" to the question, "Do you feel that the audio feedback positively benefited you for this assignment?" Students were also asked to explain the reason for their response. All responses were analyzed and open-coded, and a breakdown of the responses is shown in Table 1. Content analysis, via open coding according to Creswell's (2007) protocols, revealed eight response categories: constructiveness, level of detail, accessibility/convenience, expectations, personalized, efficiency, motivation/engagement, and no difference.

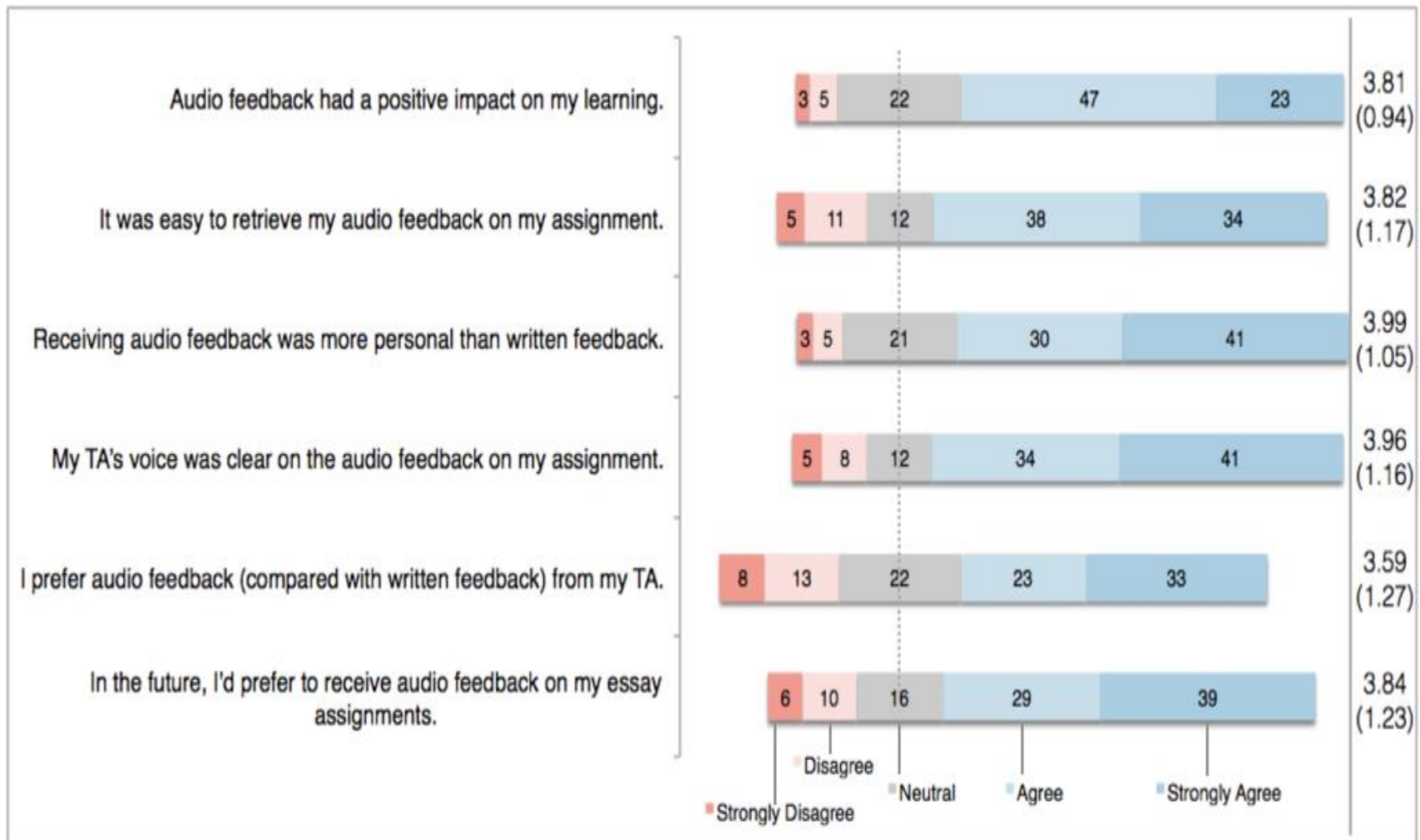*Figure 2.* This figure illustrates the Likert responses from the student perspective surveys, with numbers indicating the percentage of students who answered within a given Likert scale category. The central dotted line represents the median neutral response to the question. The far right column represents numerical averages wherein 1=strongly disagree and 5=strongly agree and the standard deviation is shown in brackets (*n*=492).

Table 1

*Open-Answer Responses from Student Perspective Survey[1]*

| Category | Positive Responses | | Negative Responses | |
|---|---|---|---|---|
| Constructive | Feedback led to better understanding of ways to improve; better understanding of next steps to take | 39.8% (198) | Feedback was not constructive | 1.8% (9) |
| Level of Detail | Feedback was detailed and specific; feedback gave specific examples | 4.8% (24) | Feedback was too broad/vague/brief | 4.0% (20) |
| Accessibility / Convenience | Convenient; no TA appointment was required for feedback; was good to be able to access feedback multiple times | 3.0 % (15) | Technical issues with accessing feedback; feedback was difficult to hear/too fast | 7.6% (38) |
| Expectations | Feedback clarified TA expectations | 15.7% (78) | (no negative responses about expectations) | 0 |
| Personalized | Feedback was personalized and sincere; feedback had a comforting tone | 12.8% (64) | (no negative responses about personalization) | 0 |
| Efficiency | Feedback was concise; audio feedback was more efficient than written feedback | 3.0% (15) | (no negative responses about efficiency) | 0 |
| Motivation / Engagement | Feedback was engaging; feedback helped motivate and build confidence | 2.2% (11) | (no negative responses about motivation/ engagement) | 0 |

No difference    No difference between written and audio feedback 1.6% (8)

[1]All responses were in answer to the question of whether or not students felt audio feedback benefited them on the assignment and to describe the reason for their response. Bracketed numbers indicate number of students presenting a response similar to the one shown. Note: students entered multiple comments so the total percentage may tally to more than 100 (*n*=498 student respondents).

Sample student response:

> I feel that the audio feedback positively benefited me, because the audio feedback felt more instructional, whereas written feedback feels more like criticism. The tone of voice of the TA also helps you determine how well you did on a section and how much you need to improve a section, whereas written feedback can feel vague.

**Constructiveness of feedback.** 39.8% of students indicated that audio feedback was constructive, while only 1.8% of students responded that the feedback was not constructive. One respondent wrote, "Instead of just receiving a mark on [the] rubric, the audio feedback really helped me realize what I was doing wrong and what I could improve on."

**Level of detail.** 4.8% of students indicated that the audio feedback was detailed and specific. However, 4% also indicated that the feedback was too broad, vague, or brief. Several students commented that they appreciated the numbers of examples the SLA-TAs gave in their feedback. One respondent wrote,

> My TA was very descriptive in the feedback that she provided. It really helped me while writing my essay. She pointed out my mistake clearly … she suggested some good ideas of what I could add to my essay (such as search x or y article…). Overall, I really liked the clarity and depth of info that the TA provided through the audio feedback.

**Clarifying SLA-TA expectations.** 15.7% of students indicated that the audio feedback clarified their SLA-TA expectations. One respondent wrote, "I feel like I understand more of what the TA expects from me. I'm more clear on what it is that I need to improve on and there are fewer misunderstandings."

**Personalized feedback.** Students also commented that audio feedback was more personal than written feedback (9.8%): 3% of students specifically indicated that the feedback was comforting and thus helped to encourage them. Some students also commented that it was beneficial to be able to hear the SLA-TA's tone of voice when making comments. One respondent wrote, "Due to [a] more personal touch, it felt like a face-to-face consultation." Another wrote,

> I think that it was nice getting the audio feedback because I got to know my TA in a sense as a real person; it felt more personal. If it was just written feedback, it's almost as if whoever was marking my assignment wasn't real. I couldn't attach a voice or face to the TA's name.

## Suggestions on How to Improve the SLA

Students were asked what advice they would give to improve the SLA in the future. The most common response was a desire for more detailed audio feedback at stage 3, the stage at which students must submit a draft essay to TurnItIn® for feedback on their paraphrasing skills. This is a valid concern, and one that we had taken into consideration in planning this iteration of the SLA. Unfortunately, due to limitations on the amount of funding available for SLA-TAs, we were not able to provide detailed audio feedback at each stage. Students also said that they would have liked more opportunities to meet with their SLA-TAs, and to have more drop-in help sessions scheduled with the Academic Skills Centre, along with online help sessions; again, these concerns are both valid and, due to financial concerns, unresolvable for this course. These issues notwithstanding, however, many students stated that they wouldn't change the structure of the SLA or the support they were provided with. One respondent wrote,

> I honestly don't think there are any ways to improve the assignment. I loved how we had due dates for each step of the assignment which helped to keep us more organized. I also love how there were always help sessions to make sure you were on the right track…The audio feedback was also very helpful.

## SLA-TA Background

The six SLA-TAs included four experienced TAs and two novice TAs. Of the four experienced TAs, they reported having experience in marking essays and assignments ($n$=1), marking only assignments ($n$=2), and experience only in a laboratory setting with no essay marking ($n$=1). None of the TAs had given audio feedback during previous marking duties.

## SLA-TA Interviews

During interviews, SLA-TAs were asked to identify benefits and drawbacks, for both students and SLA-TAs, of using audio feedback for written assignments. Table 2 summarizes the teaching assistant (TA) interview responses. All responses were open coded according to Creswell's (2007) protocols.

Table 2
*TA Interview Responses.* [1]

| Comment Category | Impact on Students | | Impacts on TAs | |
|---|---|---|---|---|
| | Benefits | Drawbacks | Benefits | Drawbacks |
| Constructive; Level of detail; Clarity | Feedback was clearer/ easier to understand/ more specific (4) | International students might have better understood written feedback (1) | Was easier to give more specific/ nuanced/ clear/in depth feedback (5) | (no comments) |
| | Feedback was more detailed/ contained more content (3) | Feedback was too vague (1) | Easier to give more constructive feedback (1) | |
| Accessibility; Convenience | (no comments) | Technical issues: students had difficulty accessing/ finding the feedback (3) | Feedback was easier (in general) (3) | Audio feedback took longer to give (4) |
| | | Technical issues: students had trouble hearing the feedback (2) | Was easier to give more feedback with less effort (1) | Technical issues with adobe and/or email (4) |
| | | Took longer to get the feedback to the students (1) | | Harder to read off screen than hard copy (1) |
| | | | | Need quiet space and more concentration (1) |

| Comment Category | Impact on Students | | Impacts on TAs | |
| --- | --- | --- | --- | --- |
| | Benefits | Drawbacks | Benefits | Drawbacks |
| Personalized | Feedback was more personal (4) | (no comments) | Feedback was more personal (5) | (no comments) |
| Efficiency | (no comments) | (no comments) | Feedback was more immediate (from perspective of marker getting thoughts on 'paper') (1) | Lose train of thought/ track of words; need to rerecord (2) |
| | | | Feedback was more concise (1) | Would need to script, write, then read orally (2) |
| Motivation; Engagement | Feedback was given in a kinder manner/ hear tone of voice (1) | (no comments) | (no comments) | (no comments) |

[1] TAs were asked to discuss the benefits and drawbacks of audio feedback to both students and TAs. The sample size for these interviews was six and the brackets indicate the number of TAs that responded with a given statement.

**Benefit to students**. Four of the SLA-TAs indicated that audio feedback was clearer, easier to understand, and more specific than written feedback, and also indicated that feedback was more personal. Three of the SLA-TAs indicated that feedback was more detailed. They said, "The students can understand your comments better when they're said rather than when they're written, because you can elaborate more when you talk." and "They feel like they're connected to their TA…generally a more personal experience. They know who you are, they know your name, they hear your voice."

**Drawback for students.** Three of the SLA-TAs indicated that some students had difficulty accessing/finding the feedback. Two of the SLA-TAs indicated that some students had trouble hearing the feedback. Two of SLA-TAs indicated that some students seemed not to understand or use the feedback they received. For example, students would ask questions in person about things that were outlined in their feedback. One respondent said,

At the beginning…they didn't really know how to access the audio feedback…I found that sometimes they didn't really listen to the comments. I don't know if they didn't listen to it at all or they just didn't make the changes, so I'm not sure if that's directly due to the audio feedback or [if] they just didn't want to make the changes

Others said, "International students may prefer when they read [feedback] rather than when you speak it because they understand written better than audio." and "I had a few students that couldn't hear me properly."

**Benefit to SLA-TAs.** Five of the SLA-TAs indicated that it was easier to give more specific/nuanced/clear audio feedback than written. Three of the SLA-TAs indicated that feedback was more personal. One SLA-TA said, "It forced me to give more in-depth feedback that was more constructive for the students, and also reminds me I'm talking to someone, although indirectly, so I give positive feedback in addition to the constructive feedback." Another said,

> It allows me to elaborate on specific portions... I can point out this sentence, or "here's where you need improvement" as opposed to just going at the end and giving a very generic response, so I think it allows me to be more specific, and … more direct…

**Drawbacks for SLA-TAs.** Four of the SLA-TAs indicated that it took longer to give audio feedback. Four of the SLA-TAs indicated that there were technical issues with Adobe and/or email. Two of the SLA-TAs indicated that they would lose their train of thought when providing feedback and/or had to rerecord their feedback if they made an error. Two of the SLA-TAs indicated that they would need to script their feedback in written form and then read it orally, thus taking more time to give feedback. One said, "Sometimes when you lose your train of thought, you have to start over, so it did make it take a little longer than opposed to just writing it directly." Another said,

> The audio feedback generally took a lot longer, and also for it to be more comprehensible, …you first have to write the comments out and then I had to speak them out, so that I don't go off on tangents or so that my sentence isn't unfinished…so it took very very long.

## Discussion

Overall, the results of our study support conclusions reached in other studies with regard to the benefits to students of audio feedback, especially in terms of the personal nature of this approach to feedback, its clarity, and its suitability for conveying detailed responses (Brearley & Cullen, 2012; Cooper, 2008; Ice, Swan, Kupczynski, & Richardson, 2008; Merry & Orsmond, 2008; Rotheram, 2009). Audio feedback was generally popular with our students, as was also noted by Rotheram (2009) and Cann (2014), and students reported that they had a fuller learning experience, also shown by Cavanaugh and Song (2014).

### Constructiveness of Audio Feedback

A key goal of using audio feedback in this class was to provide formative feedback. In open response questions, 39.8% of students indicated that the audio feedback they received was constructive, and helped them identify how to improve their essay. Audio feedback in particular has the potential to shift students from perceiving feedback as rendering a verdict on their work to understanding it as a tool to promote learning, a shift in perspective which MacLellan (2001)

identifies as leading to increased learning. Formative feedback on written submissions is valuable, particularly when students will be obliged to submit a revised version of the work that responds to feedback on the earlier draft (Stern & Solomon, 2006). It has also been noted that separating feedback from marks may be useful to emphasize to students that the feedback is formative (Black & Wiliam, 1998). Although this was not specifically investigated in our study, student marks were received in a different format via the class LMS and were thus provided separately from the formative audio feedback. It should be noted as well that the student perception of receiving valuable, personalized feedback is a significant benefit in large classes such as this one, where student disengagement is a potential risk.

## Detail of Audio Feedback

TA responses aligned with previously published reports indicating that audio feedback is richer and offers more depth compared to other modes of feedback delivery (Bauer, 2011; Brearley & Cullen, 2012; France & Wheeler, 2007; King, McGugan, & Bunyan, 2008; Merry & Orsmond, 2008). This was mirrored by the students who noted that audio feedback felt "deeper" and "richer"; Swan-Dagen, Mader, Rinehart, and Ice (2008) attributed this richer feeling partly to the use of more adjectives in audio versus written feedback.

## Personal Feel of Audio Feedback

Students indicated that audio feedback was more personal than written feedback and had a comforting tone. Other studies have also shown audio feedback to feel more caring and supportive to its recipients than written feedback (Ice et al., 2007). Sipple (2007) attributed this motivating response to TA comments containing more praise when given in an audio versus written form, something independently seconded in one TA's comment above. The majority of TAs also indicated that feedback was more personal when provided in an audio format.

## Clarity of Audio Feedback

Both students and TAs reported that audio feedback was clearer and easier to understand than written feedback. Cavanaugh and Song (2014) also reported that audio comments were easier to understand than written ones, and Glover and Brown (2006) point out that written feedback can be misinterpreted. However, some students did report that it was not always clear which part of the text the feedback was referring to. Our model of giving audio feedback did not include text annotations, but other studies, such as Cullen (2011), have included them. Student responses included in Cullen's study indicated that these annotations are crucial to utility of the feedback.

Students also commented that audio feedback clarified TA expectations, and as a result increased their levels of confidence. This result was also indicated by Sipple (2007) and Bauer (2011).

## Ease of Giving and Receiving Audio Feedback

Although Rotheram (2007) reported that audio feedback can take the same amount of time as written feedback, and Cann (2014) and Cullen (2011) reported it saves time, our TAs

found that it took them considerably longer to give audio rather than written feedback. Some TAs stated that they would lose their train of thought when providing feedback and/or had to rerecord their feedback if they made an error. Some TAs also indicated that they scripted their feedback in written form and then read it orally. However, meaningfully, these TAs also commented that going through this process meant they were likely providing better feedback than if they had just given written comments. Writing down their feedback in advance meant that they were able to develop their feedback more fully; thus, the use of audio feedback encouraged better evaluative practices among TAs by obliging them to revise and carefully consider their feedback.

Some students reported that audio feedback was convenient because no SLA-TA appointment was required to get personal feedback. Providing audio feedback files to students allowed them to relisten to their comments, as was similarly reported by Bauer (2011). However, some students reported that it was troublesome to relisten to the feedback and that they would have preferred written comments. Also, because one audio file was provided per paper, students did not receive comments linked to a particular line or paragraph of their paper. Some students reported that it would have been easier to identify their mistakes with written feedback, as was also reported by Sipple (2007).

## Technical Issues with Audio Feedback

Cavanaugh and Song (2014) reported some issues with technology. In our current study, half of the TAs mentioned that some students had technical problems with accessing feedback. However, very few students mentioned this in their open responses (2.8%). It is possible that there were a few vocal students spread across all the TAs' sections who complained about technical issues, which would exaggerate the issue from each TA's perspective, especially if they themselves had difficulty giving the audio feedback. Merry and Orsmond (2008) also experienced technical issues with audio feedback, and found that some audio files (up to 11Mb) were too big for some email servers—and, similarly, in our study the majority of SLA-TAs indicated that there were technical issues with Adobe and/or email. TAs reported it took a great deal of time to email the feedback back to the students, which was reported as well by Merry and Orsmond (2008).

SLA-TAs recorded their audio feedback using Adobe Reader 9, and files were sent via email to students. This software was chosen because it is free and relatively easy to use. Others studies have used TurnItIn Grademark (turnitin.com) for providing audio feedback (Cann, 2014); however our institution does not currently have a Grademark subscription, and thus that option was unavailable to us. Other approaches outlined in the literature, such as emailing audio comments and giving back paper with written code (Bauer, 2011) were not feasible for BIO152 due to the large class size.

## Recommendations

Due to technical issues with emailing feedback to the students, the next iteration of this assignment will likely use a cloud-based storage system to deliver feedback to students, following Cann's (2014) conclusions in this regard. In addition to changing the means of delivery, a different software for creating the audio feedback will be chosen for this class as Adobe 9 does not allow listeners to skip, pause, or rewind. Also, TAs will include feedback

footnotes alongside the audio comments, so that students will be better able to find the section of their text that audio feedback corresponds to. Each assignment will have general feedback at the beginning, and then more specific feedback to accompany the feedback footnotes. For TA training, a session will be incorporated involving listening to TA feedback and providing constructive criticism to help ensure TAs are able to speak clearly and slowly when giving audio feedback.

Overall, students and TAs reported that their experiences with audio formative feedback had a positive impact on their learning. The chief advantages of audio feedback were that it was more personal and engaging than written feedback, and that students felt it was constructive: all of these advantages relate to students' feelings of engagement in the course, which as mentioned above is a major concern in such large courses.

In this study, we have been concerned with the practicality of using this approach to feedback, and we note that the current study did not directly assess the impact of audio feedback on student engagement or learning gains. Future work will proceed in two directions: one will develop this study's work on student engagement and address retention issues; the other will assess the impact of audio feedback on student learning in large introductory courses such as this one.

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