Article

Voice Assessment of Student Work: Recent Studies and Emerging Technologies

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Abstract

Although relatively little attention has been given to the voice assessment of student work, at least when compared with more traditional forms of text-based review, the attention it has received strongly points to a promising form of review that has been hampered by the limits of an emerging technology. A fresh review of voice assessment in light of recent technological developments strongly suggests that this form of review is now ready for broad adoption. Favorable student reception of voice assessment and its potential for raising instructor awareness around the review process itself argue further for considering it afresh.

Keywords

voice grading, audio grading, instructional technology, iPads, tablet computing, new media, assessment, writing, composition, rhetoric, screen capture, learning outcomes.

The increasing, if not accelerated, use of technology in higher education continues to be well documented in academic journals and professional conferences (Means, Toyama, Murphy, Bakia, & Jones, 2009). Generous attention is given to content management systems, virtual environments, social networking sites, mobile computing, digital syndication, and tablet-based presentation (Means, Toyama, Murphy, Bakia, & Jones, 2010), to name only a few of the more recent technologies attracting the interest of teachers and researchers. However, with so much attention given to storage and distribution (Sinn, 2004), and with the increasing emphasis on assessment in higher education (Gates et al., 2002), one might wonder why more attention has not been

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given to work that most of us recognize as central to what we do as educators: the review and assessment of student work. Despite advances in these other areas, many of us continue to receive student work in written hard copy form, and we offer the same when we review their work. Papers come in, we review them, we write comments, and we return the papers with our written comments (Beach & Friedrich, 2006).

To be sure, variations on this theme exist. For example, some have used both Adobe Acrobat or Microsoft (MS) Word and voice recognition software (Crisp, 2011), so that a paper a student submits electronically is reviewed and returned electronically. Receipt and return of the paper varies and can include e-mail review, e-mail attachments, or transfer by a drop box within a content or learning management system such as Blackboard, or through cloud-based services, like Dropbox, Box.net, or Syncplicity. Nevertheless, all of these variations share in common the production of static text as the final medium of review, unless of course one decides to include both text and voice, an option we are not studying here but one that will come up several times in the discussion ahead. So, even when a voice recognition solution, such as Nuance's Dragon, is employed (Lang, 2009), the final product is static text, something the student is expected to read.

With these variations and their common element acknowledged, we turn to a form of assessment we believe is significantly different, if not in process, then certainly in product, because of its reliance on the human voice as the exclusive medium of review. We are referring to the use of audio or voice commentary to assess student work.

While clearly in the minority as a form of review, the use of audio or voice commentary has still been discussed in a variety of journals, and in each discussion, authors have emphasized how quickly the relevant technology can change (Still, 2006) and how such a change can resolve problems encountered by earlier adopters and present opportunities to new ones (Jordan, 2004). They have also hinted at the great but as yet unrealized potential of this form of assessment, from some of the pioneers on voice grading (Anson, 1999; Van Horn-Christopher, 1995) to arguably the most recent treatment of the topic in an article on iFeedback by Noreen Moore and Michelle Filling (2012), who write, "Technology has the potential to advance and improve the feedback college instructors provide students; although the use of technology in and of itself may not enhance teaching and learning, the potential does exist" (p. 12).

In the study that follows, we review the extant voice-grading research to date and consider the use of emerging voice technologies for grading student work. In addition to the technological update, this study is particularly relevant to those interested in business education because it concentrates on a large and diverse student population: one that consists primarily of undergraduate business students and working professionals in an executive MBA program.

We argue that educators are now finally in a position to move past the previous limits of assessment technology in this area and realize, along with students, the full potential voice assessment offers. We also suggest that relatively little has been written on voice assessment, at least when compared to work on written assessment, precisely because the available technology has discouraged broader adoption.

To supplement this article, and for those who have yet to work with voice assessment, we have created a website that provides a brief set of instructions to ease entry

and encourage additional study in this area: www.voicegrade.org. This site also offers rich-media examples of voice assessment from the three tiers we cover in the following discussion. Such examples can contribute significantly to the discussion because the richness voice assessment promises can only be fully appreciated by directly experiencing the actual examples of review using these technologies.

Voice Assessment: Literature Review

To appreciate the changes represented by recently emerging technologies and the opportunities they now offer, one has to see them in the context of a slightly longer historical development in both use and study at least for those within the field of business communication. That discussion begins with the 1981 *ABC Bulletin* article "Cassette Tapes: An Answer to the Grading Dilemma," in which Thomas David Clark discusses using then current technology—cassette tapes—in grading. Clark outlined what he believed were the common problems writing teachers face when grading students' "hard copies" (not a 1981 word). The biggest problem Clark saw was "the impersonality of our written comments," which leads students to simply turn to the last page of the assignment, read the grade, and not read our comments (p. 40).

Fourteen years later, Van Horn-Christopher's (1995) article, "Voice-Graded Business Communication Documents," appeared in *Business Communication Quarterly* (*BCQ*). Technology had clearly advanced: Van Horn-Christopher described using embedded sound files in Windows-based Word documents and reported that student responses to the embedded voice files are overwhelmingly positive. In that same issue of *BCQ*, Pearce and Ackley (1995) reviewed the literature on this subject in their article "Audiotaped Feedback in Business Writing: An Exploratory Study" and concluded that "audiotaped feedback has the potential to help students improve their business writing skills significantly when combined with written feedback" (p. 34). Pearce and Ackley suggested that instructors might depend entirely on taped remarks, "in which case there may be some significant time savings" (p. 34).

Some nine years later, Jordan, (2004) wrote about oral feedback as a supplement to written comments when grading statistics exams. Citing professors' perennial lament that students bypass written comments to look only at the grade, Jordan described her method of creating sound files on the university's shared network drive to supplement her written comments. She found that students better understood their exam performance and were more motivated to improve.

More recently, in "Embedded Voice Commenting as a Tool for Critiquing Student Writing," Still (2006) gave a very clear, useful description of his method of embedding both written and oral comments, and reported a mostly favorable reception from the students in his introductory technical writing courses.

Following Still (2006) were two articles that introduce us to more technologically advanced forms of commentary, forms we describe under Tier 3 in this article. Crews and Wilkinson (2010) hinted at this advancement in their title, "Students' Perceived Preference for Visual and Auditory Assessment With E-Handwritten Feedback." This is the first article to provide a sustained look at combining audio and electronically written comments, though the comments are still asynchronous, unlike the Tier 3

screen recording. Moore and Filling (2012) coined a new term in the title of their article: "iFeedback: Using Video Technology for Improving Student Writing." They further examined the use of visual media in providing commentary on student work, and they report, as others have, both success and potential for future research.

Some Observations on the Literature Review

The single problem that runs through the methods above is access to equipment—from Clark's (1981) cassette recorders and tapes, to Van Horn-Christopher's (1995) occasional lost disc, and Jordan's (2004) need for network space. Happily, today's technology has eliminated most of these hardware problems, though they have been replaced with a new set of difficulties: the increasing need for greater bandwidth. However, the good news is that bandwidth has been increasing nearly everywhere in the form of new cable networks and fiber optic feeds, to name only two popular options for data transfer, so one of the major problems MS Word presents, the large audio file size, may be mitigated. But the bad news, especially for those of us in the academic community, is that this change will probably be slow, or at least much slower than it is for commercial communities. Past practice gives us little cause for optimism, for when we do see this kind of change in overall campus bandwidth, students often rise to the occasion with the newest peer-to-peer file-sharing clients. The result is a continuation of the ongoing battle between those who do not want large media files shared and those who want to share them. To make matters significantly worse, we are just now beginning to witness what might be called the next generation of audio and video formats, and they are huge. High-definition and, more recently, the reintroduction of 3D have taken the demands of file sharing to an entirely new level. At the same time, file sharing and pirated video and audio files show few signs of diminishing, despite new attempts at encryption and threats of litigation. Because of these developments and ongoing obstacles, those considering using voice assessment of student work, or any sound or video files in this kind of review, should probably focus their software search on programs that provide the best compression. In the next section, we will review the emerging technologies that remove Word's limits and provide the kind of compression that is desirable.

New and Emerging Technologies

Just as it must have felt archaic to Still (2006) to read about audio cassettes and groundbreaking work by Clark (1981), so it seems to us when reading about MS Word. Yet that is probably the best place to begin, with what we will call Tier 1 capture technology, because it will provide the most dramatic contrast between it and other options and allow us to introduce the rich-media world beyond MS Word.

Tier 1 Voice Recording: MS Word

Using MS Word to provide voice commentary requires first that the student use it to produce a document for review. Once that is done and the document has been emailed

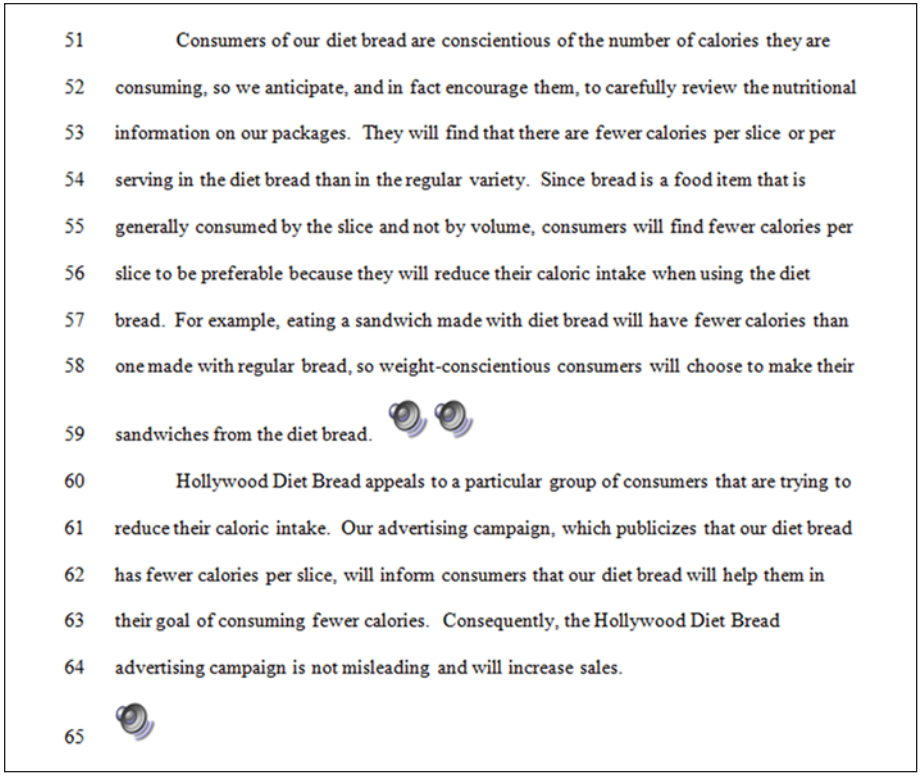

Figure 1. Screen capture of Microsoft Word page and embedded sound files.
Source: Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation.

to the instructor, provided on a USB or other storage device, or placed in a digital drop box within a course management system such as Moodle or Blackboard, the instructor can open the document for review and record a voice comment.

The speaker icons in Figure 1 are the result of the following program steps, which are taken at Word's ribbon menu: "Insert" → "Object" → "Create From File" and then the selection of the file that contains the audio recording, which must be produced by a program, such as Sound Recorder, outside of Word. So, at the very least, one will need two separate programs to provide a Word document that has an embedded sound file.

In summary, the Tier 1 option will be attractive depending on the needs, interests, and capabilities of both instructor and student. It represents the least expensive option, assuming that both instructor and student have MS Word on their systems, and Word is for the most part ubiquitous. At the same time, using this option will require more work from the instructor than the Tier 2 option because it means making Word do something for which it is not designed and taking steps that are not very intuitive in the software.

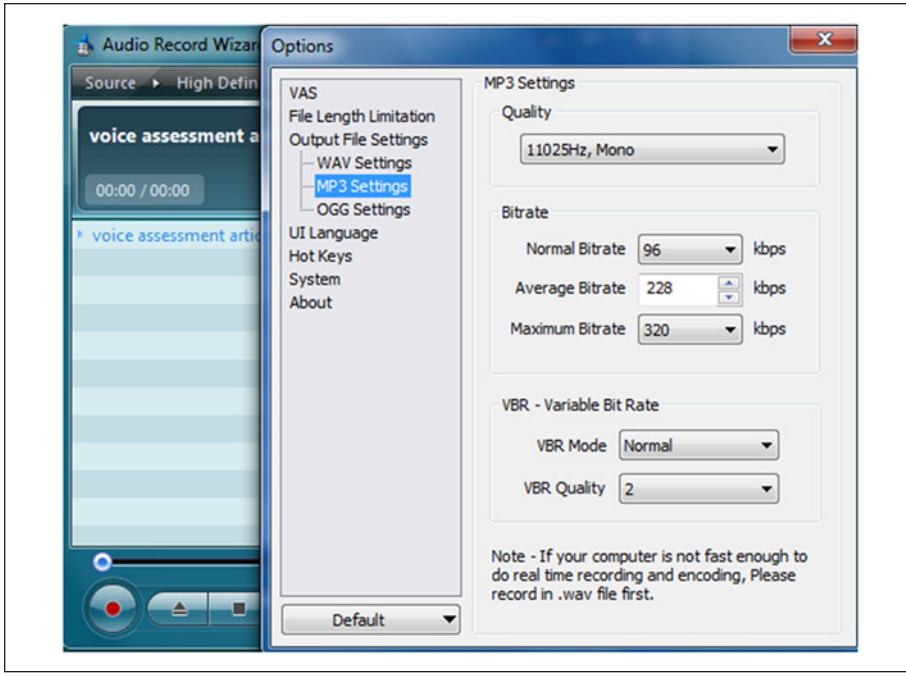

Figure 2. Screen capture of settings panel in Audio Record Wizard.
Source: http://www.nowsmart.com/

Tier 2 Voice Recording: Stand-Alone Software (Audio Record Wizard)

Given the challenges of using Word to provide voice assessment, as well as the problems that can be created by inflexible audio formats, instructors may want to look elsewhere, particularly because other good options exist. For example, one can record the voice on a software recorder and provide comments by referring to lines of text instead of embedding sound icons where the comments need to be made. This has the advantage of freeing the process from the WAV format required by Word, and that can dramatically reduce the size of the file and allow for a choice between sound formats. Figure 2 shows one such option using Audio Record Wizard, a stand-alone program that provides granular control over the settings. In this instance, the settings have been configured to record one channel (mono) because a single voice does not require two channels.

In summary, the Tier 2 option will once again be attractive, depending on the needs, interests, and capabilities of both instructor and student. It represents a more expensive option than using MS Word to embed sound, and it will require becoming familiar with a program that has a singular application, but for some, the dedicated design will be enough to make this the option of choice.

Tier 3 Voice Recording and Screen Recording: Camtasia for Windows

Although the Tier 1 and 2 limitation of recording only audio may be sufficient for the purposes of commentary, those interested in rich-media approaches to reviewing student work will find it in Tier 3 technology, which combines voice and visual data, including all computer screen activity, so that a mini movie is achieved. The student then receives something comparable to an interpersonal tutorial in which the instructor walks the student through the paper, in real time, as the comments are being made.

We will attempt to describe screen capture technology in the discussion that follows; however, we believe in this case that nothing can substitute for the actual experience of viewing a paper that has been reviewed in a screen recorder. For that reason, we have provided a sample of this form of review at www.voicegrade.org. Short of that, we offer the screenshot of Camtasia Studio for Windows in Figure 3 as a basis for description.

On viewing Figure 3, the reader will probably first notice the player control panel at the bottom. This indicates that we have a movie (an *.avi file in this case) that can be played in the same way as other movies: it can be stopped, rewound, and fast-forwarded. The viewer thus has considerable control over the speed at which the review is delivered. Segments at the level of frames can be bookmarked for direct access later, and audio is available as part of the presentation.

Also apparent from the screenshot are a number of colored markup areas. These are provided in real time, just as they might be in an interpersonal tutorial, while the student sits and views a paper (or other work) with the instructor, and while the instructor talks about the paper and makes explanatory marks on it, or, according to more recent practice, while the student writes on the paper in the instructor's presence. The software that produces this kind of movie is called a "screen recorder," and we believe it represents the next generation of review software simply because of the richness of the presentation.

In summary, the Tier 3 option represents the kind of software choice we often encounter in considering different instructional technologies because it provides an unprecedented richness of function and review but at a much higher price than either options 1 or 2, and it requires spending more time to become familiar with the program, its interface, and its many choices for compression and publication. It also produces a much larger file than either of the first two tiers because it captures video screen activity as well as audio. We have used this software a number of times, and we are very impressed with the results, but cost, time required for mastering the program, and very large file size have been enough thus far to discourage us from using it regularly.

This last point, on file size, invites a short consideration of hardware choices simply because the usually large size of audio files, and the inevitably large size of video files produced by screen capture programs, may make some choices problematic. At a time when the computer industry, including major players such as Intel, Microsoft, and Apple, is moving away from large-storage desktop systems toward mobile devices,

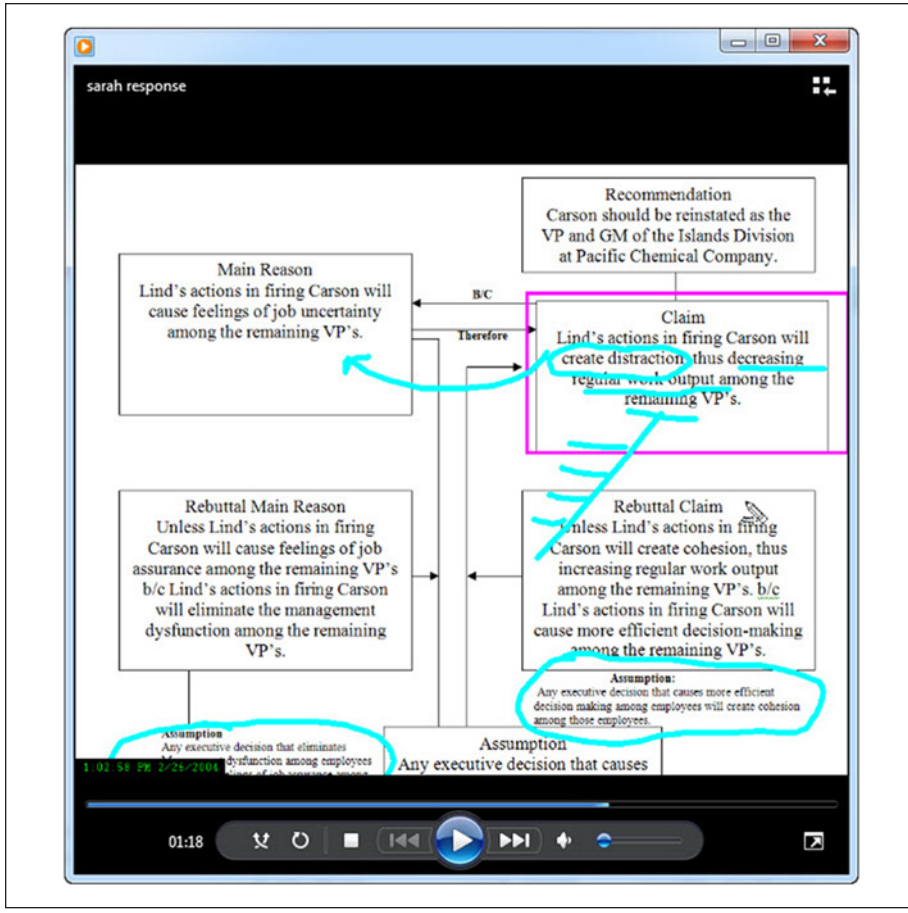

Figure 3. Screen Capture of Camtasia-Produced Review.
Source: Tech-Smith (2012). TechSmith product screenshot(s) reprinted with permission from TechSmith Corporation.

those considering using thin clients, such as tablets, need to be careful to assess their hardware according to storage capacity and ability to transfer wirelessly.

This is a timely care to exercise, given the explosion of tablet computing and especially the extent of iPad adoptions in higher education (Johnson, Adams, & Cummins, 2012). We have already seen numerous discussions of iPad use for teaching in general and, more recently, several treatments of the use of iPads in voice grading (Ward, 2012). While these developments are welcome in many ways, including providing a convenient means for the markup of digital documents, the fact that most tablet computers, including the iPad, offer only wireless transfer, argues even more for a Tier 2 selection. Given voice grading's large file sizes and constraints in wireless transfer, Tier 2 software still seems to us the best choice, regardless of whether it is used on a desktop or on a mobile device.

Table 1. Undergraduate Results.

	Semester								
	Spring 2006	Spring 2006	Spring 2007	Spring 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Total
Very useful	18	13	23	19	18	21	23	43	178
Useful	0	2	3	1	1	0	1	2	10
Not useful	0	2	0	0	1	2	0	0	5
Total students	18	17	26	20	20	23	24	45	193

Note: There were two separate sections in Spring 2006

Table 2. Graduate Results.

	Quarter						
	Summer 2008	Summer 2009	Fall 2009	Winter 2010	Summer 2010	Fall 2010	Total
Very useful	17	17	12	20	18	21	105
Useful	0	0	0	0	0	0	0
Not useful	0	0	0	0	0	0	0
Total students	17	17	12	20	18	21	105

Having now reviewed the three tiers of software technology for voice assessment, and offered an extended comment on hardware considerations, we have a context for positioning the Tier 2 approach used in this study. How the students reacted to our choice of Tier 2 Audio Record Wizard and our impressions of its instructional value are the subjects of the next section.

Our Experience and Research

Eight undergraduate and six graduate management courses at Saint Mary's College of California were surveyed from Spring 2006 through Fall 2010. A total of 193 undergraduates (see Table 1) and 105 graduate students (see Table 2) completed the survey. They responded to these questions: (a) Did you find voice grading very useful, useful, not useful? (b) How so or how not? (c) Did voice grading cause you to do anything differently? (d) Would you like to add anything else?

Those undergraduate respondents who marked "useful" gave the following commentary: One would rather talk with the professor after the class in which the papers were returned to the students; one wanted the opportunity to respond verbally but felt the voice comments were better than written; one prefers one-on-one meetings in which professors return papers individually; and seven gave no reason.

All five of the undergraduate respondents who marked "not useful" gave some commentary: One reported technical problems that were later resolved but were

independent of the software and hardware discussed in this article; two students simply felt that written comments are more useful; and two students with learning disabilities requested that future comments be written. Of course, we work with our institution's Office of Student Services to follow ADA (Americans With Disabilities Act) guidelines for students with auditory processing concerns or hearing impairments. In addition, some multilingual students, for whom English is not the first language, might prefer written comments, and we recommend accommodating that request.

Returning to the classroom the day after we send the first voice-graded assignments is always fun because overwhelmingly students like it. Once we get past the comments such as "It was awesome" or "I played it for my parents," or "it was really odd to have your voice in my dorm room," student reactions become more concrete, such as those open-ended comments students wrote in response to question (b) How so or how not [was voice grading useful]? and question (d) Would you like to add anything else?

Following are samples of undergraduate students' written comments—at least 10 students had to write some iteration of each of the following comments to be included in this list. Many students liked the clarity of meaning:

- Too often, professors' comments are confusing and handwriting is bad, so I give up.
- Written comments can have several meanings; your words were not confusing at all.
- I better understood the errors and why they were errors.

Other students increased the time spent with their returned assignment:

- I listened several times while following along on my paper instead of waiting until the next paper is due to try to find this one to review it.
- I spent more time reviewing this paper than any I've ever written.
- I will listen to the recording again before I turn papers in to other professors.

Some students felt it was a more personal evaluation, especially given the tone of voice:

- It was like you marked my paper as we talked.
- The tone of your voice was very useful; I could hear where I need to spend more time reviewing.
- It showed that you are concerned about improving our writing.
- (Surprisingly, we received a lot of this one)—You care about student writing; you care about us; you really care about students improving their writing.

Some commented on grades earned and future efforts:

- I better understood the reasons for my grade.
- I didn't blame the professor.
- I will not make these mistakes again.

And some comments were more general:

- Much more helpful.
- I much prefer this method and hope more professors use it.
- Two thumbs-up.
- I played it for my Mom, and she teaches high school English; she thought it was great.
- I loved it!

Very few undergraduate students offered criticisms, but they fell into two categories:

- Hearing harsh comments is difficult.
- You speak a bit fast to get it all into eight minutes [note: We no longer send such large files. Instead, when a paper requires a lot of attention, we hit the highlights and suggest a face-to-face meeting].

Graduate students (Executive MBAs) were overwhelmingly happy with voice grading. Some representative comments follow:

- Written grading has always felt somewhat punitive, barring a perfect score. Voice grading didn't feel this way. It seemed more constructive and helpful.
- Your suggestions were easy to follow, and I've incorporated them into a tutorial for writing future papers. When you get written comments, you never really know the severity of the correction. I was able to tell from your voice which corrections were major errors and others which were more "housekeeping" types of problems. It really helped me focus on where I needed to improve.
- I have gone back to listen to your comments much more than I would have in the past with written documents. In the past, I would usually just look at the grade and give the paper a onetime review to see corrections. With the voice feedback, I have gone back to listen to the message numerous times. Common writing problems that I have are slowly going away.
- Voice grading was extremely useful. It helped to print off the clean memo and make my own marks in response to your verbal feedback. The pace and detail allowed me to make comments and digest the information. I also was able to listen to it several times to ensure that I caught the additional suggestions.
- Verbally receiving the feedback enhanced the experience immensely. Your tone and the amount of detail were excellent, and I felt as though I was being coached by a mentor. For those of us who are used to excelling, constructive feedback can be difficult to handle, but because your tone was upbeat, the feedback was pleasant throughout the process. I also think you provided more detail verbally in terms of ways to improve, than I would have received with a written evaluation [issues that were not necessarily wrong, but rather suggestions to make the memo even better]. I was so motivated after I received the verbal feedback that I immediately took the suggestions and rewrote the memo.

- If I had received the written comments, I felt it would have led to some confusion. I really liked the idea of numbering the lines because it was very easy to locate the errors.

A Pleasant Behavioral Surprise

Although we did not witness this because we did not see students as they listened to the voice recordings, a surprising number of students, undergraduate and graduate alike, reported behavioral changes that would delight most writing professors. These included the following:

- Some students printed their papers and, while listening to the voice recording, wrote the corrections on their papers.
- Some students typed the corrections on their papers as they listened, then reread their papers.
- Many students said they listened to the recording more than once.
- Many students said they returned to listen to the recording before turning in papers in other courses.
- Many students said they will return to listen to the recording while writing drafts of the next assignment.

These are remarkable reported behaviors and much more heartening than the large number of students who reported intending to reread written comments after the review time allowed in class but ultimately did not return to the paper for further review. In addition, since we have been using voice grading, many more undergraduate students than usual request face-to-face meetings, and they bring with them hard copies of their voice-graded work, with changes made because they want to go over their changes with us. This too is heartening, and something we believe is the result of the voice-grading experience.

Findings

The Students' View

Technology has advanced well beyond the cassette tape of four decades ago to a manageable, useful, and successful digital tool for teaching. We have found that almost all students not only enjoy listening to voice grading, but many listen more than once, and many make the changes either electronically or on a printed-out hard copy—these benefits alone make this a worthwhile endeavor.

Of course, additional features need to be considered. One would be the newness of the voice-grading experience for most students. Are they responding to the novelty of voice-grading, as responses such as "I played it for my Mom" seem to indicate?

Another consideration is whether students respond by telling us what we want to hear. We would like to think not, and we do encourage honest feedback. However, given that we gathered student responses by e-mail immediately after the first

voice-graded assignment, this possibility exists. Future studies might use an anonymous feedback system instead of e-mail.

Finally, does voice grading result in better writing? Overwhelmingly, students believe it does, and that in itself is important. We found that voice grading does cause students to attend more carefully to our comments, and as the above behavioral changes indicate, students who actually make the recommended changes, who work with recasting and combining sentences, who rethink diction, and who correct their grammar errors and experiment with more sophisticated punctuation must surely benefit in terms of improved writing. This, too, is an area for future research.

The Instructors' View

Assessment literature is rich with studies of traditional approaches to providing comments (Straub & Lunsford, 2006) as well as instructors' impressions of best practices in this area (Gottschalk & Hjortshoj, 2004); however, little has been written on the instructor's impressions of how voice assessment differs from written assessment. We hope this area of research will develop as more instructors adopt voice grading. Until then, we would like to share some of our own impressions, which we arrived at by exchanging with each other samples of both written and voice comments. That way, our impressions are from the instructor's point of view but with the reader-recipient still very much in mind. Our impressions fell into three general categories.

First, we noticed that our voice comments were in nearly every case more complete and coherent than our written remarks. When speaking our remarks, we are forced into complete sentences simply to make complete sense of a thought, whereas written comments were often abbreviated at best and were sometimes cryptic, even when we reviewed them. Second, in many cases, we found the readability of written remarks suffered for reasons that might be easily guessed. This was especially noticeable when comments were written by hand as opposed to using a keyboard. Fatigue, combined with the use of muscles that have been displaced by those used in digital entry, resulted in marks that were both incomplete in thought and often illegible to those who needed to read them the most. Third, and finally, the rhetorical stance of written comments was quite often difficult to identify. Often described as a kind of verbal attitude taking, rhetorical stance can powerfully affect the way a comment is interpreted. For example, a stance that is interpreted as condescending is likely to be resisted; a stance that is offered as a compliment or cheerful opportunity for improvement is more likely to be accepted. Not surprisingly, we found in each case that the human voice did a much better job communicating stance and tone than did the written comments, which often existed as inscrutable (if not also incomplete and illegible) in the area of interpretation. All in all, we felt that voice comments provided a higher quality form of review.

Time and Efficiency

Although the relative time one might invest in the actual voice-based review (as opposed to learning the software or setting up the configuration for the best results) is not central to this study, it is certainly among the more frequently asked questions we

receive during conference presentations and discussions with colleagues who are interested in assessment and new media. It is also one of the two areas suggested for further research by Tena Crews and Kelly Wilkinson (2010) in their *BCQ* article "Students' Perceived Preference for Visual and Auditory Assessment with E-Handwritten Feedback." This is understandable because any attractiveness voice grading might have in the abstract will become less so in practice if the time required for reviewing each paper is much more than providing handwritten, typed, or voice-converted text.

For better or worse, we have found that voice grading using Tier 2 software will, on average, and after an initial learning curve, reduce the review time per paper by 5% to 10%. So, depending on the number of reviews one must do, and how important that savings is relative to the benefits of using Tier 2 software, the option of voice grading may or may not be worth the switch. Using the Tier 1 option moved us closer to the 5% side, at least for the actual recording of each review, but we believe that the setup and problems with large file size more than cancel the minor gain.

Using Tier 3 Camtasia dramatically increased the time because of the set-up time and the fact that each review needs to be rendered into a viewable format, or rather converted from a proprietary *.camrec file to an *.mp4, so that anyone planning to work with this should expect to spend 30% to 40% more time per completed paper review. This increase may also apply to approaches that combine both text, as converted from Dragon, for example, as well as the voice file, though we have not had enough experience providing both forms of commentary to make this more than an estimate.

Concluding Thoughts

When we began this article, we conceived of it primarily as an invitation to colleagues who might be interested in approaching one of their core charges, the assessment of student work, in a new and interesting way. We are certainly not the only ones who have worked with alternative methods of review, and we wanted to acknowledge those who have led the way, the brave early adopters, even though their contributions may appear dated now or amusing as analog attempts in what has become a thoroughly digital world. Nevertheless, they, and here we include Clark (1981) and his cassette tapes, were the pioneers, from whose work we have all learned.

In addition, many of us, including those who are getting on in years, know how interested today's students are in new media, and it is not always clear to us how we might connect with that interest and still provide academic benefit. Nevertheless, many of us see an obligation to connect in this way, as Moore and Filling suggest at the end of their 2012 study: "In a society that revolves around technology, it is imperative that college instructors seek ways to creatively capitalize on technology to enhance student learning" (p. 12). Voice grading both satisfies that obligation and provides a connection to student interest. It presents students with a medium that is already familiar by virtue of their status as digital natives.

As a consequence of our own positive and long-term experience, we have identified options available to those who might want to incorporate voice grading into their own review of student work. In our effort to recognize that instructors at different institutions and with different levels of expertise will have different needs, we have

identified the three tiers that we believe represent the range of technologies currently available, depending on instructors' particular situations. Having worked with all three tiers, we have found a particularly good fit with the Tier 2 option.

We have established that the Tier 2 form of review produces a strong and favorable *perception* among the students who have received their comments in this way—one of the major goals of this article. However, in doing so, we have found ourselves assuming that positive student perception of the review medium will result in improvement. Therein lies the problem, and we are not alone in noticing this. We noted a similar emphasis on perception in at least one of the most recent articles included in our literature review (Crews & Wilkinson, 2010). This suggests to us that a good next step in this area of scholarship would be to connect new-media grading with a demonstrable improvement of student work. Also a candidate for further study is the awareness instructors acquire when working with voice grading. As described in our findings, we emerged from our instructional efforts with a better understanding of the character and limits of written and oral comments. That is an area we hope attracts further investigation and one on which we plan to focus more fully in our future research.

Authors' Note

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References

Anson, C. (1999). Talking about text: the use of recorded commentary in response to student writing. In R. Straub (Ed.), *A sourcebook for responding to student writing* (pp. 165-174). Cresskill, NJ: Hampton Press.

Beach, R., & Friedrich, T. (2006). Response to writing. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 222-234). New York, NY: Guilford Press.

Clark, T. D. (1981). Cassette tapes: An answer to the grading dilemma. *The ABCA Bulletin*, *44*(2), 40-41.

Crews, T., & Wilkinson, K. (2010) Students' perceived preference for visual and auditory assessment with e-handwritten feedback. *Business Communication Quarterly*, *73*, 399-412.

Crisp, J. (2011). Evaluating student writing with Adobe Acrobat Pro. *EDUCAUS*E. Retrieved from http://www.educause.edu/ero/article/evaluating-student-writing-adobe-acrobat-pro

Gates, S. M., Augustine, K. H., Benjamin, R., Bikson, T. K., Kaganoff, T., Levy, D. G., . . . Zimmer, R. W. (2002). Ensuring quality and productivity in higher education: An analysis of assessment practices (ED 468727). Washington, DC: Office of Educational Research and Improvement. Retrieved from http://www.eric.ed.gov/PDFS/ED468727.pdf

Gottschalk, K., & Hjortshoj, K. (2004). *The elements of teaching writing: A resource for instructors in all disciplines*. Boston, MA: Bedford/St. Martin's.

Johnson, L., Adams, S., & Cummins, M. (2012). *NMC Horizon report: 2012 Higher education edition.* Austin, TX: The New Media Consortium.

Jordan, J. (2004). The use of orally recorded exam feedback as a supplement to written comments. *Journal of Statistics Education, 12*. Retrieved from http://www.amstat.org/publications/jse/v12n1/jordan.html

Lang, J. M. (2009, October 13). Speaking truth to papers. *Chronicle of Higher Education*. Retrieved from http://chronicle.com/article/Speaking-Truth-to-Papers/48788

Means, B., Toyama, Y., Murphy, R., Bakia, J., & Jones, K. (2009). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. Washington, DC: Center for Technology in Learning.Retrieved from http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). Technology and education change: Focus on student learning. *Journal of Research on Technology Education*, *42*, 285-307.

Moore, N. S., & Filling, M. L. (2012). iFeedback: using video technology for improving student writing. *Journal of College Literacy & Learning*, *38*, 3-14.

NowSmart. (2012). Audio Record Wizard (Version 6.0) [Computer software]. Retrieved from http://www.nowsmart.com

Pearce, C. G., & Ackley, R. J. (1995). Audiotaped feedback in business writing: An exploratory study. *Business Communication Quarterly*, *58*, 31-34.

Sinn, J. W. (2004). Electronic course delivery in higher education: Promise and challenge. *Journal of Technology Studies*, *15*, 39-45.

Still, B. (2006). Talking to students: Embedded voice commenting as a tool for critiquing student writing. *Journal of Business and Technical Communication*, *20*, 460-475.

Straub, R., & Lunsford, R. (2006). *Key works on teacher response: An anthology*. Portsmouth, NH: Boynton/Cook.

Tech-Smith. (2012). Camtasia Studio for Windows (Version 8.*0) [Computer software]*. Retrieved from http://www.techsmith.com

Van Horn-Christopher, D. A. (1995). Voice-graded business communication documents. *Business Communication Quarterly*, *58*(3), 35-37.

Ward, D. (2012,June 19). Grading with voice on an iPad [Weblog post]. *Chronicle of Higher Education*.Retrieved from http://chronicle.com/blogs/profhacker/grading-with-voice-on-an-ipad/40907

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