TECHNOLOGY ENHANCED FEEDBACK ON ASSESSMENT

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Abstract

The two most common forms of providing assessment feedback to students have been written comments on the assignment or face to face discussions. However research reveals that written comments are often limited in depth and marred by ambiguity while face to face discussions are often impractical and dependent on student memory. In contrast over recent years we have witnessed an increase in technology enhanced modes of feedback delivery. At its simplest this involves annotating documents with written comments. However, there are a variety of other options. This paper will outline the limited but growing empirical research on the design and impact of video, audio, screencast and other annotation feedback mechanisms. Drawing on this literature and the presenters’ own research we propose a series of design principles for the creation of effective technology enhanced feedback.

Introduction

Research has illustrated that feedback is both a broad term that incorporates a range of contexts (for example, see: Hattie & Timperley, 2007; McConnell, 2006) as well as being a valuable component of the learning process (Orsmond & Merry, 2011), with some authors indicating that feedback could be the most influential single factor affecting student achievement (Brown & Knight, 1994; Hattie & Timperley, 2007). Despite a number of papers reporting on feedback, it is somewhat surprising to find that there is no clear agreement of how feedback, including summative assessment feedback, should be designed or delivered.

Although video and other media being available for more than two decades in schools and universities, there has been very little research investigating the design and delivery of technology enhanced assessment feedback. Within this context, we provide a synthesis of effective principles when creating assessment feedback artefacts (e.g., text, video), offer a comprehensive review of research on technology enhanced individualised feedback and then report on how we have been designing such artefacts in our own research.

Assessment feedback

Feedback provided to students about their performance on assessment tasks is different from other forms of feedback provided during the learning process (for example, see: Biggs, 2003; Boud, 2000; Costello & Crane, 2010; Crook et al., 2012; McConnell, 2006) as effective assessment feedback provides more than a number or letter grade to students (Joint Information Systems Committee [JISC], 2010). Despite the literature confirming the importance of assessment feedback as part of the learning process, the same body of literature also points out that many students do not value the feedback comments but simply skip to the grade (for example, see: Bailey & Garner, 2010; Crisp, 2007; Higgins, Hartley, & Skelton, 2001; Orsmond & Merry, 2011).
With such student dissatisfaction, many researchers have turned their attention to feedback design characteristics in an attempt to improve the quality of feedback being provided by teachers. Notable examples are Evan (2013) and Nicol and Macfarlane-Dick (2006) who separately outline general principles of effective feedback. However, the recommendations of these and other researchers do not always fit easily with each other, nor are they all relevant to the concern of this paper: educators creating feedback artefacts for summative assessment. Consequently, a guiding set of principles relating to the design of teacher created feedback artefacts on summative assessment has been synthesised from key texts in the literature (see Table 1).

Table 1
Principles for the Design of Teacher Created Assessment Feedback Artefacts

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<thead>
<tr>
<th>Principle</th>
<th>Description</th>
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<tr>
<td>be timely</td>
<td>Give feedback while details are still fresh, and in time to assist the student in future task performance.</td>
<td>Bailey and Garner (2010); Costello and Crane (2010); Evans (2013); Glover and Brown (2006); Rodway-Dyer, Knight, and Dunne (2010)</td>
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<td>be clear (unambiguous)</td>
<td>It is important to be unambiguous in communication. For example, do not assume students have the same understanding of academic language or discourse. Similarly phrases such as “good work” are unclear due to lack of specificity.</td>
<td>Brockbank and McGill (1998); Chanock (2000); Duncan (2007); Evans (2013); Glover and Brown (2006); Higgins et al. (2001); Lillis and Turner (2001); Weaver (2006)</td>
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<td>be educative (and not just evaluative)</td>
<td>Indicating something as incorrect is not as helpful as suggesting how it could be corrected or improved. It is also valuable to focus on strengthening, developing and extending what has been done well.</td>
<td>Costello and Crane (2010); Evans (2013); Lizzio and Wilson (2008)</td>
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<td>be proportionate to criteria/goals</td>
<td>More emphasis should be placed on feed forward.</td>
<td>Bailey and Garner (2010); Boud (2000); Davies (2003); Hattie and Timperley (2007); Nicol and Macfarlane-Dick (2006); Stefani (1994)</td>
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<td>locate student performance in relation to:</td>
<td>the goals of the task (feed-up)</td>
<td>Bailey and Garner (2010); Boud (2000); Crook et al. (2012); Duncan (2007); Evans (2013); Hattie (2009); Hattie and Timperley (2007)</td>
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<td>clarifying what they did well and not so well (feedback)</td>
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<td>and as a result what they can most productively work on in the future (feed forward)</td>
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<td></td>
<td>More emphasis should be placed on feed forward.</td>
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<td>emphasise task performance</td>
<td>Feedback to students should be focused on the task rather than self or attributes of the learner. In particular the feedback should provide guidance on the process and metacognition (self-regulation) level.</td>
<td>Boud and Molloy (2013); Evans (2013); Hattie and Timperley (2007); Higgins et al. (2001); Nicol and Macfarlane-Dick (2006)</td>
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<td>be phrased as an ongoing dialogue rather than an endpoint</td>
<td>Instead of an end-point in the teaching and learning processes, feedback should be seen as an invitation and a starting point for reciprocal communication that allows students to continue developing skills and ideas through conversations with their teachers.</td>
<td>Bailey and Garner (2010); Blair and McGinty (2013); Crisp (2007); Evans (2013); Higgins et al. (2001); Nicol (2010); Nicol and Macfarlane-Dick (2006); Orsmond and Merry (2011)</td>
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<td>be sensitive to the individual</td>
<td>Feedback should reflect the individual student’s:</td>
<td>Bailey and Garner (2010); Costello and Crane (2010); Crisp (2007); Higgins et al. (2001); Jonsson (2013); Lea and Stierer (2000); Lizzio and Wilson (2008); Orsmond and Merry (2011); Reid, Francis, and Robson (2005); Whittington, Glover, and Harley (2004)</td>
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<td></td>
<td>context and history</td>
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<td>emotional investment and needs</td>
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<td>identity</td>
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<td></td>
<td>access to discourse</td>
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<td>It should encourage positive self-esteem and motivation.</td>
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While these principles provide helpful guidance, trying to apply them all at the same time through text based feedback, while not impossible, would be complicated and time consuming, particularly in large classes. As a result of the tension between the desire to provide effective feedback and our own limitations in time, the authors intuited the potential of digital based multimedia (e.g., video) as an alternative to text based feedback.

**Video-based assessment feedback**

In contrast with the considerable body of literature dealing with feedback, little attention has been paid to the ways or medium in which assessment feedback is delivered to students. Very little literature is available that deals with the use of video-based feedback in relation to assessment tasks. Hattie and Timperley’s (2007) meta-analysis noted that “video or audio” feedback had an average positive effect size of 0.64 yet they failed to explain what they mean by video feedback or identify the source of the meta analysis. Personal correspondence with Hattie (16th Nov 2012) clarified that the results in their meta-analysis were drawn from studies of Computer Assisted Learning. As such, the results are not directly relevant to this investigation since we are dealing with videos recorded by educators in response to student assessment, as opposed to typical CAL applications of video cues in response to student actions.

A literature review on the use of technology in feedback by Hepplestone, Holden, Irwin, Parkin, and Thorpe (2011) made no reference to video-based feedback. However, in a similar review of technologies for learner-centred feedback, Costello and Crane (2010) identified video having some benefits, but their conclusion is based on two sources, only one of which was based on empirical evidence (Parton, Crain-Dorough, & Hancock, 2010), while the other (Denton, Madden, Roberts, & Rowe, 2008) is itself making a passing reference to a much older article from 1997 (Hase & Saenger, 1997).

After a significant search of the literature only a small number of journal articles were found that reported empirical research about video-based assessment feedback. Over a decade ago, Hase and Saenger’s (1997) study of recording assessment feedback on analogue videotape and posting the video to students found that the “videomail” was “an extremely valuable and personalised method of obtaining feedback by learners” as the lecturers were able to use “a wide variety of communication techniques such as self-disclosure and reflection, for example, not available to them using written feedback only” (p.362). However, they concluded that video feedback is a means of enhancing, not replacing, written feedback. Inglis (1998) discussed the technical feasibility of providing digital video via email for assessment feedback, concluding that while it was possible at that time, it would be more feasible as bandwidth and computer processing increased. Despite Inglis’ prediction being correct, there is a gap of almost 10 years before researchers looked again at digital video as a means of assessment feedback.

When comparing podcasting (audio) and video used for weekly generic (i.e., whole class) feedback on students’ performance in the previous week’s assessment, Cann (2007) notes that the video files were downloaded over five times more than the podcasts, indicating the students’ strong preference for the medium. However, no explanation for this preference was offered other than the suggestion that while video is widely accepted by younger learners, podcasting is considered to be too restrictive. A slightly more detailed case study is offered by Abrahamson (2010) in which 10 generic short videos were created to supplement written feedback on assignment drafts. The videos were numbered and referred to as and when appropriate in the written feedback, thus offering a degree of personalisation that was particularly valued by the students. Abrahamson (2010) also noted that the video-based feedback provided staff with “greater freedom in expressing feedback as a learning process and not simply as a product of learning” (p.4). Cann’s and Abrahamson’s conclusions reflect those of studies conducted a decade earlier: students valued the video; the video was useful as a supplementary aid to text based feedback; and video offered educators new opportunity for richer communication.

Crook et al. (2012; 2010) report on a much larger project spanning several universities (8 staff and 105 students completing the post-video questionnaire) in which an online platform was created to host
generic videos in response to student formative assessment. As with the previous studies, all of the
teachers and a majority of students responded positively to the use of video-based feedback with 80%
in favour of it being used the following year. The students reportedly took more notice of the videos,
with the main advantage being that the content was easier and clearer to understand, and that it was
“more extensive, informative, the key points were better emphasised and that it aided their
visualisation of the task through demonstrations and/or diagrams” (Crook et al., 2012, p. 391).
However, a minority of students noted the disadvantage of technical difficulties (12%) and particularly
that the feedback was too generic (17%), and de-personalises the feedback experience (12%). From
the staff perspective, the majority felt that using video positively changed their approach to feedback.
However Crook et al. (2012; 2010) do not provide detail as to how the content of the videos were
designed other than the staff were encouraged to adopt a feed forward perspective. They conclude that
the approach can enhance staff and student feedback experiences and that, while video was used as a
generic response in their project, it could be used for individual feedback dependent on small class
size.

Research from the last decade has only produced one paper related to individualised video-based
assessment feedback. Parton et al. (2010) conducted a study in which an instructor provided 12
graduate level students with written feedback on their first assignment, a combination of written
feedback and a video explaining the remarks made on the hardcopy of the second assignment, and
only video-based feedback on the third. The videos were approximately five minutes in length, and
created through the use of a Flipcamera (video camera with USB connection). However no further
detail was provided about the design of the video-based feedback. The instructor reported the students
found the video feedback easier to understand. The most striking outcome of the project was the clear
indication that the video-based feedback resulted in the students feeling they had a closer connection
with their instructor. As a consequence Parton et al. (2010) conclude that the “primary benefit of the
videos appears to be in developing the bond between instructors and students” (p.5). However they
note that the small number of participants is a major limitation to the study.

Audio recording and screencasting assessment feedback

Since there has been little research in video-based assessment feedback, the authors extended their
literature review to other digital modes of feedback delivery, namely audio recordings and
screencasting.

Hepplestone et al. (2011) noted that audio based feedback is a “recent innovation” (p.121), with
Jonsson (2013) reporting on a small but “growing number of studies investigating digital audio
feedback” (p.65). The research is characterised as small case study or quasi-experimental designs with
unique contexts and small numbers of participants. However, there is enough evidence of benefits to
learners to recommend further research and suggest that video-based feedback may not only share in
these benefits but also be able to strengthen them. The reported benefits of audio based are listed as
part of Table 2.
Table 2

<table>
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<tr>
<th>Benefits</th>
<th>Audio feedback</th>
<th>Screencasting feedback</th>
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<tr>
<td>Greater detail in feedback</td>
<td>Hepplestone et al. (2011); Jonsson (2013); Lunt and Curran (2009);</td>
<td>Hyde (2013); Marriott and Teoh (2012); Mathieson (2012);</td>
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<td>Merry and Orsmond (2008); Rodway-Dyer et al. (2010); Rotheram (2009)</td>
<td>Thompson and Lee (2012)</td>
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<td>Faster or just as efficient to create feedback (in comparison with text feedback)</td>
<td>Jonsson (2013); Lunt and Curran (2009); Rotheram (2009)</td>
<td>Edwards, Dujardin, and Williams (2012)</td>
</tr>
<tr>
<td>Clearer meaning (audio visual cues such as tone perceived as conveying meaning easier)</td>
<td>Bourgault, Mundy, and Joshua (2013); Ice, Curtis, Phillips, and Wells (2007); Merry and Orsmond (2008); Rodway-Dyer et al. (2010)</td>
<td>Edwards et al. (2012); Marriott and Teoh (2012); Thompson and Lee (2012)</td>
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<td>Feedback is perceived as more individualised</td>
<td>Bourgault et al. (2013); Rotheram (2009)</td>
<td>Edwards et al. (2012); Hyde (2013); Marriott and Teoh (2012); Mathieson (2012)</td>
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<tr>
<td>Students feel a stronger connection with their teachers, or stronger social presence of teachers</td>
<td>Ice et al. (2007); Johnson and Keil (2002)</td>
<td>Thompson and Lee (2012)</td>
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</table>

Screencasting is also increasingly appearing in the literature as a mode of feedback delivery. Screencasts typically include a video recording of the computer screen while the marker uses the cursor to point to examples, makes edits, highlights or annotates sections of the individual student’s work while simultaneously audio recording the marker’s voice as they talked about the student’s work. In the literature search, there were only a relatively small number of publications based on empirical research. In these examples, there were no video recordings of the marker’s face although that is an option in some screencasting software.

As in the case of audio recordings, the literature on screencasting is dominated by small case study and quasi-experimental designs. While keeping these limitations in mind, it is interesting to note that the findings are not only similarly positive but repeat the same themes as shown in Table 2.

The benefits of audio visual feedback could be explained, at least in part, by the affordances of the media: namely, the speed of talking in comparison with writing and the richer communication cues, such as tone. In turn, it is plausible that such a detailed and richly communicative response would increase clarity of message, as well as a sense of individualisation and social presence leading to stronger connections or rapport. However, while the literature reviewed to date agrees that students are largely in favour of audio visual feedback, the same literature also calls for further research. The following section explains the method by which we have successfully implemented video based feedback and how the same principles can be generally applied to all multimedia feedback artefacts.

**Implementation of technology enhanced feedback**

This research has evolved out of a scholarship of teaching practice. In contrast to a planned research project, our use of video-based feedback resulted from a feeling that this approach had the potential to increase student understanding and satisfaction in graduate and postgraduate classes in an Education faculty. This approach has now also been used in secondary schools with equally positive results. Research findings are briefly mentioned in the conclusion of this paper and will be presented in detail in future publications. The goal of this paper is to describe how video-based assessment feedback (and by extension other digital modalities such as audio, screencasting, and portfolio) have been effectively constructed in our own teaching and research.
The design of video-based feedback

In producing the videos we have used different hardware and software including a webcam coupled with video recording software, and even an iPhone (propped up to reduce camera movement). These methods mean that the videos are immediately available and in a format ready for uploading without any editing or post-production work. The simplicity of the process meant that we could easily record the videos wherever we marked the assignment, at work or home.

As shown in Figure 1, the camera was focussed on the heads and shoulders of the teachers with enough space in the frame to allow some movement and capturing of hand gestures. Consequently, there is no need for high quality video resolution so long as the student can see the facial expressions and clearly hear the teacher. Keeping video files sizes small enough to upload quickly and even email is an important consideration. We have found that five minutes is sufficient to provide detailed feedback while also maintaining manageable file sizes for uploading and downloading.

![Frames from a feedback video](image)

**Figure 1.** Frames from a feedback video

The videos were generally recorded immediately after the assignment was read which allowed teachers to provide specific comments with a sense of immediacy as no ‘scripts’ were written with comments based on notes made while reading the assignments. We rarely re-recorded and never edited videos as this would make the process too time consuming; however, this meant that the videos often contained pauses, ums, and even moments where we had to rephrase our comments because we realised we had not been clear enough or were momentarily distracted. The recorded videos along with the grades were then uploaded to an LMS (Moodle). We chose not to use public hosting services such as YouTube due to the (at the time) concerns over privacy.

In comparison to text-based feedback from the same teachers it was found that the video-based feedback gave more time to establishing and building on relationships with students and emphasised students future performance. The structure of the video-based feedback is elaborated in Table 3.
### Table 3

**Structure for technology enhanced feedback artefacts**

<table>
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<tr>
<th>Structural element</th>
<th>Description</th>
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<tr>
<td>Salutation</td>
<td>Conversational/ informal salutation: “Hi Lee.”</td>
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<tr>
<td>Relational work</td>
<td>Recognition and valuing of the student including personal circumstance and history. This both draws on and reinforces the pedagogical relationship between teacher and student. This might include a sympathetic comment (e.g., “I know you have been quite ill lately and I am truly impressed that...”), appreciation of effort of previous drafts (e.g., “I can see you have made a lot of changes to your introduction”), reaction to quality or other aspect of submission (e.g., “Thank you for submitting... I can see how much effort...”),</td>
</tr>
<tr>
<td>Evaluative summary</td>
<td>General statement of evaluation not necessarily the grade or mark. Very few of the videos specifically stated the grade which was indicated to the student before they opened the video. A general evaluative statement here provided a chance to highlight the overall strength and weakness of the assignment before dealing with the more specific issues. For instance, “The essay is very strong in its theoretical approach... need work in...” and “I thoroughly enjoyed... but there are some issues we need to talk about, namely...”</td>
</tr>
<tr>
<td>Textual issues</td>
<td>Briefly describing the nature, patterns and extent of textual issues in this assignment, occasionally with one or two specific examples. This segment of the feedback is short but generally included the same volume of comments about textual issues as the final evaluative notes in the text-based feedback (but not the specificity of the in-text edits).</td>
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<tr>
<td>Commenting on the substance of the assignment with an emphasis on feed forward.</td>
<td>Engaging with the conclusions, arguments, logic, justification, and literature included in the assignment. Commenting on strengths, weaknesses, flaws, gaps, creativity and insights. <strong>Importantly, comments were phrased to emphasise how students can improve their grades in future work and how they can extend their thinking about the substance of the assignment.</strong> This might include examples of alternative arguments, additional literature and different ways to think or approach the topic. Usually 2 to 3 issues were discussed in detail, regardless of result.</td>
</tr>
<tr>
<td>Valediction and invitation</td>
<td>This is largely relational work. Usually involving use of student name, coupled with congratulations or commiseration over result or other interpersonal validation, such as, best wishes for future studies / holiday. Importantly, this structural component included an invitation to contact the lecturer to “continue the discussion” of this feedback and future work.</td>
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</table>

While these guidelines were originally developed and evaluated in relation to video-based feedback, the same guidelines have been applied to other technology enhanced feedback, primarily digital audio and screencasting. The media, combined with the structure of the feedback (Table 3) has resulted in positive responses from students and teachers in higher education and secondary contexts. In brief, students reported five main strengths (perceived as more personalised than text; increased clarity; more supportive and caring; prompting reflection; constructive and useful) and two potential weaknesses (initial anxiety about receiving feedback and a degree of difficulty in matching feedback to specific parts of the assignment). These findings relating to impact will be presented in future publications.

### Conclusion

There is a growing interest in technology enhanced feedback on assessment. However there is a need for guidance about how to design and implement such feedback. This paper has presented a synthesis of the literature relating to the design of teacher created feedback artefacts (e.g., text, video). The resulting principles are: be timely; be clear (unambiguous); be educative and not just evaluative; be proportionate to criteria/goals; locate student performance; emphasise task performance; be phrased as an ongoing dialogue rather than an endpoint; and be sensitive to the individual.

This article has also offered guidelines about the creation and structure of technology enhanced assessment feedback, including framing, length, and unscripted nature of the content. The structure is
much the same as what may be found in text based feedback but places a greater emphasis on relational work, invitational work, and feed forward (see Table 3), all of which are aided by the richness of the media.

References


Jonsson, A. (2013). Facilitating productive use of feedback in higher education. *Active Learning in
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