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Feedback modes matter: Comparing student perceptions of digital and non-digital feedback modes in higher education

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Abstract

Assessment feedback is increasingly being provided in digital modes, from electronic annotations to digital recordings. Digitally recorded feedback is generally considered to be more detailed than text-based feedback. However, few studies have compared digital recordings with other common feedback modes, including non-digital forms such as face-to-face conversations. It is also unclear whether providing multiple feedback modes is better than a single mode. To explore these possibilities, an online survey asked 4514 Australian university students to rate the level of detail, personalisation and usability of the feedback comments they had most recently received. Of the students who received a single feedback mode only, electronic annotations and digital recordings were rated most highly on the three quality indicators. Students who received multiple modes were more likely to agree with all three indicators than those who received a single mode. Finally, students who received multiple modes were more likely to agree that the comments were detailed and usable when one of those modes was a digital recording. These findings enhance our understanding of feedback design, indicating that it is important to consider the strengths and weaknesses of particular modes, and the value of offering multiple modes.

Introduction

The notion that feedback is not something that is "done to" students "by" teachers is becoming increasingly represented in the feedback literature. Indeed, leading scholars argue that effective feedback involves learners receiving and making sense of information about their performance, and using that information to enhance their future performance (Boud & Molloy, 2013; Carless, 2015). This reconceptualisation of feedback positions the learner at the centre of the process, and highlights two essential features of effective feedback. The first is that learners are able to comprehend and make sense of the information they receive, and the second is that they have the motivation and opportunity to subsequently act upon that information to progress their learning (Carless & Boud, 2018). These goals are difficult to achieve, and the content of the feedback

Practitioner Notes

What is already known about this topic?

- Different feedback modes, such as face-to-face conversations, electronic annotations, handwritten comments, rubrics and digital recordings offer various benefits and challenges for learners and educators.
- Face-to-face feedback conversations are personalised and detailed, but are laborious and ephemeral. Text-based comments are permanent but can lack detail and clarity. Digitally recorded feedback can be personalised and detailed, and can be played multiple times. Recordings are therefore seen as a promising alternative to both face-to-face dialogue and text-based comments.

What this paper adds

- Previous research focusing on digitally recorded feedback has primarily compared it with text-based comments. This paper extends such research by comparing learner perceptions of comments received via four other common modes of feedback: handwritten comments, electronic annotations, marking sheets/rubrics and face-to-face conversations.
- This study indicates that learner perceptions of feedback may be lower when comments are delivered via a single mode rather than multiple modes.

Implications for practice or policy

- The method used to deliver feedback comments can impact on the level of detail, personalisation and usability of the information.
- When delivering feedback comments via a single mode, electronic annotations and digital recordings may be the most detailed, personalised and usable for students.
- Rubrics are useful supplementary material for learners to situate their performance, but they are not as likely to be perceived as favourably by learners as other modes when they are the only source of feedback.
- Providing learners with multiple modes of comments has a complementary effect that may enhance the message by reducing the limitations of a single individual mode, particularly when one of those modes allows for verbal delivery of information (ie, digital recordings).

comments is just one variable. Nevertheless, there is mounting evidence that feedback is best supported when the comments are detailed, personalised and usable.

Feedback comments should be detailed. Costello and Crane (2010) argue that "detailed comments will let a learner know where they did great work, where they may have misconceptions, and how to improve" (p. 10). However, Court (2014) and Evans (2013) caution against providing significant amounts of corrective advice, as this may encourage learners to remain dependent upon their educators for explicit directions every time they take on a new task. Indeed, as Glover and Brown (2006) suggest, a balance needs to be struck with regard to the volume and focus of the detail. In general, feedback comments should be sufficiently detailed so that the learner knows why and how to improve their future work.

Feedback comments should be personalised. This does not mean that the comments focus on the learners' personal qualities, as critical comments about an individual can be emotionally damaging (Gibbs & Simpson, 2004; Ryan & Henderson, 2018) while positive comments, such as

praise, do not help learners in their abilities to improve (Hattie & Timperley, 2007). Rather, personalised feedback comments are designed to address performance on the assessed task (Dawson *et al.*, 2018; Henderson & Phillips, 2015). In other words, personalised feedback comments are unique to the individual, and they respond directly to the learner's piece of work rather than generalising about the entire cohorts' performance (as may be the case with statement banks, rubrics, etc.). Several studies have found that personalised feedback comments aid comprehension and, because of their relevance to the leaner, are more readily actionable (Beaumont, O'Doherty, & Shannon, 2011; Dawson *et al.*, 2018).

Feedback comments should be usable. This means that the comments are crafted to focus specifically on what the learner can do to in the future to improve (Hattie & Timperley, 2007; Henderson & Phillips, 2014). As argued by Carless and Boud (2018), "this imperative for students to take action is a critical aspect of feedback processes, which is sometimes underplayed" (p. 1318). To facilitate action taking, feedback comments provided by educators should be relevant to a future task or learning outcome (Boud, 2015). Critically, the learner also needs to be able to recognise how to implement the feedback information they received in order to improve their future performance (Carless & Boud, 2018; Winstone, Nash, Rowntree, & Parker, 2017).

Logically, the combination of detail, personalisation and usability are synergistic. For instance, it may be that while some comments are usable, they may not be sufficiently detailed or personalised to be of any consequence in improving their future work. Similarly, learners are unlikely to benefit from feedback comments that are detailed and personalised, but are not usable. Therefore, we argue that the combination of these three elements together provides a useful diagnostic tool for effective feedback design.

Another key consideration for creating feedback comments that learners can use and make sense of is the method used to convey the information. The research literature has demonstrated that different feedback modes, such as face-to-face dialogue, handwritten notes, rubrics and digital recordings offer various affordances and challenges (Elola & Oskoz, 2016; Fiorella, Vogel-Walcutt, & Schatz, 2012). The selection of a specific mode in the delivery of feedback information may either support or constrain the level of detail, personalisation and usability of the information. The present paper explores this potentiality by comparing learners' perceptions of personalisation, detail, and usability of feedback comments across different modes, including handwritten comments, electronic annotations, digital recordings (ie, audio, video, screencasts), marking sheets/rubrics and face-to-face conversations. This study also explores whether perceptions of effectiveness differ when the comments are delivered via a single mode or multiple modes, or when learners receive multiple modes that include digitally recorded feedback.

Affordances and challenges of feedback modes

Face-to-face dialogue is typically thought to be the "gold standard" when it comes to modes of feedback comments. When learners engage in synchronous conversation with an educator, it is possible for the participants to co-create meaning (Nicol, 2010; Yang & Carless, 2013). This can enhance sense making by allowing learners to regulate their understandings and clarify misconceptions with a knowledgeable other (Boud, Lawson, & Thompson, 2013). Indeed, Pask (1976) and Laurillard (1999) argue that learning occurs when individuals externally represent and justify their knowledge about a topic by engaging in conversation with another participant. Therefore, feedback dialogues may involve rich two-way exchanges that are detailed, personalised and usable.

While synchronous feedback dialogues can be effective, they are also ephemeral. As such, learners may fail to remember all of the nuances of the conversation, particularly when it involved a

significant amount of detail. Another obvious drawback, for educators at least, is the extremely laborious, time-consuming and logistically difficult nature of offering feedback dialogues to numerous individual learners, such as through consultation hours. Such challenges are obviously intensified in the case of massified or online courses. Other, more impromptu feedback dialogues, such as when learners approach instructors following formal class situations (ie, lectures), can also be challenging. For example, depending on the amount of time the instructor has at that moment, and their depth of understanding regarding the individual learners who approach them, these interactions may lack both detail and personalisation. The information may not even be particularly usable if the learner is not able to point to a particular example in their work that they would like to strengthen.

The labour issues associated with face-to-face feedback dialogues demands that such interactions are infrequently offered by educators, at least in higher education contexts. Instead, the most common feedback mode provided by tertiary educators is text-based—typically represented as handwritten comments on hard copies of assessment tasks, or typed digital annotations on electronic copies (Chang *et al.*, 2012). Providing text-based comments to large cohorts is generally more sustainable than face-to-face conversations, and educators are able to facilitate sense making by linking to the relevant section of the learners' work (eg, by using a pen to underline or circle text, or using comment boxes, sticky notes or track changes on a word processing system) (Beach, 2012). However, it generally takes longer to type or write comments than it does to articulate information verbally (Denton, 2014); therefore, it can still be an arduous process to provide detailed comments to large cohorts using text-based modes. While rubrics, marking sheets and statement banks tend to permit more detailed information to be provided in a sustainable manner, a substantial trade-off is usually made with regard to personalisation of the information (Denton & Rowe, 2015).

Digitally recorded feedback comments, using audio, video or screencast recordings, offer a promising alternative to both face-to-face dialogue and text-based comments. Unlike face-to-face dialogues, recordings provide a permanent artefact that learners can revisit as many times as necessary. They are also considered by educators to be more efficient to produce than text-based comments (Borup, West, & Thomas, 2015; Knauf, 2016; Morris & Chikwa, 2016). When created according to best practice guidelines, digital recordings can be an expedient way to provide detailed comments in a concise format (Denton, 2014; Orlando, 2016), and they allow rich information to be conveyed in a clear and personalised manner. A growing body of research has shown that learners find digital recordings to be easier to understand (Bourgault, Mundy, & Joshua, 2013; Henderson & Phillips, 2015), more supportive (Borup *et al.*, 2015), and more personalised (Knauf, 2016; West & Turner, 2016) than text-based comments. This has been attributed to the fact that recordings allow educators to express cues, such as tone, pace, body language and expression (Cavanaugh & Song, 2014).

Each mode of digitally recorded feedback has particular benefits for students and educators. For example, audio recordings result in manageable file sizes and can be easily shared with students via email or by embedding in a written assessment task (Edouard, 2015; Orlando, 2016). However, audio recordings are restricted to a single channel of information (ie, the educator's voice), while video recordings provide dual channels of information (ie, the voice and face). The addition of visual cues in a video recording allows for the presentation of extra information that can be useful for student comprehension, such as body language, facial expressions and demonstrations (Crook *et al.*, 2012), thus leading to an enhanced feedback experience (Marriott & Teoh, 2012; McCarthy, 2015). Screencasts are similar to video recordings, but they offer the benefit of additional channels of information beyond the face and voice. For example, educators can use

screencasts to present a split screen approach where they visually present their face and voice in one area of the screen, and the student's work or a rubric in another area. Anson (2015) suggests that the use of screencast feedback is extremely suitable for disciplines which feature design elements, or when written work is being "simultaneously evaluated on theoretic, empirical, compositional, stylistic, and research design components" (p. 376).

Clearly, the choice of mode can impact on the effectiveness of feedback comments. Each mode offers benefits and challenges, and differentially affects the level of usability, personalisation and detail. A small number of recent studies, stemming from the second language acquisition literature, suggest that providing feedback comments using a combination of modes may help overcome the constraints of individual approaches. For example, Elola and Oskoz (2016) found that second language learners preferred receiving written comments for grammatical issues and verbal comments for content-related issues. In another study, Soden (2016) created screencast recordings that allowed learners to view text-based annotations placed in margins of their work, while simultaneously hearing the voice of the educator explaining the annotations and providing detailed examples of how to address issues. The verbal delivery of information allowed the educator to provide personalised and detailed comments in a way that would be unsustainable via text comments alone, and helped learners make sense of the written information in an engaging manner. On the other hand, the text annotations provided a useful and accessible artefact for learners to check back upon in the future, without having to play the screencast recording repeatedly.

Aims and hypotheses

This study aims to examine student perceptions of detail, personalisation and usability for specific modes of feedback comments, both when presented alone and in combination with another mode. Based on previous research, we hypothesised that:

> H1. Students who receive a single mode of feedback comments will provide more positive ratings for detail, personalisation, and usability when that mode is a digital recording.

> H2. Students who receive feedback comments via multiple modes will provide more positive ratings for detail, personalisation, and usability than learners who receive a single mode.

> H3. Students who receive multiple modes of feedback comments will provide more positive ratings for detail, personalisation, and usability when one of those modes is a digital recording.

Method

This paper reports on selected data from the first phase of a nationally funded research project relating to assessment feedback in higher education. This phase involved a large-scale cross-sectional survey study of staff and students at two Australian universities. The survey targeted the feedback beliefs and practices of university academic staff, as well as the feedback experiences and perceptions of undergraduate and graduate coursework students. The current paper focuses on student data taken from survey items relating to the detail, personalisation, and usability of various modes of feedback comments.

Participants

More than 67 000 coursework students from two universities were invited to participate in the online survey, and 10% (n = 6744) of students volunteered. Of those, 67% (n = 4514) completed

the survey, which comprises 0.3% of all Australian university students. While the sample used in this study is mostly representative of the entire population of Australian higher education students, it does include a slightly higher proportion of females, Health students, part time students, and online students. In addition, the proportion of students aged 17–19 and Art, Design, Architecture students is slightly lower than the Australian student population. A detailed demographic comparison of the total sample and all Australian higher education students in 2016 is published in Ryan and Henderson (2018). The majority of students in the total sample were domestically enrolled (70%), undergraduates (66%), attending university full time (82%) and studying on-campus (82%). Sixty-seven per cent were female, 32% were male and 1% were other/unspecified. Eighteen per cent were aged 17–19, 62% were 20–29, 11% were 30–39 and 9% were 40 or over.

Survey items selected

For the purposes of this paper, data are drawn from four key items relating to the most recent feedback comments that students had received from an assessor after submission of a task. The first was a multiple choice item asking students what mode(s) of feedback comments they had most recently received, with response options including "handwritten comments on a hard copy of an assessment," "handwritten comments on a scanned copy of an assessment," "electronic annotations (eg, comments in Word or pdf), face-to-face comments, audio recorded comments, video recorded comments, marking sheet/rubric, and "another form of comments." The other three items asked students to indicate their level of agreement with the following statements: "The comments I received from my assessor after submission were detailed," "I will use/have used the comments I received from my assessor after submission," "The comments I received from my assessor after submission were personalised to me." These items used a five-point rating scale, with anchor points ranging from 1 = "strongly disagree" to 5 = "strongly agree." A "not able to judge" option was also available. Reliability for the three items measuring the quality of the feedback comments was acceptable (α = .80).

Procedure

The online student survey was developed as part of the broader study, and involved an iterative process in which the literature, external feedback research experts, teaching staff, students and the research team were consulted over several rounds to identify/develop and select items to meet the research goals. This included the review and, when appropriate, adaptation of items from seven other surveys (Adcroft, 2011; Harris & Brown, 2008; Irving & Peterson, 2007; Lizzio & Wilson, 2008; Pereira *et al.*, 2016; Y1Feedback, 2016). After this process, an online version of the questionnaire was tested for content validity using a pilot group of six academic staff and five students (for more details regarding the survey construction see Ryan & Henderson, 2018). The survey comprises 47 items relating to students' feedback beliefs, perceptions, and experiences at university (see www.feedbackforlearning.org/publicationsresources to obtain a copy of the survey). The survey was hosted online using Qualtrics (www.qualtrics.com).

Recruitment occurred over a period of four weeks at one university and two weeks at the other, at a time when most students would have received at least one set of feedback comments from an academic staff member on a piece of assessed work. The survey was voluntary, and the link was advertised through bulk emails, notifications posted on online learning management systems, and on-campus advertising (eg, flyers, posters, and electronic notices). Students from each university were incentivised to complete the survey through the offer of a chance to win one of two AU$400 gift cards from a selection of popular Australian supermarkets and department stores.

Data analysis

Several steps were taken to simplify data for analysis and reporting: the two handwritten comment modes ("hard copy" and "scanned copy") were collapsed into a single variable called "handwritten comments," as were the two "digital recording" options ("audio" and "video"). Respondents who selected "another form of comment" as their only mode of feedback comments ($n = 246$) were excluded from analysis. Mann Whitney U and Kruskal–Wallis tests are used for comparisons between groups instead of their parametric alternatives (ie, t-test, ANOVA) as the three survey items (detail, personalisation, usability) were measured using ordinal response scales. The use of these non-parametric statistical procedures are an appropriate choice when data are ordinal and the samples being compared are unequal (Field, 2009). As these procedures are based on the calculation of mean ranks, these measures of central tendency are reported rather than medians. The interpretation of all effect sizes were guided by Cohen's (1988) criteria for r: a small effect = .10, a medium effect = .30, a large effect = .50 and a very large effect = .70.

Results and discussion

Table 1 presents frequencies for the different modes of feedback comments received by the total sample, along with the 62% of students who received a single mode of comments and the 32% who received multiple modes (as previously noted, the remaining 6% were removed because they received "another form of comment"). Overall, the majority of students received text-based comments, with electronic annotations and marking sheets/rubrics being most common. This result is as expected; text-based comment modes are generally quite prevalent in higher education contexts (Chang *et al.*, 2012), and the two universities involved in this study had assessment policies which stated that rubrics must be provided to students.

A minority of students received verbal comment modes (ie, face-to-face and digital recordings), particularly when looking at the sample of students who received a single mode of comments only. It appears that verbal modes of feedback comments were more frequently received in conjunction with at least one other mode of comments. This possibly highlights the widespread belief among educators that verbal feedback interactions are more laborious and less sustainable than text comments. It may also point to a tendency for verbal comments to be provided in a supplemental capacity to text-based comments (Abrahamson, 2010), perhaps delivered to the whole

Table 1: Percentage breakdown of feedback comment modes received by students

	Total sample (N = 4268)		*Received single mode (N = 2814)*		*Received multiple modes (N = 1454)*	
Mode of comments	*%*	*n*	*%*	*n*	*%*	*n*
Text-based						
Electronic annotations	58.0	2475	51.8	1458	69.9	1017
Marking sheet or rubric	41.5	1773	23.1	649	77.3	1124
Handwritten	21.7	928	17.7	497	29.6	431
Verbal						
Face-to-face	11.6	495	5.1	144	24.1	351
Digitally recorded	4.5	190	2.3	66	8.5	124

Note. Percentages for the total and multiple modes samples sum to >100% as respondents could select multiple options.

class rather than to individuals, or via quick impromptu face-to-face discussions during consultation hours or after lectures/tutorials.

Comparing individual modes

This section examines ratings of detail, personalisation and usability for each of the five comment modes. To compare each mode against the other, it was necessary to include ratings from students who reported receiving a single mode of comments only (see Table 2). When agree/strongly agree responses are collapsed, it is evident that the majority of students felt that the feedback comments from all modes were detailed (50.5–74.2%), personalised (61.1–74.2%) and usable (64.7–75.8%). Thus, most students were generally satisfied with the level of detail, personalisation and usability of the feedback comments they received, regardless of mode.

Table 2: Percentage breakdown of responses from students who received a single mode of feedback comments

	Text-based feedback comments						*Verbal feedback comments*			
Item and response categories	*Electronic annotations (n = 1458)*		*Marking sheet or rubric (n = 649)*		*Handwritten (n = 497)*		*Face-to-face (n = 144)*		*Digitally recorded (n = 66)*	
	%	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*
The comments were detailed										
Not able to judge	1.0	15	1.1	7	1.4	7	1.4	2	3.0	2
Strongly Disagree	6.3	92	9.6	62	6.2	31	4.2	6	10.6	7
Disagree	15.8	230	20.3	132	20.7	103	16.0	23	4.5	3
Neutral	18.0	262	18.5	120	20.5	102	18.8	27	7.6	5
Agree	38.8	565	34.5	224	36.0	179	43.1	62	39.4	26
Strongly Agree	20.2	294	16.0	104	15.1	75	16.7	24	34.8	23
The comments were personalised to me										
Not able to judge	1.8	26	2.5	16	3.2	16	3.5	5	1.5	1
Strongly Disagree	3.7	54	8.0	52	4.8	24	4.9	7	7.6	5
Disagree	7.5	109	10.9	71	8.9	44	13.9	20	4.5	3
Neutral	14.1	206	17.3	112	17.9	89	16.7	24	12.1	8
Agree	42.0	613	41.9	272	40.6	202	38.2	55	24.2	16
Strongly Agree	30.9	450	19.4	126	24.5	122	22.9	33	50.0	33
I have used/will use the comments to improve my subsequent work										
Not able to judge	1.6	24	2.0	13	3.6	18	2.8	4	1.5	1
Strongly Disagree	4.6	67	6.6	43	3.2	16	2.8	4	10.6	7
Disagree	6.8	99	12.0	78	9.5	47	9.7	14	4.5	3
Neutral	12.6	183	14.6	95	16.3	81	17.4	25	7.6	5
Agree	41.4	604	40.8	265	41.9	208	33.3	48	37.9	25
Strongly Agree	33.0	481	23.9	155	25.6	127	34.0	49	37.9	25

H1 proposes that students who receive only one mode of feedback comments will provide higher ratings when that mode was a digital recording. To test this hypothesis, the mean rank scores of the 2814 students who received a single mode of feedback comments were calculated and a series of independent samples Kruskal–Wallis tests were performed (see Table 3). As shown, students who received digital recordings had higher mean rank scores than students who received any other single mode of feedback comments, while students who received marking sheets or rubrics had the lowest. In addition, there were significant differences between groups for ratings of detail, personalisation and usability.

Dunn's post-hoc tests with Bonferroni corrections were calculated in order to examine pairwise comparisons between mean ranks scores for the different modes. Significant results from the Dunn's tests are presented in Table 4. As shown, students who received electronic annotations or digital recordings had significantly higher mean ranks for detail when compared to students who received a marking sheet or rubric, or handwritten comments. There were no significant differences between the mean rank scores for detail for electronic annotations, digital recordings or face-to-face comments. Students who received electronic annotations or digital recordings had higher mean rank scores for personalised than students who received comments via marking sheets/rubrics, handwritten comments or face-to-face conversations. The latter result is surprising, given that face-to-face is often considered to be the gold standard mode of feedback, though many of these conversations may have been impromptu (eg, after a lecture) and thus not particularly personalised. With regard to usability, students who received electronic annotations had higher mean rank scores than students who received handwritten comments or a marking sheet/rubric. There were no significant differences between the mean rank scores for usefulness across students who received electronic annotations, digital recordings and face-to-face comments.

Table 3: Mean ranks and independent-samples Kruskal–Wallis test results for the detail, personalisation and usability of each comment mode

Item and comments modes	*Mean ranks*	*H*	*df*	*p*
The comments were detailed		30.77	4	<.001
Digitally recorded	1696.63			
Electronic annotations	1459.63			
Face-to-face	1452.11			
Handwritten	1330.30			
Marking sheet or rubric	1310.20			
The comments were personalised to me		58.88	4	<.001
Digitally recorded	1680.31			
Electronic annotations	1494.80			
Handwritten	1352.51			
Face-to-face	1282.19			
Marking sheet or rubric	1252.87			
I have used/will use the comments to improve subsequent work		34.32	4	<.001
Digitally recorded	1515.38			
Electronic annotations	1478.93			
Face-to-face	1428.05			
Handwritten	1337.71			
Marking sheet or rubric	1284.94			

Note. Comment modes are ordered according to their mean ranks, from highest to lowest.

Table 4: Results of significant post-hoc pairwise comparisons between modes of feedback comments

Survey item	*Pairwise comparison*	*Adjusted significance*	*r*
The comments were detailed	Marking sheet or rubric—Electronic	.001	.09
	Marking sheet or rubric—Digital recordings	.001	.13
	Handwritten—Electronic	.015	.07
	Handwritten—Digital recordings	.004	.15
The comments were personalised to me	Marking sheet or rubric—Electronic	<.001	.15
	Marking sheet or rubric—Digital recordings	<.001	.15
	Handwritten—Electronic	.004	.08
	Handwritten—Digital recordings	.012	.13
	Face-to-face—Electronic	.019	.08
	Face-to-face—Digital recordings	.006	.22
I have use/will use the comments to improve subsequent work	Marking sheet or rubric—Electronic	<.001	.12
	Handwritten—Electronic	.004	.08

The results presented in this section partially support H1, and reaffirm previous findings that digital recordings are an effective mode for detailed and personalised feedback comments (Knauf, 2016; Orlando, 2016; West & Turner, 2016). However, the hypothesis that digitally recorded comments would be perceived as more usable than other modes was not supported. Although it is not possible to drill further into these data to investigate the actual reasons for this finding, it is possible to speculate that this may reflect a design issue. One well-known limitation of digitally recorded feedback is the need to explicitly indicate which section or aspect of the assessment task or performance that the comments are referring to at any given time (Mahoney, Macfarlane, & Ajjawi, 2018). Without this signposting, students' ability to make sense of, and subsequently action, verbal information may be restricted (Henderson & Phillips, 2015). Assessors can overcome this issue by verbally indicating which part of the assessment task is being referred to at any given time. Alternatively, if the assessment task is in a digital format, it is also possible to record multiple short audio files and embed them directly into the file (Orlando, 2016), or to record a screen capture of the assessment task and highlight each specific section of the task as it is being discussed. The latter can be achieved by pointing with the mouse cursor, using highlighting tools, making edits directly to the text, or using a digital pen (Henderson & Phillips, 2014).

More broadly, these results suggest that when a student receives a single mode of feedback comments, electronic annotations or digital recordings are likely to be the most suitable for offering detailed and personalised comments, while marking sheets and rubrics are least suitable. As marking sheets and rubrics originated as standardised scoring guides to facilitate educators in the process of marking (Lombard, 2011), their limitations as feedback artefacts are not surprising. While marking sheets and rubrics appear to be commonly provided to students following assessment (41.5% of students in this study reported receiving one on their most recent assessment task), they are not specifically designed to offer learners detailed or personalised formative comments, nor to provide information that feeds forward into future tasks. Rubrics are certainly useful for students, as they enable them to evaluate their own performance against a set of criteria and understand how their marks were assigned (Dawson, 2017), but they may be best provided in conjunction with another mode of comments that allows for greater detail, personalisation, and usability.

Comparing a single mode with multiple modes

This section presents analyses in which the ratings of students who received a single mode of feedback comments are compared with those who received multiple modes. Descriptive results

are presented in Table 5, and show that a higher proportion of students strongly agreed with all three items when they received multiple modes.

H2 proposes that the students who received multiple modes of feedback comments will perceive them to be more detailed, personalised, and usable than students who received only one mode. To test H2, a Mann Whitney *U* test was used to compare the mean ranks of 2814 students who received only one mode of feedback (eg, handwritten comments) with 1454 students who received more than one mode of feedback (eg, handwritten comments and a digital recording). The results are presented in Table 6. Students who received multiple forms of feedback had consistently higher mean ranks than students who did not, and these differences between the two groups were significant, with a small-to-medium effect.

The results in this section support H2, and confirm the value of providing multiple modes of comments to engender effective feedback processes. This adds weight to the argument that the combination of common modes has a complementary effect which may enhance the effectiveness of the message by reducing the limitations of a single individual mode (Elola & Oskoz, 2016). Providing multiple modes may also appeal to learners with a range of thinking and learning preferences (Johnson & Cooke, 2014), and reduce disengagement by offering feedback comments in a novel way (McCarthy, 2015). Moreover, the feedback literature often calls for diverse feedback

Table 5: Percentage breakdown of responses from students who received single or multiple modes

Survey item	*Not able to judge*	*Strongly disagree*	*Disagree*	*Neither disagree nor agree*	*Agree*	*Strongly agree*
The comments were detailed						
Single mode	1.2%	7.0%	17.4%	18.3%	37.5%	18.5%
Multiple modes	0.8%	4.6%	10.2%	16.6%	41.5%	26.2%
The comments were personalised to me						
Single mode	2.3%	5.0%	8.8%	15.6%	41.2%	27.1%
Multiple modes	1.7%	3.2%	5.2%	12.4%	37.6%	39.9%
I have use/will use the comments to improve subsequent work						
Single mode	2.1%	4.9%	8.6%	13.8%	40.9%	29.7%
Multiple modes	1.9%	3.4%	5.2%	9.8%	38.0%	41.7%

Table 6: Mann Whitney U test results comparing mean ranks for students who received a single mode of comments or multiple modes

Survey item	Mean rank for a single mode $n = 2814$	Mean rank for multiple modes $n = 1454$	z	p	r
The comments were detailed	2023.93	2348.49	−8.491	<.001	.13
The comments were personalised to me	2020.13	2355.84	−8.884	<.001	.14
I have use/will use the comments to improve subsequent work	2026.97	2342.61	−8.382	<.001	.13

opportunities and sources of feedback across assessment tasks to enable student self-regulation (for discussion see Evans, 2013).

Comparing multiple modes with and without a digital recording

The last set of analyses focuses solely on the 1454 students who received multiple modes of feedback comments. Specifically, the comparison is between those who received a digital recording as one of the modes with those who did not receive a digital recording. Descriptive results (see Table 7) reveal that high proportions of students who received digital recordings strongly agreed with all three items. This trend was less evident among students who did not receive a digital recording.

H3 proposed that students' level of agreement would be higher for all three quality indicators in the group who received a digital recording. A Mann Whitney *U* test was used to test this hypothesis by comparing the mean rank scores of 124 students who received multiple modes of feedback, including at least one digital recording, with those of 1330 students who received multiple modes of feedback but no digital recording (see Table 8). The results demonstrate that students who received multiple forms of feedback, including at least one digital recording, had consistently higher mean rank scores that those who did not receive a digital recording. The differences in mean rank scores between the two groups were also significant for the two items relating to detail and intention to use to improve subsequent work. There was no significant difference between the two groups when it came to personalisation.

These results provide partial support for H3, as the combination of digital recordings plus at least one other mode of comments were rated more highly than multiple modes without a digital recording for detail and usability, but not for personalisation. The latter result was somewhat unexpected, as greater personalisation is one of the key benefits of digital recordings (Knauf, 2016; West & Turner, 2016). The data collected for this study do not allow us to elucidate exactly why this result occurred; however, these digital recordings were all provided to students in

Table 7: Percentage breakdown of responses from students who received multiple modes with and without a digital recording

Survey item	*Not able to judge*	*Strongly disagree*	*Disagree*	*Neither disagree nor agree*	*Agree*	*Strongly agree*
The comments were detailed						
Received digital recording	0.8%	4.8%	3.2%	16.1%	31.5%	43.5%
Did not receive digital recording	0.8%	4.6%	10.9%	16.7%	42.5%	24.6%
The comments were personalised to me						
Received digital recording	2.4%	5.6%	4.0%	11.3%	26.6%	50.0%
Did not receive digital recording	1.6%	3.0%	5.3%	12.6%	38.6%	38.9%
I have use/will use the comments to improve subsequent work						
Received digital recording	0.8%	3.2%	3.2%	10.0%	25.8%	58.9%
Did not receive digital recording	2.0%	3.4%	5.3%	8.1%	39.2%	40.1%

Table 8: Mann Whitney U test results comparing mean ranks for students who received a single mode of comments or multiple modes

Survey item	*Mean rank for multiple modes with digital recordings n = 124*	*Mean rank for multiple modes without digital recording n = 1330*	*z*	*p*	*r*
The comments were detailed	856.47	715.48	−3.760	<.001	.10
The comments were personalised to me	776.63	722.92	−1.451	.147	.04
I have use/will use the comments to improve subsequent work	849.11	716.16	−3.612	<.001	.09

conjunction with another mode of comments. Due to this, it is possible that many of the recordings were designed to be supplementary to another mode of feedback.

Conclusion

This paper adds to the growing body of evidence supporting the effectiveness of digital recordings for the provision of assessment feedback. Specifically, this research has confirmed that digital recordings are perceived by students to be detailed, personalised and usable when compared to alternate modes such as handwritten comments and rubrics. The results of this study also strongly point to the value of multiple modes of feedback, especially if electronic annotations or digital recordings are included. These findings add to our understanding of effective feedback design, indicating that we need to consider the advantages and challenges of individual comment modes, along with the value of offering multiple channels or modes of feedback.

This study reminds us that even within the same assessment task, students benefit from receiving multiple modes of comments, particularly when at least one of the modes facilitates delivery of rich information. However, there were several limitations with this study, and thus, the conclusions need to be treated with some caution. For example, the study design was cross-sectional, and data were self-reported by a self-selected sample of students. The survey items asked students about the most recent feedback comments they received, but did not specify whether these comments were directed at the individual, a group or the entire class. In addition, although the survey asked students to rate actual or intended use of feedback comments, it is likely that the accuracy of student ratings may have been affected if they were not yet able to identify an opportunity to use the feedback comments. Furthermore, the significant differences reported in this study were associated with small effect sizes, therefore it is recommended that subsequent studies, particularly those featuring experimental design, are performed to validate the findings. Finally, while student perceptions of detail, personalisation and usability are valuable indicators of feedback success, there is a need to conduct more refined and longitudinal research on the impact of such feedback on subsequent performance or learning.

In general, students who received digital recordings provided positive perceptions about the detail, personalisation and usability of the feedback comments. However, technology is not a silicon bullet, and it is unlikely that the simple implementation of a different mode of feedback comments using technology will automatically guarantee improved feedback. Instead, it is highly likely that the different modes facilitate certain kinds of information exchange, relationship development and pedagogical designs. Further research therefore needs to explore the relationships

between mode, feedback design and the broader instructional ecology. Nevertheless, the results of this study strongly suggest that it is well worth pursuing further research into the provision of multiple modes of feedback comments, particularly when individualised digital recordings are included.

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Statement on open data, ethics and conflict of interest

The anonymised data set used in this paper can be accessed by emailing the authors and providing a short description of what the data will be used for. Approval was received from the human research ethics committees of both universities prior to data collection. There are no conflicts of interest to report for any of the authors.

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