

“WRITTEN FEEDBACK DOESN'T MAKE SENSE”: ENHANCING ASSESSMENT FEEDBACK USING TECHNOLOGIES

Abstract

Research reveals that effective assessment feedback is clear, specific, and sensitive to the individual. In practice, comments on assessment tasks are commonly provided in a text-based format, which can be perceived by students as ambiguous and impersonal. Digitally recorded comments, in the form of audio, video, or screencast recordings, may present a clearer and more personal alternative to text-based feedback. However, at this stage, research tends to be restrained to the higher education setting. This paper builds upon previous research by examining perceptions of digitally recorded assessment feedback in an Australian Catholic girls' secondary school. Thirteen teachers from eight broad subject areas (English, Math, Science, IT, Languages, Psychology, Music, and PE/Health) provided recorded comments to students in Years 7-12. To gauge perceptions of the digitally recorded assessment feedback, 262 students completed an anonymous online survey. In support of previous research, the majority of students preferred digitally recorded feedback to text-based feedback, reporting that it was more individualised, detailed, clear, useful, and caring. Several advantages and challenges also emerged from open-ended responses. Further research should aim to examine the relationship between the affordances of the media itself, the instructional content and its structure, and the ecology of the individual classes.

Introduction

Feedback is best understood as a cyclical process, involving the provision of performance-related information which leads to a change in subsequent activities or behaviours. In an educational environment, feedback on assessment tasks is essential in orienting students to learning (McConnell, 2006) and can influence student achievement (Adcroft, 2011), motivation (Pitt & Norton, 2016), development (Crisp, 2007; Lizzio & Wilson, 2008), and future performance (Zimbardi et al., 2016).

However, the very act of providing comments on assessment tasks does not guarantee that such positive outcomes will occur. While high quality feedback is reported to be the most powerful single influence on student achievement (Brown & Knight, 1994; Hattie & Timperley, 2007), the impact of written comments can be undermined by ambiguity and lack of detail (Anson, 2015; Thompson & Lee, 2012). Similarly, face-to-face feedback, while potentially rich in detail, is dependent on student memory and can be further hampered by performance anxiety (Author, 2014).

What makes feedback effective?

Despite considerable volumes of literature on feedback, there is surprisingly little consensus regarding what should be included to enhance the effectiveness of assessment feedback. Consequently, Authors (2014) synthesized a broad range of literature to propose a guiding set of eight principles relating to the design of teacher-created feedback artefacts on summative assessment. They argue that feedback is likely to be effective when it is timely, clear, educative, relevant to the assessment criteria or learning goals, able to locate student performance, focused on task performance, phrased as an ongoing dialogue rather than an end point, and sensitive to the individual.

Combined, the eight principles above not only require comments to be returned to students quickly, but to also convey a considerable amount of individualised detail in a way that is empathetic to each student's context and needs. Unsurprisingly this balance can be difficult to achieve with written comments, especially if limited to the margins of essays or through the use of rubrics. As a response to this dilemma, Authors (2015) experimented with creating digital feedback recordings and providing

these to undergraduate and graduate classes over a seven year period. The response from students was overwhelmingly positive, and indicated that the digitally recorded feedback was less ambiguous and more personalised than text-based feedback alone.

Digitally recorded feedback

A growing body of literature has reported on the use of digital recorded assessment feedback over the last decade. This literature primarily refers to three types of recordings: audio, video, and screencasts. Audio recordings are quick to create, and are easily shared between educators and students (Edouard, 2015). However, they are limited only to the voice of the teacher. On the other hand, video recordings of the teacher's face enables students to obtain both audio and visual information at the same time. Due to the addition of visual cues, video feedback offers multiple communication benefits not available in text-based or audio feedback (Crook et al., 2012). For instance, educators can convey extra information through the use of body language, facial expressions, objects, and demonstrations. As a result, students tend to prefer audio-visual recordings to either audio-only or text-only feedback (Marriott & Teoh, 2012).

Screencasts are essentially audio-visual recordings, but they are somewhat more flexible than a video of the teacher's face. For example, a screencast can present an audio recording of the teacher's voice while visually presenting the students' work at the same time. Screencasts also allow for a split screen approach that simultaneously presents multiple pieces of information, such as the educator's face and voice, the student's work, and a marking rubric. The use of screencast may be particularly appropriate for certain disciplines, particularly those in which there is a significant visual component to the work, or when written work is being "simultaneously evaluated on theoretic, empirical, compositional, stylistic, and research design components" (Anson, 2015, p. 376).

Literature Review

Based on the limited body of literature available at the time, Authors (2014) presented a review of the most commonly reported benefits of audio and screencast feedback. More recently, additional studies have emerged focusing on both the advantages *and* challenges associated with using audio, video, and screencast recordings for the purposes of assessment feedback. To account for these newer findings, an expanded version of the results reported by Authors (2014) is presented in Table 1. A brief overview of the main findings of studies is also provided below.

Advantages associated with digitally recorded feedback

Authors (2014) report that students consider recorded feedback to contain greater detail than text-based feedback, and acknowledge that it can be more supportive, more personal, and better able to enhance their relationship with their teacher. As shown in Table 1, recent research also supports these findings (e.g., Knauf, 2016; Morris & Chikwa, 2016). Moreover, the latest studies reveal that students appreciate the more informal style of communication inherent in recorded feedback (Borup, West, & Thomas, 2015), as well as the increased quantity of feedback afforded by the medium (West & Turner, 2015). Recorded feedback has also been shown to increase student engagement levels (Hung, 2016; Morris & Chikwa, 2016; West & Turner, 2015), and is considered to be more helpful, caring, and constructive than text-based feedback (Anson, 2015).

Challenges associated with digitally recorded feedback

Despite the tendency for students to recognise the advantages of recorded feedback, some appear to prefer receiving comments on their assessment tasks in a text-based format. There are several apparent reasons for this; for example, some students note that, when preparing for subsequent assignments, it is quicker to access specific sections of information from text based feedback rather than listening through a full recording (Borup et al., 2015; Morris & Chikwa, 2016). A small proportion of studies also found that some students feel trepidation before playing the recorded feedback, perhaps because they are anticipating negative comments (e.g., Authors, 2015). One study

also found that students perceived written content to be easier for them to process and understand than auditory content (Knauf, 2016).

Table 1. Advantages and challenges associated with digitally recorded feedback

Findings	Audio feedback	Video feedback	Screencast feedback
<i>Advantages</i>			
Greater detail in feedback	Hepplestone, Holden, Irwin, Parkin, and Thorpe (2011); Jonsson (2013); Lunt and Curran (2009); Merry and Orsmond (2008); Morris and Chikwa (2016); Rodway-Dyer, Knight, and Dunne (2010); Rotheram (2009)	Authors (2015); Borup et al. (2015); Crook et al. (2012)	Hyde (2013); Marriott and Teoh (2012); Mathieson (2012); Thompson and Lee (2012)
Faster or just as efficient to create feedback (in comparison with text feedback)	Jonsson (2013); Knauf (2016); Lunt and Curran (2009); Morris and Chikwa (2016); Rotheram (2009)	Authors (2015); Crook et al. (2012)	Edwards, Dujardin, and Williams (2012); West and Turner (2015)
Clearer meaning (audio visual cues such as tone perceived as conveying meaning easier)	Bourgault, Mundy, and Joshua (2013); Ice, Curtis, Phillips, and Wells (2007); Merry and Orsmond (2008); Rodway-Dyer et al. (2010)	Authors (2015); Borup et al. (2015); Crook et al. (2012); Hung (2016); Parton, Crain-Dorough, and Hancock et al. (2010)	Edwards et al. (2012); Marriott and Teoh (2012); Thompson and Lee (2012); West and Turner (2015)
Feedback is perceived as more individualised	Bourgault et al. (2013); Knauf (2016); Rotheram (2009)	Authors (2015); Crook et al. (2012); Hung (2016)	Anson (2015); Edwards et al. (2012); Hyde (2013); Marriott and Teoh (2012); Mathieson (2012)
Students feel a stronger connection with their teachers, or stronger social presence of teachers	Ice et al. (2007); Johnson and Keil (2002); Knauf (2016)	Authors (2015); Parton et al. (2010)	Anson (2015); Thompson and Lee (2012); West and Turner (2015)
Students find recorded feedback to be engaging	Morris and Chikwa (2016)	Cann (2007); Crook et al. (2012); Hung (2016)	West and Turner (2015)
<i>Challenges</i>			
Students are initially sceptical about receiving digitally recorded comments	Fawcett and Oldfield (2016)	Authors (2015)	Edwards et al. (2012)
Written comments are more efficient to read (e.g., easier to find specific comments)	Morris and Chikwa (2016)	Authors (2015); Borup et al. (2015); Crook et al. (2012)	Edwards et al. (2012)

NOTE: This table is based on the work of Authors, 2014.

Context of the present study

Overall, the literature indicates that the advantages of digitally recorded feedback may outweigh the challenges. However, the vast majority of studies in this domain tend to be based on data from higher education students. In response, the present study arises from a desire to determine whether comparable findings can be replicated in secondary schools. This study is exploratory, and aims to reveal student perceptions of digitally recorded feedback, with a view of further clarifying the potential advantage and challenges of comments provided using these modalities.

Method

This study utilises a design-based research method. This is a well-established method of researching the iterative development and evaluation of interventions in operating educational contexts (Anderson, 2005; Bannan-Ritland, 2003; Peterson & Herrington, 2005). Using this approach, researchers and practitioners work together to address real-world problems, adapting the interventions according to the complex social setting of the classroom (Anderson, 2005).

Participants

Thirteen teachers from a girls-only Australian Catholic secondary school self-selected to participate in the study. These teachers created digitally recorded feedback multiple times across 16 classes. The classes represented eight broad subject areas: English, Maths, Science, IT, Languages, Psychology, Music, and PE/Health. Three hundred and eight students participated in the anonymous survey, of which 262 completed (85% completion rate). Of those students, 53% were in Years 7-8 (typically aged between 12-14 years old), 29% were in Years 9-10 (typically aged between 14-16 years old), and 17% were in Years 11-12 (typically aged between 16-18 years old). English was the first language of 92% of the students. With regard to the modality of feedback, 75% received comments from a video recording, 21% received a screencast, and 4% received an audio recording.

Materials

The survey comprised 43 items, including a series of 5-point Likert scale questions (strongly agree – strongly disagree) designed to explore the benefits and challenges of digitally recorded feedback featured in the literature, and open ended questions intended to elicit details about students' experience of both the recorded feedback and written feedback.

Procedure

The school approached the researchers after a public call for participation. The teachers and researchers then met to discuss how feedback could become more effective within the context of the school. As part of these discussions, the researchers introduced the teachers to a proposed structure of feedback content which had been tested in tertiary settings (see Authors, 2014). Key components of the structure include addressing students directly, recognizing the individual student's context and histories, using examples from their work when discussing issues, and placing a higher emphasis on feedforward. Underlying this approach is the assumption that the feedback is an important and valuable opportunity for instruction.

The teachers were then trained to use video, audio, or screencast technologies as they deemed appropriate for their discipline and class. Such variations are in keeping with the exploratory nature of the study and recognise the imperative of design based research to adapt interventions according to the needs and real world problems of the practitioners. The teachers then implemented the feedback method across both formative and summative assessments, including essays, portfolio and design projects, mathematical solutions, and language performances.

Both qualitative and quantitative data were collected over a six month period, and included observation of teacher professional development workshops, a large scale anonymous survey of students, and in-depth interviews with teachers. These data were deemed appropriate for the analysis of this exploratory study, and aimed to reveal the appropriateness of digitally recorded feedback for

both students and staff in a secondary school setting, and to identify key issues that warranted further research. It should be noted that a detailed analyses of these data is outside the scope of the current paper and, as such, only a selection of the student survey data is reported.

Results and findings

Quantitative variables were entered into SPSS for analysis, while open-ended responses were analysed using the constant comparative method (Glaser & Strauss, 1967). The data were open coded until, in the opinion of the researchers, analysis had reached theoretical saturation. While the brevity of this paper excludes the possibility of discussing all issues arising from these data; the key issues of the advantages and challenges of digital recordings will be explored.

Descriptive statistics

The majority of students (81.7%) said they liked receiving recorded comments about their assessment tasks, compared to only 18.3% who disliked this modality of feedback. Most students (85.5%) also stated that their teachers should continue providing comments in this way, while only 14.5% indicated that they should not continue. With regard to mode preference, 42% had an equal preference for recorded and written feedback, 33.6% preferred or strongly preferred recorded feedback, and 24.4% preferred or strongly preferred written feedback.

Table 2 presents a comparison between feedback mode preference and attitudes regarding the continuation of recorded feedback. A χ^2 test of independence was performed, and the results revealed a statistically significant association with a large effect size (Cohen, 1988), $\chi^2(4, n = 262) = 95.20, p < .001$, Cramer's $V = .60$. Examination of the standardised residuals indicated that this result is attributable to the high proportion of students who preferred or strongly preferred written feedback, and suggested that teachers should not continue with recorded feedback. It is also noteworthy that, of the 64 students who preferred or strongly preferred written feedback, 32 (50%) believed that their teacher *should* continue with the recorded feedback.

Table 2. Comparison of feedback mode preference with opinions regarding continuation of recorded feedback

Mode preference	Should your teachers continue with recorded feedback?					
	Yes (N = 224)		No (N = 38)		Total (N = 262)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Strongly prefer recorded	24	10.7	-	-	24	9.2
Prefer recorded	62	27.7	2	5.3	64	24.4
Equal preference	106	47.3	4	10.	110	42.0
Prefer written	25	11.2	17	44.7	42	16.0
Strongly prefer written	7	3.1	15	39.5	22	8.4

With regard to Likert scale items, the vast majority of students (77.8%) agreed or strongly agreed that the recorded feedback helped them understand what they needed to do to improve in future assessment tasks, while 19.1% neither agreed nor disagreed with this item. Just over half of the students (56.5%) agreed or strongly agreed that the recorded comments were more detailed than the written comments they normally receive, while 34.4% felt that the amount of detail was about equal. Almost half of the students (49.7%) agreed or strongly agreed that recorded feedback improved their confidence to complete similar tasks, while 42% neither agreed nor disagreed with this statement. Similarly, 49.6% agreed or strongly agreed that the recorded feedback has a stronger impact than

written feedback on their confidence to improve their performance, while 36.3% neither agreed nor disagreed.

Frequency results relating to specific aspects of the recorded feedback indicated that the majority of students agreed or strongly agreed that the comments were detailed, individualised, caring, clear, and useful. Table 3 illustrates the distribution of responses, with only four to eight percent of the respondents disagreeing or strongly disagreeing on any one item.

Table 3. Frequency of responses for aspects of recorded feedback

Item	Level of agreement									
	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree	
<i>The recorded feedback was...</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Detailed	3	1.1	18	6.9	43	16.4	143	54.6	55	21.0
Individualised	1	0.4	11	4.2	41	15.6	130	49.6	79	30.2
Caring	2	0.8	15	5.7	64	24.4	121	46.2	60	22.9
Clear	4	1.5	8	3.1	36	13.7	139	53.1	75	28.6
Useful	3	1.1	12	4.6	46	17.6	125	47.7	76	29.0

Note: $N = 262$ for all items

Open responses

Students were asked open-ended survey questions regarding the advantages and challenges of digitally recorded feedback. Of the 262 respondents, 257 provided at least one advantage and 240 provided at least one challenge. Several themes emerged from these data, and are discussed below.

Advantages

Four main themes emerged in the thematic analysis of responses relating to the advantages of recorded feedback. The most prominent of these themes was referenced by 124 students, and related to the notion that recorded feedback was rich in cues, such as facial expressions and tone of voice. Within these comments, students noted that teachers portrayed their emotions in the recordings, which helped students obtain a better sense of whether they had done well, or if they needed to improve. Quoted examples of this theme include, “we can see [the teacher’s] facial expressions on how they think we did” and “you can tell by their voice if they are pleased or not”. Some students indicated that the addition of visual and audio cues reduced ambiguity, as in the following quote: “We get to see the teacher as if they are actually talking to us. We get to listen to the teacher’s voice and the expression they are using because sometimes we can interpret written feedback the wrong way”. Interestingly, 24 students mentioned that the ability to see their teacher’s face helped them to believe that the feedback was less generic and more genuine; for instance, “you can see facial expressions to see if the person is lying”, and “You know that your teacher didn’t just make up a whole lot of stuff, as you can see them actually saying things”.

The second strongest theme, referenced by 105 students, related to the propensity for teachers to provide more detail in recorded feedback than they can in text-based feedback alone. For example, one student said “Teachers can elaborate more in what they’re trying to tell me about my work so it is easier to understand rather than being brief on paper”, while another said “I felt as though it targeted specific questions that I needed to address and I was given more helpful tips than would have fit on a piece of paper”. This theme further supports the quantitative results presented above, where 75.6% of students indicated that the recorded feedback was detailed (see Table 3), and 56.5% felt that it was more detailed than the written comments that they usually received.

The third theme, mentioned by 56 students, relates to recorded feedback being clearer and easy to understand. Within these responses it was evident that some students had struggled to read written comments in the past, as demonstrated in the following comments: “when the teacher is writing [the comments] down, you sometimes can’t read the writing”, “written feedback doesn’t make sense”, and “I can clearly understand what my teachers are saying. It is not messy and doesn’t have writing scribbled all over the page.” These comments strengthen the quantitative results reported in Table 3, where 81.7% of students agreed or strongly agreed that the recorded feedback was clear.

The fourth theme (24 responses) referenced the individualised nature of the recorded feedback. Most of these comments specifically mentioned that the comments felt more personal, such as “It makes it more personal and makes you feel like they care about your results”, while others mentioned feeling more connected to their teachers as a result of the recorded feedback: “It makes you feel more connected”. Several students noted that the comments were specifically created for them: “It is more personal, I felt as though it targeted specific questions that I needed to address”. This theme provides further context to results relating to the caring and individualised nature of the feedback, as shown in Table 3.

Challenges

Within the responses relating to the challenges of recorded feedback, three major themes emerged. The most prominent of these, referenced by 67 students, was the feeling that recorded feedback was more inconvenient to access than written feedback. Several students noted that they would be required to start up their computers to access the feedback, rather than just reading it on a piece of paper; for example, “feedback [is] on the computer rather than having a piece of paper handy”. One comment expanded on this theme, by mentioning that there were additional requirements to access the feedback: “Requires a computer, and so it is difficult to listen to feedback in places other than home or school, whereas feedback in written form can easily be brought with me, i.e., I’d normally read my written feedback on the bus”.

There were three subthemes of note within the major theme of inconvenience. The first relates to the time needed to listen to or watch a recording (24 responses), and included such quotes as “takes a bit of time to watch the whole video”. The second (18 responses) raises issues associated with technology, for example, “You can’t open it. Sometimes it wastes your time because you’re trying to find the perfect program to see the video”. The third references the fact that recorded feedback could not easily be scanned or skimmed over (12 responses). On this subtheme, students provided quotes such as “[I am] unable to find a specific part easily, e.g., [when] looking for feedback of a particular paragraph on an essay” and “it’s harder to go [to] the part [of the] video that you want to hear more about”.

The second major challenge, mentioned by 43 students, was that recorded feedback could be harder to understand than written feedback. Some comments were general, such as “the teacher can be hard to understand”, “can be confusing”, and ‘sometimes not clear’, while other related specifically to the fact that they couldn’t hear their teacher very well (16 responses), as seen in the following quote: “teachers...will sometimes mumble something that you can’t hear or they were in [a] public place where there’s a lot of noise”. Another subtheme (9 responses) referred to the fact that listening to or watching a recording required more attention than reading written comments: “You have to watch it numerous times to figure out exactly what you did wrong and what to improve on”. Yet another subtheme (8 responses) suggested that it was sometimes difficult to connect the comments spoken by the teacher with specific examples in the text; for example, “It is not always clear specifically which part of your assignment the teacher is referring to when they make a comment”.

The third theme was less prominent than the others, being mentioned by only 13 students. This theme relates to the tendency for recorded feedback to make students feel somewhat uncomfortable. Within this theme, students made references to feeling intimidated, nervous, weird, or awkward upon watching or listening to the comments. For instance, one student stated: “At the start it’s a bit creepy”,

while another remarked that “it is a bit awkward to be listening to your teachers through video!”. Yet another suggested that the feedback was “confrontingly personal”.

Discussion

This study took an exploratory approach, and sought to identify student perceptions of audio, video, and screencast feedback, as well the advantages and challenges of these modalities. Overall, the majority of students indicated that they liked the recorded feedback, and believed that their teachers should continue to provide it to students. When asked to compare their preferences for recorded feedback or written feedback, the majority either indicated that they liked both equally, or preferred recorded feedback.

A more specific aim of this paper was to determine whether findings relating to the use of recorded feedback in higher education context would be supported in a secondary school environment. Previous research has revealed that higher education students consider recorded feedback to be more thorough, personal, engaging, supportive, clear, and better able to foster a sense of connection with their teachers (Authors, 2014). As shown in the present paper, many of these advantages were also recognised by the secondary school students. In fact, the quantitative data revealed that the vast majority of students agreed that the recorded feedback was detailed, individualised, caring, clear, and useful. Most of these themes were also apparent in the open-ended responses. Furthermore, approximately half of the students agreed that recorded feedback was more detailed than written feedback, and believed that it was better able to improve their performance on, and confidence with, future assessment tasks.

In their open-ended responses, many students pointed to the fact that audio visual media is richer in communication cues, such as tone. According to media richness theory (Daft & Lengel, 1986), this type of media is likely to reduce ambiguity (i.e., increase clarity), and this was certainly noted by students. It is likely that this perceived increase in clarity was largely a result of an interplay between ‘media richness’ and the structure of the feedback content that was recommended to teachers (e.g., addressing each student by name, quoting examples of their work, focusing on performance, and providing future strategies). The speed of talking in comparison with writing allows the teachers to provide more comments in the same amount of time; however, students indicated that it was not just volume of comments that was valued, but also that the teachers were able to quote specific examples of their work.

In addition to these perceived advantages, the data revealed a range of potential challenges. The most dominant of these was the perceived inconvenience associated with watching or listening to recorded feedback. A number of subthemes emerged, including the requirement of accessing an internet-enabled device to play the file, the extra time needed to watch a recording (as compared to reading written comments), technological problems with accessing the file, and the potential need to replay the recording in its entirety in order to find specific comments of interest. Similar issues of inconvenience have also been reported in studies of higher education students (Borup et al., 2015; Crook et al., 2012; Edwards et al., 2012; Morris & Chikwa, 2016). It is interesting that these issues continue to be reported in both universities and schools, considering the high levels of access to technology, as well as students’ purported competency and affinity with digital tools. This suggests that the perceived inconvenience of recorded feedback may instead be a function of students’ preference for the feedback practices that they are familiar with (i.e., written comments). This is not an insurmountable challenge, as it is likely that preferences can change over time.

Several themes emerged in the present study that have not been frequently reported in the higher education literature. First, a small group of students felt that the recorded feedback was more honest and genuine than written comments. This aspect of feedback appears to be particularly important to secondary school students, as studies have shown that they consider honest and useful comments to be reflective of teachers’ care for them (Pajares & Graham, 1998). Second, a selection of students

mentioned feeling uncomfortable with the notion of watching or listening to a recording of their teacher speaking directly about them. This finding is worth further exploration, as it may reflect adolescents' underlying perceptions of the traditional roles of teachers. Moreover, it is important to determine whether these reactions elevate the importance of digitally recorded feedback in the minds of students, or whether they instead distract from the comments being provided.

One of the main limitations of this study is that was restricted to a sample of female students in an Australian high-achieving secondary school environment. As such, further research is necessary before the findings reported here can be generalised to all secondary schools. Another constraint is the reliance on a limited selection of survey data. In particular, the use of open-ended survey questions is somewhat confining, as there is no ability to seek further clarification from participants, and analysis can be biased by subjective interpretations. In addition to the data reported here, further analysis is being conducted to compare student disciplinary experience, year level, and scholastic aptitude, along with additional data comparing written experiences with recorded experiences. Further insights will also be derived from interview data collected from teachers.

Conclusion

Assessment feedback is an important instructional component of the learning process. However, written feedback has been reported to often be ambiguous, undetailed, and unhelpful in terms of eliciting future strategies. Clearly, in this situation, valuable opportunities for learning are being lost. This exploratory study has demonstrated the value of technology enhanced feedback on assessment in a secondary school setting, particularly in terms of it being perceived as clearer, more detailed, and more personal. Further research now needs to be conducted to understand the complex relationship between the affordances of the media itself, the instructional content and its structure, the adopted eight principles of feedback, and the ecology of specific classes, including individual student differences and preferences.

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