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Channelling feedback through audiovisual presentations: Do higher education students perceive, use and benefit from video feedback compared to written feedback?

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Abstract

Background: Delivering effective feedback to large groups of students represents a challenge for the academic staff at universities. Research suggests that undergraduate students often ignore the Elaborated Feedback (EF) received via digital learning environments. This may be because instructors provide feedback in written format instead of using more engaging channels (e.g., audiovisual).

Objectives: This quasi-experimental study examines the extent to which feedback format (video vs. written) influences students' perceptions of feedback, their decision to access EF messages related to high-stakes assignments in digital environments, and its impact on academic performance, while considering the effect of their academic engagement.

Methods: A total of 171 undergraduate students received generic EF messages through a learning platform the day after submitting each course assignment. 78 students received EF in written format and 93 in video format.

Results and Conclusions: Our results showed that feedback format influenced students' decision to access EF and their academic performance, but not their feedback perceptions. Students in the written-feedback group accessed EF messages more often, but students who received video-feedback performed better than their counterparts in the written-feedback group. Moderation analysis showed that the relationship between the feedback format and students' academic performance was moderated by their academic engagement, suggesting that students with lower levels of academic engagement may benefit from video-feedback.

Takeaways: The results reveal that using video feedback in digital environments may influence students' decisions to process EF and their academic achievement, especially when it comes to students with lower levels of academic engagement.

KEYWORDS
assessment, digital environment, higher education, video feedback, written feedback

1 | INTRODUCTION

Virtual and/or hybrid teaching modalities require research on instructional strategies using digital tools which could help promote student learning in high-stakes assignments. In this regard, one of the main challenges faced daily by academic staff at universities is figuring out how to effectively deliver generic feedback to large groups of students on their assignments so that this feedback is received, processed, valued, and promotes learning (Henderson et al., 2019). Existing research on students' feedback perceptions and use at college degrees is scarce and shows mixed results (Paterson et al., 2020; Van der Kleij & Lipnevich, 2021). Thus, while some studies have found that students positively value receiving their professor's feedback (Crook et al., 2012; Poulos & Mahony, 2008), others suggest that they are often dissatisfied with the feedback received and decide to ignore it (e.g., Carroll, 2014; Hounsell, 2007; Nicol, 2010; Winstone et al., 2021). One way to promote the use of feedback among students may depend on how this information is presented in digital learning environments. Previous research suggests that university students tend to show a favourable predisposition towards the video-feedback format (Crook et al., 2012; West & Turner, 2015) and/or multimodal feedback distribution methods (e.g., combining face-to-face, digital audio recorded, written and/or electronic feedback) (Paterson et al., 2020). However, instructors usually deliver feedback in written format (Chang et al., 2012; Henderson et al., 2019; Wolsey, 2008), which may explain why students do not process this information as desired. Conducting empirical studies in real-life contexts on the instructor-student interaction in digital learning environments is crucial when it comes to improving the learning process (Janelli & Lipnevich, 2021). Unfortunately, there is a lack of research examining whether feedback format (e.g., audiovisual vs. written) influences students' perceptions of feedback, their decision to access feedback messages in digital environments, and its impact on academic performance (Mahoney et al., 2019; Turner & West, 2013). Examining these influences is the main goal of the present study.

2 | LITERATURE REVIEW

2.1 | Feedback effectiveness in digital environments

Among other instructional techniques, formative feedback is considered one of the most effective tools for improving students' learning (Wisniewski et al., 2020). While carrying out academic assignments, students are likely to internally evaluate the correctness of their responses (Winne & Hadwin, 1998). However, this evaluation is often inaccurate, which could be detrimental to self-regulated learning processes (Bjork et al., 2013). To reduce these metacognitive inaccuracies, feedback that provides information about performance standards (e.g., the solution with an explanation) may shorten the gap between the students' current knowledge and the level expected by instructors (Hattie & Gan, 2011; Hattie & Timperley, 2007; Shute, 2008; Wisniewski et al., 2020). Thus, formative feedback allows students to actively monitor their performance by seeking connections between their current level of performance and the standard level provided by the feedback (Butler & Winne, 1995).

Theoretical studies and meta-analyses suggest that feedback can produce positive effects on learning, although its effects are often inconsistent and highly variable (e.g., Azevedo & Bernard, 1995; Jaehnig & Miller, 2007; Kluger & DeNisi, 1996; Kulhavy et al., 1985; Moreno, 2004; Mory, 2004; Shute, 2008; Van der Kleij et al., 2011; Wisniewski et al., 2020). While some studies have reported positive effects, others have found no effects or even negative effects on students' learning (Bangert-Drowns et al., 1991; Van der Kleij et al., 2015; Wisniewski et al., 2020). In digital environments, feedback effectiveness has been evaluated in a wide variety of learning tasks over the past decades, suggesting that not every type of feedback benefits student learning. A meta-analysis conducted by Van der Kleij et al. (2015) showed that Elaborated Feedback (EF) including explanations is the most effective type of feedback, Knowledge-of-Correct-Response (KCR) is somewhat effective, and that Knowledge-of-Response (KR) does not influence learning outcomes. Effect sizes for EF, KCR and KR are 0.49, 0.32, and 0.05, respectively. In academic assignments that require students to deploy high-order cognitive processes (e.g., solving cases or applying theoretical knowledge to new situations), EF messages that include information related to the performance standard may increase the probability of bridging the gap between the current and desired level of performance (e.g., Butler et al., 2013; Hattie & Timperley, 2007; Narciss, 2004; Narciss & Huth, 2004; Shute, 2008). Following these evidence-based principles, EF messages including the response model (KCR feedback) and an explanation were delivered for each assignment in this study.

2.2 | Feedback perceptions, use, and effectiveness: The role of feedback presentation format

According to the literature, students access the feedback messages they receive through digital learning environments to a limited extent (Aleven et al., 2003; Duncan, 2007; Winstone et al., 2021). Among other characteristics, the format in which feedback is delivered may explain why they do not engage as expected (Lowenthal, 2021; Mahoney et al., 2019). Digital learning environments give educators the possibility to deliver feedback messages in different formats other than written, which has been the most common format employed so far. Over the last decade, there has been a growing interest in examining the role of alternative presentation formats, such as audio or video feedback (e.g., Crook et al., 2012; Denton, 2014; Duncan, 2007; Espasa et al., 2022; Gould & Day, 2013; Henderson & Phillips, 2015; Lunt & Curran, 2010; Mahoney et al., 2019; Mayhew, 2017; Orsmond & Merry, 2008; Orsmond & Merry, 2011; West & Turner, 2015). While most of these studies have examined students' perceptions and preferences for one feedback format or another, few have explored the extent to which the feedback presentation format influences students' voluntary decision to consult the feedback

messages and its impact on academic achievement in real-life learning scenarios.

In terms of students' perceptions of feedback, the existent literature suggests that undergraduate and graduate students tend to prefer audiovisual feedback messages compared to written feedback, stating that the former are more specific, clear, personal, engaging, and effective for learning (e.g., Crook et al., 2012; Henderson & Phillips, 2015; Mahoney et al., 2019; West & Turner, 2015). It is important to note that not only the students perceive audiovisual feedback this way, but also the instructors. For example, university instructors positively value feedback messages in audiovisual format, as they consider it more accessible and efficient (Henderson & Phillips, 2015), especially when they have to deliver a generic single video-feedback message to a large group of students (Crook et al., 2012). However, the results do not always go in this direction (e.g., Borup et al., 2015; Orlando, 2016). For example, Borup et al. (2015) found that both students and teachers rated feedback in written format as more efficient than feedback in video format. This disparity in results shows the need for further research that examines the extent to which feedback presentation format influences students' perceptions of the feedback received in digital environments.

Most of the aforementioned studies have examined students' perceptions of feedback using questionnaires or surveys. Despite the great value of this methodology for understanding learners' perspectives, decisions on how to effectively deliver feedback in digital environments should be made based on evidence-based findings rather than individual advice or preferences. So far, very few studies have collected data on the extent to which the feedback presentation format influences students' decisions to consult and process EF messages in digital environments after submitting their course assignments (Crook et al., 2012; Denton, 2014; Espasa et al., 2022; Mahoney et al., 2019; Turner & West, 2013; West & Turner, 2015). Evidence with self-reported data suggests that students spend more time processing video-feedback compared to written-feedback (Mayhew, 2017; West & Turner, 2015). However, findings are very limited and do not yet provide reliable information on how the feedback presentation format influences students' engagement with EF in digital environments.

When it comes to academic performance, a recent review by Mahoney et al. (2019) suggested that the impact of video feedback on student outcomes has not been thoroughly researched yet. To the best of our knowledge, few attempts have been made to examine whether video feedback influences students' performance. Most of the studies conducted have used specific high-stakes assignments, such as essays (e.g., Ali, 2016; Denton, 2014; Henderson & Phillips, 2015; Moore & Filling, 2012). In general, these studies suggest that video feedback has the potential to improve student performance. However, other studies have found that providing video feedback has little or no influence on student performance (e.g., Espasa et al., 2022; Turner & West, 2013). As suggested by Nicol (2013), it is possible that modifying the feedback presentation to result in better reception and perception of the messages may not necessarily impact student academic achievement. This is a key aspect that deserves specific research.

In short, our study aims to contribute to the existing literature by examining the extent to which feedback presentation format (written- or video-feedback) influences students' perceptions of feedback, their decision to voluntarily access generic EF messages, and their academic performance. However, given the complexity of getting students to value and engage in the processing of EF messages received in the digital learning environments, we further examine the role of students' academic engagement (Hattie & Timperley, 2007; Van der Kleij & Lipnevich, 2021).

2.3 | Receiving feedback in digital environments: The role of students' academic engagement

Few studies have examined the extent to which students actually engage in processing or seeking feedback in digital environments (Dempsey et al., 1993; Fox et al., 2014; Lefevre & Cox, 2016; Pridemore & Klein, 1991; Timmers & Veldkamp, 2011; Van der Kleij et al., 2012). Recent evidence suggests that learners focus primarily on looking up their grades, paying attention to simple corrective feedback, and avoid processing EF messages (Dempsey et al., 1993; Lefevre & Cox, 2016; Winstone et al., 2021). In her seminal work, Shute (2008) argued that the variability in feedback use and effectiveness is likely the result of differences in individual characteristics. Among others, students' academic engagement is one of the personal variables that can best explain the extent to which they may be involved in processing teachers' feedback (Fredricks et al., 2004; Handley et al., 2011; Price et al., 2011), which can predict their learning outcomes, academic satisfaction, and retention in higher education (Groccia, 2018; Kuh et al., 2006; Reschly & Christenson, 2012). In general, student's engagement refers to a broad construct intended to encompass salient academic and non-academic aspects of the student experience, including "active learning, engagement in challenging academic activities, formative communication with academic staff, participation in enriching educational experiences, and feeling legitimized and supported by university learning communities" (Coates, 2007, p. 122). In other words, student's academic engagement encompasses a positive, fulfilling, relatively stable, schoolwork-related state of mind (García-Ros et al., 2018; Salmela-Aro & Upadaya, 2012; Schaufeli et al., 2002).

While student's academic engagement is closely linked to their willingness to receive teacher's feedback (e.g., Handley et al., 2011; Pianta et al., 2012; Price et al., 2011; Skinner & Pitzer, 2012), feedback can also encourage students' engagement with the academic task (Zhang & Hyland, 2018). Feedback can allow students to observe their own progress and improve their learning outcomes (Butler & Winne, 1995; Cleary & Zimmerman, 2012), especially when it comes to students with higher motivation (Zhang & Hyland, 2018; Zhao et al., 2021). In fact, student engagement may even mediate the effects of perceived teacher's feedback on academic performance

(Wang & Zhang, 2020). In this study, we assessed student's academic engagement to better understand the influence of this individual variable on the relationship between the feedback presentation format and students' academic performance, given that students with different levels of academic engagement may benefit from different feedback formats.

3 | THE PRESENT STUDY: RESEARCH QUESTIONS AND HYPOTHESES

The present study was conducted over an entire academic course using actual high-stakes assignments, including case solving, text analysis, or understanding research designs, which required students to apply and transfer knowledge of developmental and educational psychology topics to new situations. Given that administering assessments with no personal consequences (i.e., low-stakes tests) are associated with a decrease in motivation and performance (Wise & DeMars, 2005), we used high-stakes tasks to increase ecological validity, as students were indeed solving the tasks necessary to fulfil the course demands. For each assignment, a generic EF message was created, which included the correct response along with an explanation to help students comprehend the knowledge assessed.

In this paper we aim to examine the extent to which the format of the generic EF messages (video or written) influences students' feedback perceptions, their decisions to access EF messages, and their academic performance, while taking into account the effect of their academic engagement. To achieve this goal, we address the following research questions (RQs):

1. Does the feedback presentation format influence students' feedback perceptions?

Based on previous findings, we expected that students in the video-feedback group would be significantly more satisfied with the EF messages (*satisfaction with feedback*) and would perceive the format as more useful (*perceived usefulness of feedback format*) than their counterparts in the written-feedback group (*Hypothesis* 1) (e.g., Crook et al., 2012; Espasa et al., 2022; Henderson & Phillips, 2015; West & Turner, 2015).

2. Does the feedback presentation format influence students' decision to access the feedback messages and their academic performance?

Regarding the students' decisions to access EF messages, we hypothesized that students in the video-feedback group would significantly access more EF messages than students in the written-feedback group (*Hypothesis* 2) (e.g., Crook et al., 2012; Mayhew, 2017; West & Turner, 2015). Despite the scarce literature available on the positive influence of video-feedback in students' academic achievement (e.g., Ali, 2016; Denton, 2014; Henderson & Phillips, 2015; Moore & Filling, 2012), we also expected that students in the video-feedback group would perform better (*academic performance*) than students in the written-feedback group (*Hypothesis* 3) (e.g., Denton, 2014; Mahoney et al., 2019).

3. Does student's academic engagement moderate the effect of the feedback presentation format on student's academic performance?

Given the relevance of students' academic engagement in processing and benefiting from feedback (e.g., Fredricks et al., 2004; Groccia, 2018; Handley et al., 2011; Price et al., 2011), we further expected that students' academic engagement would moderate the relationship between the feedback presentation format and students' academic performance. In particular, we predicted that providing video-feedback could benefit students with lower levels of academic engagement (*Hypothesis* 4).

4 | METHOD

4.1 | Participants and design

A total of 175 undergraduate students aged 19 ($M_{age} = 18.99$, $SD = 2.89$) participated in this study. All participants were Spanish native speakers and most of them were female candidates (81.9%), which aligns with the trend of undergraduate students who enrol in the bachelor's degree in Teacher Training for Early and Primary School Education in Spain. Data from four students were excluded from data analysis because they scored 2 Standard Deviations below or above the mean in the course exam. Four groups of 42, 36, 43, and 50 students participated in this study. A quasi-experimental design was employed, with two groups randomly assigned to the written-feedback group ($N = 78$) and the other two to the video-feedback group ($N = 93$). Students' academic engagement was measured to control for specific effects of personal variables. No differences between groups on students' academic engagement were found (all p-values >0.05). Participation was approved by the University (UV-SFPIE_PID-1640118) and followed the guidelines of the Declaration of Helsinki. Participants' informed consent was collected on the first day of the semester.

4.2 | Materials

Learning materials included several assignments administered during the academic year and a final questionnaire. Assignments required students to apply and transfer knowledge about developmental and educational psychology topics to new situations (e.g., solve cases, analyse texts, comprehend research designs). For each assignment, a generic EF message was created, which included the correct response along with an explanation to help students comprehend the knowledge assessed, and a self-assessment prompt to monitor their own learning based on the feedback (see an example in Table 1). Feedback messages were, on average, 1136 words long for the written-

TABLE 1 Example of an Elaborated Feedback (EF) message provided for the classical conditioning task. Students had to identify the stimulus and responses and explain how learning happened.

Case: A month ago, Andres fell in Physical Education (PE) class and fractured his arm. Since that day, every time he has to go to PE class, Andres feels chills and starts sweating exaggeratedly.		
EF message	**Correct Response**	Unconditioned Stimulus (US): Arm fracture Unconditioned Response (UR): Pain and anxiety Neutral Stimulus (NS): Conditioned Stimulus (CS): PE class Conditioned Response (CR): Chills and sweating when going to PE class
	Explanation	In this case, Andres has associated the PE class with the moment he fractured his arm while doing sport, a moment when he felt pain and anxiety (unconditioned responses that are manifested at the moment of injury). Thus, Andres has learned to respond involuntarily with shivering, sweating and anxiety when he has to go to PE class. These are conditioned responses (i.e., responses learned after association between stimuli).
	Self-assessment[a]	Indicate two aspects of your answers that match the solutions and two aspects to improve.

[a]The self-assessment prompt was delivered as a final question at the end of the EF message, not for each of the cases separately.

feedback group and 9 min long for the video-feedback group. For the video-feedback group, the instructor-recorded videos included a slide deck as visual media and an audio narration. Regardless of the feedback format, the content of the EF messages was controlled to be the same.

Participants completed a final questionnaire during the last week of the semester. They completed the Schoolwork Engagement Inventory (García-Ros et al., 2018) to assess their academic engagement, and answered two Likert-type questions on their satisfaction with the feedback received (i.e., *To what extent did you like receiving the feedback messages through Moodle?*) and the perceived usefulness of the feedback presentation format (i.e., *To what extent do you consider that the format in which you have received feedback (video or text) is effective for improving your learning?*).

4.3 | Apparatus

Both the assignments and the corresponding EF messages were provided via Moodle, the learning platform employed by the University to manage the course materials. As for the format, we used the Questionnaire tool to provide the feedback in written format, and the EduQuizz tool to provide the feedback in video format. As we have explained, a generic EF message was created to reach large groups of students. The EF messages were fully available next to the assignment in Moodle and could be consulted at any time to review the responses. The digital settings available in Moodle allowed us to gather information about the number of EF messages students accessed during the semester.

4.4 | Measures

To capture the students' feedback perceptions, two measures were computed: (a) *satisfaction with feedback*: participants rated how satisfied they were with the EF messages received via Moodle on a scale of 1 (strongly dissatisfied) to 10 (strongly satisfied), and (b) *perceived usefulness of feedback format*: participants rated how effective the feedback presentation format (written or video) was to improve their learning on a scale of 1 (very ineffective) to 10 (very effective). Students' *feedback access* was computed as the percentage of voluntary decisions to open the EF messages provided via Moodle. Students' *academic performance* was computed as participants' course scores on a scale of 0 to 10 points.

Students' engagement was assessed with the Spanish adaptation of the Schoolwork Engagement Inventory – SEI–EDA – (Appendix A – Table A1) (García-Ros et al., 2018, 2021; Salmela-Aro & Upadaya, 2012). It has nine items that measure schoolwork Energy (e.g., "At university, I am bursting with energy"), Dedication (e.g., "I am enthusiastic about my studies"), and Absorption (e.g., "Time flies when I am studying"). It also enables the calculation of a global score for schoolwork engagement, which was used in this study. The responses are rated on a five-point scale ranging from 1 (*Never*) to 5 (*Always*). The scale has shown satisfactory internal consistency in previous research (Cronbach's $\alpha = 0.83$) and in this study (Cronbach's $\alpha = 0.79$).

4.5 | Procedure

Participants received a general introduction about the study the first day of the semester. They were informed that the University had approved a study to better understand how students interact with the learning materials uploaded to the Moodle courses. In addition, they were told that their collaboration would be valuable in improving the way instructors interact with their students through the platform. However, no information about the main or specific research goals was provided. Given that participants were first-year students, they received general instructions about how to use Moodle (e.g., how to use the interface, download materials, submit assignments, and access the EF messages). All participants were told that they would receive an EF message for each assignment so that they could review their responses and improve their knowledge. Finally, they were asked to provide their informed consent to participate in the study.

During the academic year, two instructors administered a set of formative assignments to be carried out individually by the students. For each assignment, a generic EF message that included a response model along with an explanation was designed. Instructors initially created the written-feedback message. Then, they recorded a screen-captured video-feedback including a slide deck as the visual media and an audio narration. Written-feedback messages were provided using the Questionnaire tool, while video-feedback messages were delivered with the EduQuizz tool. Both written- and video-feedback messages were delivered through the learning platform to the entire group of students 24 h after the submission deadline and no collective explanations were provided to the group in the classroom. To control an undesirable effect due to the instructor-student interaction, each instructor provided one group with written-feedback and the other group with video-feedback. During the last week of the semester, participants were surveyed on their academic engagement, their satisfaction with the EF received, and the perceived usefulness of the format in which they received the feedback.

4.6 | Data analysis

We first conducted Pearson correlation analysis to examine the extent to which students' academic engagement, feedback perceptions, feedback accesses, and academic performance are related to each other (Appendix B – Table B1). Given that students' satisfaction with feedback was positively related to the perceived usefulness of the feedback format ($r = 0.716$; $p < 0.001$), and student's decision to access feedback was positively related to their academic performance ($r = 0.251$; $p < 0.001$), we conducted two multivariate analyses of covariance (MANCOVAs) for both sets of dependent variables that are intercorrelated (Block 1. Students' satisfaction with feedback and the perceived usefulness of the feedback format, and Block 2. Students' feedback access and their academic performance). The format in which feedback was administered (video vs. written) was introduced into the model as a between-subjects independent variable. Given that student's academic engagement was positively related to feedback satisfaction ($r = 0.339$; $p < 0.001$), perceived usefulness of the feedback format ($r = 0.346$; $p < 0.001$), and academic performance ($r = 0.157$; $p = 0.04$), this variable was introduced into the model as a covariate. For each MANCOVA test, we first report the composite multivariate effect using Pillai's trace, which considers the set of variables under analysis jointly, and then report the univariate effects for the single variables considered in the multivariate model. Finally, we conducted a linear moderation analysis to examine the extent to which student's academic engagement moderates the effect of feedback presentation format (video vs. written) on student's academic performance. Please note that all analyses were conducted using standardized scores.

5 | RESULTS

5.1 | Does the feedback presentation format influence students' feedback perceptions?

The first aim was to examine the extent to which feedback presentation format (video vs. written) influences students' feedback perceptions (satisfaction and perceived usefulness), after controlling the effect of students' academic engagement. The results of the MANCOVA suggest that there was a non-significant effect of feedback presentation format on the general composite, $V = 0.005$, $F(2, 167) = 0.43$, $p = 0.652$, $\eta_p^2 = 0.01$. Contrary to our predictions (*Hypothesis* 1), non-significant univariate effects were found for both students' satisfaction with feedback, $F(1, 168) = 0.77$, $p = 0.382$, $\eta_p^2 = 0.005$, and the perceived usefulness of the feedback format, $F(1, 168) = 0.67$, $p = 0.414$, $\eta_p^2 = 0.004$. Therefore, the format in which the EF messages were provided through the learning platform did not influence participants' perceptions of feedback. The covariate students' engagement, significantly contributed to the composite, $V = 0.133$, $F(2, 167) = 12.86$, $p < 0.001$, $\eta_p^2 = 0.133$. Descriptive statistics are provided in Table 2.

5.2 | Does the feedback presentation format influence students' decision to access the feedback messages and their academic performance?

The second aim was to determine to what extent feedback presentation format (video vs. written) influences students' decision to access the feedback messages delivered for the assignments and their academic performance, after controlling the effect of students' academic engagement. The results of the MANCOVA suggest that there was a significant effect of feedback presentation format on the general composite variable, $V = 0.09$, $F(2, 167) = 7.82$, $p < 0.001$, $\eta_p^2 = 0.086$. The independent effects helped us understand this general multivariate effect in detail. We found two significant univariate effects for both the number of EF messages accessed and the students' performance. Contrary to our *Hypothesis* 2, results showed that students in the written-feedback group ($M = 59.87$, $SD = 40.79$) accessed more

TABLE 2 Means (standard deviations) for the students' feedback perceptions (satisfaction with feedback and perceived usefulness of the feedback format), feedback access and academic performance as a function of the feedback presentation format.

	Satisfaction with feedback	Perceived usefulness of feedback format	Feedback access	Academic performance
Written-feedback	8.18 (1.61)	7.87 (1.64)	59.87 (40.79)	6.99 (1.91)
Video-feedback	8.45 (1.63)	8.17 (1.79)	44.35 (42.27)	7.46 (1.46)

TABLE 3 Results of the moderated regression analysis for the students' academic performance ($N = 171$).

Parameters	β	SE β	t	p	95% CI Lower	95% CI Upper
Constant	0.01	0.07	0.13	0.893	−0.14	0.16
Feedback presentation format	0.35	0.15	2.33	0.021	0.05	0.64
Academic engagement	0.26	0.13	2.03	0.044	0.01	0.52
Feedback format × Acad. Eng.	−0.49	0.26	−1.86	0.064	−1.00	0.03

EF messages than their counterparts in the video-feedback group ($M = 44.35$, $SD = 42.27$), $F(1, 168) = 5.72$, $p = 0.018$, $\eta_p^2 = 0.033$. However, according to our *Hypothesis* 3, results showed that students in the video-feedback group ($M = 7.46$, $SD = 1.46$) performed better than their counterparts in the written-feedback group ($M = 6.99$, $SD = 1.91$), $F(1, 168) = 5.48$, $p = 0.02$, $\eta_p^2 = 0.032$. The covariate students' engagement, did not significantly contribute to the composite, $V = 0.022$, $F(2, 167) = 1.89$, $p = 0.155$, $\eta_p^2 = 0.022$. Descriptive statistics are provided in Table 2.

5.3 | Does student's academic engagement moderate the effect of feedback presentation format on student's academic performance?

The last aim of this study was to examine whether the effect of the feedback presentation format on students' academic performance varies as a function of students' academic engagement. Hence, we conducted a linear moderation analysis that included students' academic engagement as a moderator of the relationship between the feedback presentation format (video vs. written) and the academic performance scores. Academic engagement was introduced as a continuous variable, so that higher scores on this measure indicate greater commitment to academic activities. The model significantly accounted for 7.5% of the variance in students' academic performance, $F(3, 167) = 4.5$, $p = 0.005$. Results indicated that both feedback presentation format and participants' academic engagement significantly predicted academic performance scores (Table 3). Interestingly, moderation was revealed by a marginally significant interaction between the feedback presentation format and students' academic engagement ($p = 0.064$), which means that the relationship between the feedback format and students' scores was moderated by their academic engagement (see Figure 1). According to our *Hypothesis* 4, results suggest that providing feedback in video format may benefit students with lower levels of academic engagement. However, delivering feedback in written format may play a stronger part in academic performance when students have higher levels of academic engagement.

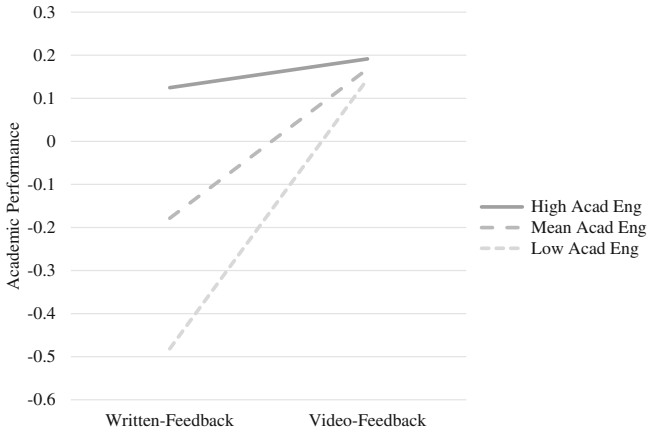

FIGURE 1 Moderation effect of students' academic engagement between feedback presentation format (Written or Video) and academic performance.

6 | DISCUSSION

Delivering feedback to large groups of students in virtual and/or hybrid teaching modalities is a challenge for the academic staff at universities. Literature has shown that students do not always have a positive perception of the feedback they receive (e.g., Carroll, 2014; Hounsell, 2007; Nicol, 2010; Van der Kleij & Lipnevich, 2021) and they often avoid processing EF messages delivered via digital learning platforms (Winstone et al., 2021). One way to improve students' feedback perceptions and promote students' engagement with feedback may lie in the format in which EF messages are delivered in digital environments. Recent findings suggest that university students tend to show a favourable predisposition towards feedback received in audiovisual format (Crook et al., 2012; West & Turner, 2015) compared to the widely used written format (Chang et al., 2012; Henderson et al., 2019; Wolsey, 2008). This may explain why students do not process this information as expected. In the current study, we examined the extent to which feedback presentation format (e.g., video vs. written) influences students' perceptions of feedback, students' decision to access generic EF messages for high-stakes assignments, and its impact on academic performance (Mahoney et al., 2019; Turner & West, 2013). In addition, we examined the extent to which students' academic engagement moderates the relationship between feedback presentation format and students' academic performance.

The first aim of this study was to investigate whether the feedback presentation format influences students' feedback perceptions (in terms of satisfaction with the EF messages received and the perceived usefulness of the feedback format). Previous findings have shown that students prefer video-feedback compared to written-feedback (e.g., Crook et al., 2012; Espasa et al., 2022; Henderson &

Phillips, 2015; West & Turner, 2015). Some authors even suggest that delivering a generic single video to a whole cohort may be more highly valued than written feedback provided to individual students (Mahoney et al., 2019). In our study, participants expressed slightly higher satisfaction with the content of video-feedback messages and perceived this format as more useful than written-feedback. However, no significant differences between the conditions were apparent. Overall, students in both the written- and video-feedback groups rated the EF received in a similar fashion after controlling for the effects of their academic engagement, an individual characteristic that positively predicted the students' feedback perceptions (Handley et al., 2011; Price et al., 2011). It is worth mentioning that students from both the written- and video-feedback conditions rated the feedback received and the presentation format positively. This finding aligns with prior research (Crook et al., 2012; Poulos & Mahony, 2008) and contradicts claims that higher education students are frequently dissatisfied with feedback (e.g., Carroll, 2014; Hounsell, 2007; Nicol, 2010).

The second aim of the study was to explore the extent to which feedback presentation format influences students' decisions to access EF messages and their academic performance. When it comes to students' commitment to access and process EF messages, the literature claims that university students do not access digitally-delivered feedback as expected (Timmers & Veldkamp, 2011; Winstone et al., 2021) and that the presentation format may play a role in this (Mahoney et al., 2019). Existing research suggests that students are more likely to engage with generic video-feedback than with written- and audio-feedback (Cann, 2007; Crook et al., 2012; Mahoney et al., 2019). Based on the existing literature, we predicted that students in the video-feedback group would access significantly more EF messages than students in the written-feedback group (e.g., Crook et al., 2012; Mayhew, 2017; West & Turner, 2015). Contrary to our prediction, the results indicated that students in the written-feedback group accessed more EF messages than their counterparts in the video-feedback group. Although there is scarce research showing that students may be more likely to access written-feedback compared to video-feedback (Borup et al., 2015), our finding is consistent with this pattern. This written-feedback access advantage observed in our study could be attributed to the processing speed required to comprehend EF, which may require a higher level of attention in order to review previously-acquired knowledge located in students' long-term memory. Thus, participants in the written-feedback group probably accessed more EF messages because they could easily take control of the reading speed while processing the text. On the other hand, the speed of speech used in video-feedback may not suit every listener's needs, an aspect that could discourage some students from using this type of feedback. Despite this trend in favour of written feedback, it is worth noting that students in both groups accessed a limited number of EF messages and that some skipped them all, which is in line with what the literature suggests (Winstone et al., 2021).

We also aimed to explore the impact of feedback presentation format on students' academic performance. In general, students in the video-feedback group outperformed their counterparts in the written-feedback group, which is consistent with previous claims (e.g., Denton, 2014; Mahoney et al., 2019). To better comprehend this effect, the third aim of this study examined the extent to which student's academic engagement might impact the relationship between feedback presentation format and performance. Our findings suggest that providing feedback in video format may benefit students with lower levels of academic engagement, whereas delivering feedback in written format may impact academic performance when students have higher levels of academic engagement. It is possible that video-feedback messages were processed with less effort, and those with lower levels of engagement took advantage of this. It is also possible that using innovative teaching experiences (e.g., listening to your professor explain the solutions to the assignments anytime and anywhere, that is, video-feedback) has modified the students' sense of connection to the course and, in turn, their academic achievement (Wong et al., 2022).

7 | LIMITATIONS AND FUTURE RESEARCH

Although in this study we investigated whether feedback presentation format (video vs. written) influences students' feedback perceptions, feedback access and academic performance in a digital learning environment using high-stakes tasks, our research reveals some areas for improvement that warrant further studies. First, we delivered a set of generic EF messages to an entire cohort of students. Given the time constraints inherent in teaching large groups, generic EF was provided based on evidence-based principles (e.g., providing the correct response along with an explanation). Future studies could examine whether tailoring video-feedback to a range of students' responses may increase feedback use beyond generic video- and written-feedback. Second, screen-captured video feedback presenting a slide deck with an audio narration was recorded and posted alongside the assignment on the course website. Although this audiovisual format is a simple and convenient way to create feedback messages with the instructor's presence guaranteed by his or her own voice, future studies could explore whether instructor presence at eye-level in the video-feedback may enhance students' engagement with this information, thus increasing their sense of connection to the course (Wong et al., 2022). Third, we employed relatively long EF messages, which may have discouraged the students from accessing this learning material. Our EF messages were rooted in evidence that explanations foster learning. However, it is difficult to know whether the length of the feedback messages may have influenced students' decision to access this information, their perceptions, and their performance. Fourth, participants were encouraged to access EF messages and review their responses. However, no task revisions were assigned, which may have reduced the likelihood of students using the EF messages as expected. Future research should explore the extent to which giving students the opportunity to use feedback to improve the assignments would increase feedback use in different presentation formats. Similarly, future research should examine the amount of time students spend processing feedback and consider collecting online data on the

cognitions they deploy while reviewing the feedback messages. Finally, learners were given a set of high-stakes activities to explore if they voluntarily seek out the corresponding EF messages. Given that current empirical studies typically examine feedback use in one task (e.g., writing an essay), we urge researchers to include a greater number of assignments to better track students' decision to use digitally-delivered feedback throughout their courses.

Our study was conducted over an entire academic course using high-stakes assignments and EF messages delivered through a digital learning platform. This ecologically valid setup covers one of the main challenges faced by academic staff in universities on a daily basis: effectively delivering feedback to large groups of students on their academic assignments to ensure that messages are received, processed, and valued, thereby promoting learning (Henderson et al., 2019). Our study provides several insights into the instructional implications of feedback delivery through digital learning platforms. The findings suggest that learners positively value the EF they receive in both presentation formats, which means that they recognize the importance of this information in the learning process. However, students' engagement in using feedback messages may be quite limited. Regarding the presentation format, our study indicates that students may access generic written-feedback more frequently than screen-captured video-feedback. However, when it comes to students' academic performance, the results showed that video-feedback positively influenced course achievement, especially when students had low levels of academic engagement. This disparity of results between video and written feedback shows the need for further (quasi-)experimental studies in real-life learning environments, as this is a relevant aspect of the interaction process between instructors and students (Mahoney et al., 2019).

AUTHOR CONTRIBUTIONS

Ignacio Máñez: Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; writing – original draft; writing – review and editing. **Noemi Skrobiszewska:** Resources; software; visualization; writing – review and editing. **Adela Descals:** Methodology; resources; software; supervision; visualization. **María José Cantero:** Methodology; resources; software; supervision; visualization. **Raquel Cerdán:** Supervision; validation; writing – review and editing. **Óscar Fernando García:** Resources; visualization. **Rafael García-Ros:** Data curation; formal analysis; validation; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interests to disclose.

PEER REVIEW

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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APPENDIX A

TABLE A1 Spanish adaptation of the Schoolwork Engagement Inventory – SEI–EDA – (García-Ros et al., 2018, 2021; Salmela-Aro & Upadaya, 2012).

Cuestionario de Implicación Académica Por favor, señala la alternativa que mejor describe tu situación en los estudios durante este último mes.
1. En mis estudios me siento lleno de energía
2. Pienso que las actividades académicas en la carrera son relevantes y significativas
3. El tiempo me parece que "vuela" cuando estoy estudiando
4. Me siento con gran fuerza y vigor mientras estudio
5. Me entusiasma lo que estudio en mi carrera
6. Cuando estoy trabajando o estudiando me olvido de todas las cosas que pasan a mi alrededor
7. El trabajo y actividades de la carrera me resultan ilusionantes
8. Tengo ganas de ir a clase cuando me levanto por las mañanas
9. Me satisface trabajar con intensidad en mis estudios

Note: The responses are rated on a five-point scale ranging from 1 (Never) to 5 (Always).

APPENDIX B

TABLE B1 Pearson correlations of measures.

Measure	1	2	3	4	5
1. Academic engagement	—	0.339***	0.346***	0.05	0.157*
2. Satisfaction with feedback		—	0.716***	0.114	0.094
3. Perceived usefulness of feedback format			—	0.124	0.066
4. Feedback access				—	0.251***
5. Academic performance					—

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.