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Effects of different types of computer-assisted corrective feedback on L2 pragmatics learning

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Abstract

Despite the widely-acknowledged and much-investigated impact of feedback on second language acquisition, surprisingly little is known about its role in the development of L2 pragmatics. This gap may stem from the limited focus on pragmatics in second language curricula, leading to inconclusive findings on the effects of various feedback types. Additionally, the role of technology in this area is understudied, despite evidence that computer-assisted language learning (CALL) feedback positively impacts language learning. The present study addressed these gaps by examining the effects of computer-assisted corrective feedback (CF) on L2 pragmatics learning in an EFL context. A quasi-experimental study was conducted with three PowerPoint-based corrective feedback groups, using pre- and post-testing. The feedback types included: (1) an affective component via video-based pedagogical agent (PA), (2) high-information feedback as text, and (3) a combination of text and PA videos. Statistical analysis revealed that the group receiving feedback with only the affective component made significant learning gains and outperformed the other groups. These findings support the argument that motivation, enhanced by interaction with the PA, can improve pragmatics learning performance. This highlights the potential of affective feedback components in facilitating L2 pragmatics acquisition.

Keywords: affective feedback; corrective feedback; pragmatics; CALL

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Introduction

It is already well established that CF produces a positive effect on learning (Li, 2010). However, its effect on L2 pragmatics learning is not well understood (Yousefi & Nassaji, 2021). In addition, "...the factors constraining its effectiveness" (Li, 2010, p.349) are still under researched. This study sought to address these gaps in the knowledge by investigating how components of affective feedback could enhance CF. This purpose was determined because it has already been shown to positively affect learning (Lang et al., 2022) and there is still little research on how affective feedback affects cognitive load and learning (Plass & Kalyuga, 2019). Scarantino's (2017) Theory of Affective Pragmatics, which asserts that emotional reactions in an immediate context can convey more information than emotional reactions alone, was also drawn upon to enhance the context of the affective feedback used. Referencing Mishra's (2006) construct of affective feedback, an affective component, a video-based pedagogical agent of an EFL teacher delivered through PowerPoint, was created that could provide metapragmatic CF. Additionally, drawing upon Scarantino's (2017) Theory of Affective Pragmatics, specific speech act circumstances in which the PA was situated and acted were created. Additionally, a traditionally high performing form of feedback, high-information feedback, which consisted of metapragmatic corrective feedback and a form of self-regulative feedback, was used as a comparative form of feedback.

The present study thus focused on three PowerPoint CF treatments: high-information feedback (text only), affective feedback (the video-based PA only) and high-information affective feedback (a combination of the high-information text and video-based PA). Each of these different types of feedback was administered to a group of EFL high school learners and their relative effectiveness on pragmatics learning performance was measured using pre-post testing. This study contributes to the field of L2 pragmatics learning by addressing gaps in CF research, particularly its effectiveness in this domain and the factors that constrain it. By integrating affective feedback with Social Presence Theory and Social Agency Theory, it explores how emotional and social components can enhance CF. Through situating feedback within specific speech act scenarios to increase contextual relevance and developing a novel video-based pedagogical agent to deliver metapragmatic CF, the findings provide valuable insights into the design of CF strategies for improving L2 pragmatics learning.

Literature Review

Feedback

Feedback is an information-sharing process, acknowledging that feedback is seen as information provided by an agent (e.g., teacher or peer), involving learners actively generating insights from this information to enhance their work (Hattie & Timperley, 2007). This approach encourages "feedback literacy," which refers to students' capacities to seek, generate, and utilize feedback effectively (Carless, 2022). Feedback has been widely recognized as a critical component in the acquisition of second language (L2) pragmatics, with evidence pointing to its overall positive impact on learners' pragmatic competence (Yousefi & Nassaji, 2021; Yousefi & Nassaji, 2024). However, while the general effectiveness of feedback is well-established, there remains considerable uncertainty regarding which types of feedback are most beneficial for learners. For example, research comparing explicit and implicit feedback has yielded mixed results. Some studies suggest that explicit feedback, which clearly identifies errors and provides direct instruction on how to correct them, leads to better outcomes than implicit feedback, which is subtler and often relies on hints or prompts (Guo, 2013; Nguyen

et al., 2012). In contrast, other studies have found no significant difference in the effectiveness of these two feedback types (Fukuya et al., 1998; Nguyen et al., 2017). These discrepancies suggest that learner-specific factors, such as individual differences in cognitive, emotional, or motivational capacities, may play a crucial mediating role in determining the success of feedback strategies.

One underexplored yet potentially influential factor in this context is how learners respond to feedback that incorporates an affective component. Affective feedback refers to responses to a learner's language production that include an emotional element, such as encouragement, empathy, or expressions of approval or disappointment (Mishra, 2006). The role of affective feedback in L2 learning is the subject of ongoing debate. On one hand, some researchers argue that affective feedback may hinder learning by consuming limited cognitive resources and diverting attention away from the primary task (Li et al., 2013; Guo et al., 2014). According to this perspective, the emotional content of feedback could interfere with the learner's ability to process linguistic information, thereby reducing the effectiveness of the feedback (Cabestrero et al., 2018). Furthermore, studies have suggested that emotional distractions may negatively impact memory retention (Curci et al., 2013; Plancher et al., 2019), creativity (Isen et al., 1987), and overall learning outcomes (Pekrun & Linnenbrink-Garcia, 2012).

On the other hand, a growing body of research highlights the potential benefits of affective feedback in enhancing learning outcomes. For instance, it has been shown that affective feedback can improve working memory (Frechette & Moreno, 2010) and encourage learners to invest greater mental effort in their tasks (Plass & Kalyuga, 2019). Affective feedback that provides support and encouragement has also been found to enhance learners' motivation, emotional engagement, and performance (Kim et al., 2007). These findings suggest that affective feedback, when delivered appropriately, could serve as a powerful tool for fostering both cognitive and emotional engagement in L2 learners. However, as Lang et al. (2022) note, the potential benefits of affective feedback remain "barely explored" (p. 3), and more research is needed to fully understand its impact on L2 learning processes.

The relationship between emotion and cognition provides a theoretical foundation for exploring the role of affective feedback in language learning. Advances in affective neuroscience have demonstrated that emotion and cognition are deeply interconnected, with emotional processing involving highly integrated cortical networks (Plass & Kalyuga, 2019). In fact, they went further by asserting that "a functional separation of emotion and cognition can no longer be supported by the available research evidence" (Plass & Kalyuga, idem, p. 354). This challenges earlier models that treated emotion and cognition as separate domains, emphasizing instead that emotional and cognitive processes are mutually influential. For example, the amygdala, a small brain region responsible for processing emotions, has been shown to respond to emotional stimuli even before conscious awareness or focused attention occurs (Whalen et al., 1998; Anderson et al., 2003). This early response enhances perception and facilitates the encoding of emotional events into memory (Phelps, 2004). In contrast, non-emotional information does not benefit from the same neural mechanisms, leading to less effective memory encoding and retention (Kensinger & Corkin, 2004; Segal & Cahill, 2009).

Research further supports the idea that emotional information is more likely to be stored in long-term memory than neutral information. For instance, studies have found that emotionally charged events are remembered more vividly and accurately than non-emotional ones (Liu et al., 2008; Nielson & Powless, 2007). The stronger the emotional response triggered by an event, the better it is remembered (Buchanan, 2007; Sharot et al., 2007). These findings suggest that the emotional content of feedback could play a significant role in shaping learners' memory and attention processes, potentially making affective feedback a valuable tool for enhancing L2

learning. However, despite the wealth of evidence on the effects of emotion on cognition, the specific application of affective feedback in L2 pragmatics remains an underexplored area of research.

To better understand the effectiveness of affective feedback in L2 pragmatics acquisition, it would be useful to compare it with other well-established forms of feedback, such as high-information feedback. High-information feedback combines corrective feedback, which directly addresses linguistic errors, with self-regulative feedback, which helps learners reflect on their learning processes and strategies (An et al., 2021). This type of feedback has been shown to be particularly effective in enhancing learning outcomes. For example, a meta-analysis by Wisniewski et al. (2020) found that high-information feedback had a large positive effect size (0.99) on learning performance. The effectiveness of high-information feedback lies in its ability to help learners manage their attention, emotions, and motivation, thereby creating optimal conditions for learning.

By comparing the effects of affective feedback and high-information feedback on L2 pragmatics acquisition, researchers could gain valuable insights into how different feedback strategies influence learners' cognitive and emotional engagement. Such research could also shed light on the broader question of how emotion and cognition interact in the context of language learning, ultimately contributing to the development of more effective and personalized feedback strategies for L2 learners.

Computer-Assisted Corrective Feedback

The use of technology to deliver corrective feedback in second language (L2) pragmatics learning has been proposed as a promising solution to address key challenges in traditional classroom instruction. These challenges include limited instruction time and the potential embarrassment learners may feel when receiving direct feedback on their pragmatic errors in front of peers (Sydorenko et al., 2020; Taguchi & Roevers, 2017). By leveraging technology, feedback can be delivered in a private, self-paced, and non-threatening environment, which may enhance learners' receptivity and engagement with the correction process.

Research has generally highlighted the benefits of various forms of technology—such as mobile devices, computer-assisted language learning (CALL), and computer-mediated communication (CMC)—in supporting L2 pragmatics acquisition. These tools have been particularly effective in drawing learners' attention to grammatical forms and pragmatic features, thereby facilitating language development (Yousefi & Nassaji, 2021). However, despite the growing body of evidence supporting the use of technology in L2 instruction, relatively few studies have specifically explored the application of technology to provide corrective feedback tailored to learners' pragmatic errors.

One notable example of technology-supported feedback in L2 pragmatics is the work of Holden and Sykes (2013), who developed Mentira, an augmented reality mobile game designed to teach Spanish. In this game, learners interacted with non-player characters (NPCs) who responded to their language choices with subtle emotional reactions. However, the researchers found that participants initially failed to notice these implicit feedback cues from the NPCs. It was only after multiple iterations of the game—during which the NPC feedback was modified and made more explicit—that learners began to recognize and respond to the feedback. This finding underscores the difficulty of making implicit corrective feedback salient enough for learners to notice and act upon in virtual environments.

Similarly, Tang and Taguchi (2020) addressed the issue of feedback saliency in their game-based learning study, which focused on the social consequences of learners' pragmatic choices. They developed a game called Questaurant, in which NPCs provided affective feedback

through exaggerated facial expressions, bodily gestures, and behaviors in response to learners' language use. For example, NPCs displayed distinct emotional reactions based on whether a learner's pragmatic choice was appropriate or inappropriate. Despite these enhancements, their experimental results mirrored those of Holden and Sykes (2013): most participants still failed to notice the NPCs' implicit feedback. This suggests that even when affective feedback is designed to be more explicit through exaggerated emotional cues, learners may not always perceive it as corrective feedback.

The challenge of making implicit feedback noticeable was also observed by Sydorenko et al. (2020) in their study on pragmatics role-play simulations using CALL. Their research involved a virtual environment where learners engaged in simulated role-plays designed to teach pragmatic skills. The study concluded that implicit feedback—such as NPC emotions and behaviors—needs to be highly salient to be effective. Furthermore, they emphasized the importance of coupling implicit feedback with explicit instruction to maximize its impact. Specifically, they suggested that combining explicit feedback (e.g., direct explanations of errors) with implicit feedback (e.g., subtle emotional or behavioral cues) in a sequential manner could produce better learning outcomes. As they noted, "it is likely that certain sequences (e.g., explicit, followed by implicit) might produce better results" (Sydorenko et al., 2020, p. 62). All these pragmatics studies that involved implicit feedback (i.e. NPC emotions and behavior) in a virtual environment already mentioned above found that more effort had to be made to make implicit feedback noticeable.

Although the research into the effects of PA and NPC affective feedback on learning continues, most of it has focused on learning of subjects other than L2 pragmatics (Eslami & Zohoor, 2023). Even so, those studies also show that much is still not understood about the effects of different types of affective feedback on learning (Arguedas et al., 2024).

In any case, across the pragmatics studies that have been conducted, a consistent theme emerges while implicit feedback in virtual environments (e.g., NPC emotions and behaviors) holds potential for fostering L2 pragmatics development, it often fails to capture learners' attention without additional modifications. Researchers have repeatedly found that significant effort is required to make implicit feedback noticeable and meaningful to learners. Enhancing the saliency of feedback—whether through exaggerated emotional cues, explicit instruction, or a combination of both—appears to be a critical factor in ensuring its effectiveness in technology-supported L2 pragmatics instruction. These findings highlight the need for further research to refine the design of computer-assisted corrective feedback systems, particularly in terms of balancing implicit and explicit feedback to optimize learning outcomes.

Rationale for the Study

Existing research highlights the significant potential of technology in delivering affective feedback and exploring its effects within a controlled environment. This opens opportunities to better understand how such feedback can influence language learning outcomes. Additionally, technology-supported feedback instruction has been suggested to be able to reduce the challenges of limited instruction time and embarrassment that learners potentially experience when getting direct feedback on their pragmatics errors in class (Taguchi & Roevers, 2017; Sydorenko et al., 2020).

Moreover, the role affective feedback plays on L2 pragmatics learning remains contentious. Some argue that such feedback consumes limited cognitive resources and draws attention away from the task at hand (Li et al., 2013; Guo et al., 2014), interfering with the learning process (Cabestrero et al., 2018; Pekrun & Linnenbrink-Garcia, 2012). Memory is also argued to be negatively affected (Curci et al., 2013; Plancher et al., 2019) along with creativity

(Isen et al., 1987). However, others have found that affective feedback can help with increasing working memory (Frechette & Moreno, 2010) and encourage learners to commit greater mental effort (Plass & Kalyuga, 2019). Kim et al. (2007) showed that emotional feedback that provides support is more likely to enhance emotions, motivation, and performance. However, overall affective feedback's potential benefits remain "barely explored" (Lang et al., 2022, p.3).

Based on the existing research it was clear to us that considerable potential exists for the use of technology to provide affective feedback and to investigate its effects in a controlled environment. Our research question was thus: *To what extent do different types of computer-assisted corrective feedback improve L2 learners' pragmatic learning performance?*

Methodology

Research Design

This quasi-experimental study compared the effects of three types of computer-assisted feedback on L2 pragmatic learning; a high-information group, an affective group and a high-information affective group. The study included a pretest, three different corrective feedback treatments, an immediate posttest and an exit questionnaire. The feedback mode (the way feedback was delivered in each treatment) was the independent variable of this study. The null hypothesis was that there would be no difference in pragmatics learning based on treatment feedback mode. This was tested with one-tailed pair-sample testing and by calculating effect sizes.

In week one of the study, there was an orientation, a 15-minute pretest and the first treatment. During the orientation the participants were shown how to use and navigate through the computer-based treatment materials (delivered through PowerPoint). The treatment included three speech act simulations appropriate for the age and proficiency levels of the participants: apologies, requests and refusals. These scenarios unfolded through interaction with a pedagogical agent (PA), a video-based character who provided feedback (Kim et al., 2007). Participants were presented with different scenarios and were prompted to select the most appropriate response from several provided options. If they made errors, they were corrected by the PA and had to select again. They then received further feedback until they chose correctly.

In weeks two and three, the same treatment was administered again. In week three, after the final treatment, participants completed an immediate posttest and an exit questionnaire.

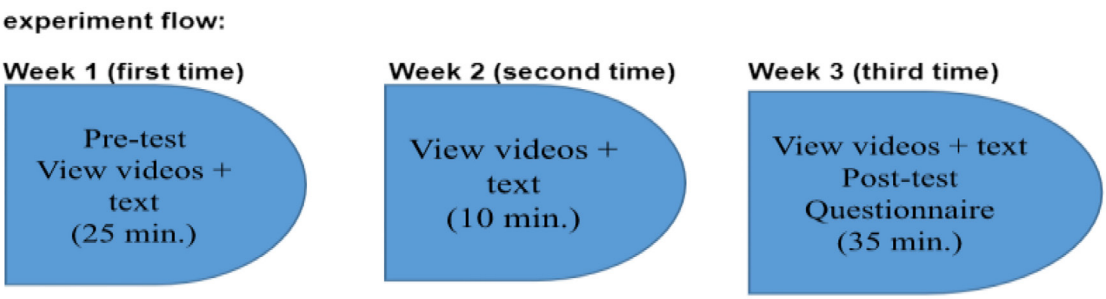

Figure 1 *Experiment flow.*

Population and Samples

Following ethics approval, participants were recruited by visiting first and second-year high school classrooms in a large city in Japan and handing out fliers detailing the experiment. We recruited 82 participants (3 males and 79 females). All of them provided informed consent. Participants were on average 15.77 years old (SD = 0.63 years), and their English proficiency ranged from beginner (CEFR A1) to intermediate level (CEFR B1). They were randomly assigned to one of three treatment types.

Research Instruments

Pretest and Posttest

Participants' "pragmatics learning performance" was measured using pre-posttests, whose content was similar in format to that used in the treatments (described below). The tests had a total of ten question items worth one point each.

All the pre-post test questions were reviewed by two expert panels, piloted with volunteer Japanese high school students and modified if frequently answered incorrectly at both the pretest and posttest stage. The final versions were also administered to an experienced native teacher who answered all the questions correctly.

The content for the pre-post test questions came from *Metro 1, Let's Talk 2 (2nd ed.), Four Corners (2nd ed.), American Headway (3rd ed.), Cambridge Experience 1*, textbooks widely used in Japanese 1st and 2nd year high school classes with 15–16-year-old learners.

Treatments

There were three treatment groups, each receiving a different type of feedback. The affective group received feedback from the PA in the form of videos with L1 subtitles. The high-information group (chosen for comparison since it has already been established as an effective form of feedback; Wisniewski et al., 2020), only received text feedback. And the affective high-information received feedback through both PA videos and text. All the metapragmatic feedback was provided in the L1 and L2. However, the self-regulative feedback (example sentences of correct target expression usage) was only provided in the L2.

To optimize the affective feedback, this study drew upon the findings of Ko and Eslami (2021). According to them, both explicit and implicit corrective feedback should be used in video games and virtual simulations. This is because explicit corrective feedback helps learners to make progress while implicit corrective feedback encourages them to explore more. Following this rationale, the affective feedback included explicit metapragmatic feedback and implicit emotional reactions and responses from the video-based PA (Tang & Taguchi, 2020; Mishra, 2006).

To ensure that the participants fully understood what to do, all oral instructions were in their L1. All the questions in the pre-post tests were also written in the participants' L1. Only the multiple-choice answer options were not translated. This was done to ensure that the participants had to rely exclusively on the CF from the treatments and no other L2 pragmatics background knowledge.

In the PowerPoint treatments, the participants were given speech act scenarios (an apology, a request and a refusal) with an explanation of the nature of the situation. For example, for the apology scenario, the first slide read "You are going to meet a teacher, Mr. Kent, but you are 30 minutes late! You knock on the teacher's door." (see Figure 2). Next, they watched a short video of the PA's response (i.e. "Why are you late?") and then they had to choose the best pragmatic response to the PA from three options. They had to consider power, distance and imposition

to answer correctly (Brown & Levinson, 1987). If they chose the correct answer, they advanced to the next scene of the scenario (each scenario had three scenes) where the interaction would continue. If they answered incorrectly, they received corrective feedback and returned to the original scene until they answered correctly. Additionally, to help the participants understand whether they had answered correctly or not, sound effects were also added (Loderer et al. 2019; Plass & Kalyuga, 2019). Each treatment time was 10 minutes and there was no pragmatics instruction.

The treatment materials were reviewed for accuracy and appropriateness by a panel of four Japanese English teachers (JETs) and two Japanese language professors, all with a minimum of five years of language teaching experience. A second panel, consisting of JETs and one Japanese English language professor, was asked to confirm that the affective feedback content conveyed the same information as the high-information feedback.

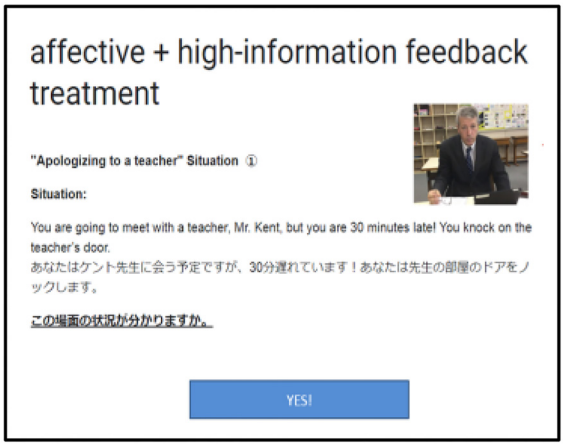

Figure 2 *Apology scenario.*

As can be seen from Figure 3, the PA's spoken discourse was included in written form above the video in both English and Japanese. The PA video in the middle of the screen had Japanese subtitles. Below the video were the three answer options.

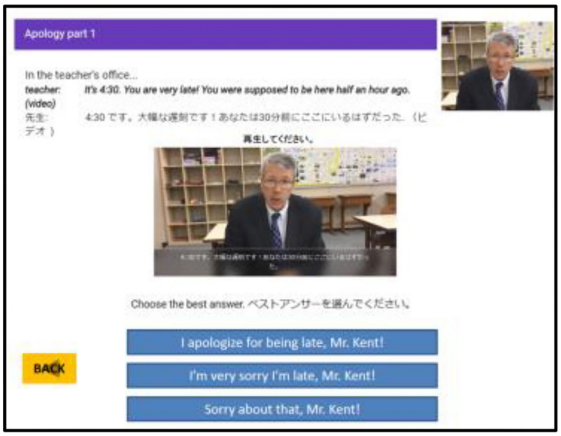

Figure 3 *Apology scene and response prompt.*

In the high-information affective feedback condition, the affective feedback was included in the video in the PA's reaction (see Figure 4). The blue box on the upper left showed the answer option that the participant previously selected.

If participants responded correctly, they received feedback in the form of an on-screen emoji and the Japanese symbol for 'OK' (see Figure 7).

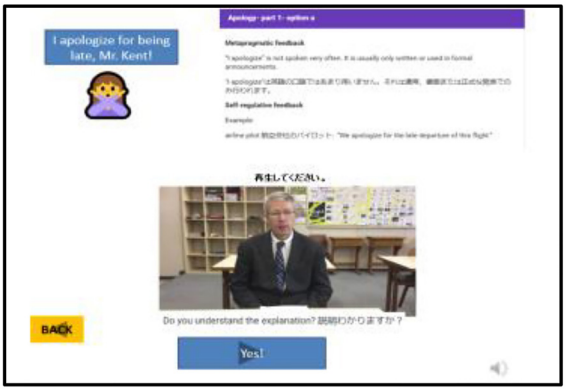

Figure 4 *High-information affective feedback.*

Figure 5 *High-information feedback.*

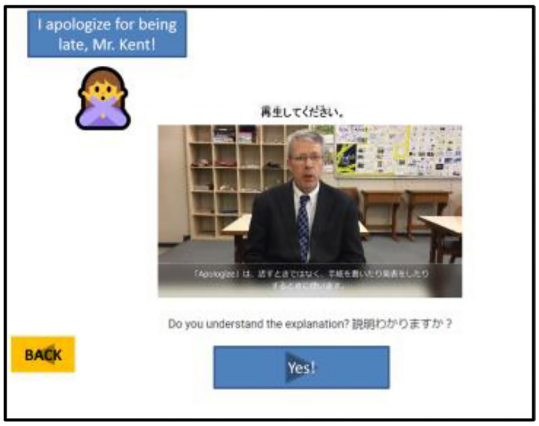

Figure 6 *Affective feedback.*

Figure 7 *Correct answer feedback.*

Exit Questionnaire

In the questionnaire, participants were first asked to rate their experiment experience: did they understand what to do? Was the PowerPoint understandable and easy to navigate? Was the treatment time sufficient? Also, it sought to determine how effective the participants thought the feedback they received was using a five-point Likert scale. In addition, space was provided below each question for participants to provide their reasons for any score of three or lower. Lastly, the questionnaire asked about age, gender, and English proficiency background information to determine if there were any moderator variables.

Data Analysis

A one-way ANOVA was conducted to determine whether the three groups' pretest scores were comparable. After data normality was confirmed, the mean (M) and standard deviation (SD) for all pretest and posttest feedback groups were calculated. One-tailed paired-sample t-tests were conducted to determine whether there were any statistically significant differences between the pretest and posttest means of each treatment group. Effect sizes for each treatment group were calculated to compare their relative effectiveness (Hinkle et al., 1994).

Results

Descriptive Statistics

The three pretest and posttest feedback groups' "pragmatics learning performance" scores (max score = 10 points) were confirmed to be normally distributed with the help of a Shapiro-Wilk Normality test (see Tables 1 and 3) for an alpha level of .05. Also, a one-way ANOVA (see Table 2) was performed which showed that the three groups' pretest scores were comparable for an alpha level of .05. From the pre-post test results, all the groups improved: the affective feedback group improved the most and the high-information affective group improved the least.

Table 1 Pretest descriptive statistics.

Feedback type	n	M	SD	Shapiro-Wilk normality
Affective	28	5.32	1.96	0.24
High-information	27	5.41	1.72	0.45
High-information affective	27	5.82	1.88	0.25

Table 2 Single factor ANOVA: all feedback groups' pretest scores.

Source of variation	SS	df	MS	F	P-value	F-crit
Between groups	3.79	2	1.89	0.55	0.58	3.11
Within groups	272.7	79	3.45			
Total	276.49	81				

Table 3 Posttest descriptive statistics.

Feedback type	n	M	SD	Shapiro-Wilk normality
Affective	28	5.93	1.48	0.29
High-information	27	5.85	1.79	0.06
High-information affective	27	5.96	1.68	0.07

Inferential Statistics

Affective Feedback Group Inferential Statistics Results

Next, we wanted to know if any of the groups had improved significantly in their pragmatics learning. More specifically, we wanted to determine whether there was any statistically significant difference between the means of the pretest and posttest for each of the three groups. For this purpose, we used paired-sample t-testing. Given that few L2 language learning studies have researched the effectiveness of Mishra's (2006) affective feedback (which was the construct used in this study) and the relatively small number of participants, a one-tailed significance level of $p = .1$ was chosen.

For the affective feedback, the *p-value* was calculated to be .09. In other words, the pretest and posttest scores were statistically significantly different at the $p = .1$ level. Therefore, the null hypothesis that the pretest and posttest score means were the same was rejected at the $p = .1$ level.

Next, the effect size, Cohen's *d*, was calculated. The effect size for the difference between the pretest and posttest means was 0.37. This is considered a small effect size (Hinkle et al., 1994). See Table 4 for a summary of all the results.

Table 4 Feedback group effect sizes.

Effect sizes	n	Cohen's *d*	
Affective	28	0.37	$^{**}p = .1$
High-information	27	0.25	
High-information affective	27	0.08	

High-Information Feedback Group Inferential Statistics

The descriptive statistics for both the pretest and posttest scores of the high-information feedback group's distribution were also found to be normal (See Tables 1 and 2.). This being the case, they were compared using paired-sample t-testing to determine whether there was any statistically significant difference between them.

Given that high-information feedback has already been shown to be one of the most effective forms of feedback (d =0.99) (Wisniewski et al., 2020) and therefore generally has a positive effect on language learning performance, it was decided that a one-tailed paired sample t-test should be conducted to determine if there was any statistically significant difference between the high-information feedback group's pretest and posttest score sets.

Using the paired-sample t-test, it was determined if there was a statistically significant difference between the pretest and posttest means. The *p-value* was calculated to be .15. As a result, high-information feedback pretest and posttest scores were not statistically significantly different at the $p = .05$ level. Therefore, the null hypothesis that the pretest and posttest group score means were the same was confirmed at the $p = .05$ level.

Next, the effect size was calculated to be 0.25. This is considered a small effect size (Hinkle et al., 1994).

High-Information Affective Feedback Group Inferential Statistics

The descriptive statistics for both the pretest and posttest scores of the high-information affective feedback group's distribution were found to be normal. They were compared using paired-sample t-tests to determine whether there was any statistically significant difference between them.

Given that high-information affective feedback in this study was a combination of high-information feedback, one of the most effective forms of feedback, and corrective feedback, which has also been found to have a generally positive effect (Li, 2010), it was decided that a one-tailed paired sample t-test be conducted to determine if there was any statistically significant difference.

Using the paired sample t-test, it was determined if there was a statistically significant difference between the pretest and posttest means. The p-value was calculated to be .35. As a result, high-information affective feedback pretest and posttest scores were not statistically significantly different at the $p = .05$ level. Therefore, the null hypothesis that the pretest and posttest group score means were the same was confirmed at the $p = .05$ level. The effect size was 0.08. This is considered a small effect size (Hinkle et al., 1994). Paired-sample t-tests showed that only the affective feedback group had a statistically significant gain at the $p = .1$ level.

Discussion

Impact of Affective Feedback

The affective feedback treatment in this study outperformed the high-information feedback and the high-information affective feedback treatments. This result is contrary to Hattie and

Timperley's (2007) claim that affective feedback does not aid cognition of complex learning because it does not provide supportive information for cognitive processing. However, in their article, they were referring to affective feedback that had been operationalized as criticism or praise. In this experiment, though, affective feedback was operationalized following Mishra (2006), who includes sympathizing, offering help, emotional reactions to (someone's) success and failure; all of these delivered in a specific context. In this study affective feedback was implemented with the help of a video-based PA who reacted emotionally, both positively and negatively, criticized and provided metapragmatic advice and hints to participants who made pragmatic errors. There was ample background information provided, with the affective feedback treatment also including contextualized "consequences" (Taguchi, 2022, p.329) through the emotional reactions of the PA for mistaken pragmatics selections. The high-information feedback, on the other hand, only provided information and scaffolding in the form of plain-text explanations. According to Fiorella and Mayer (2015), this limits engagement, thus interfering with learning and comprehension. The high-information affective feedback also included contextualized consequences. However, being that there was both video and text of the same information, this may have resulted in divided attention and subsequently lessened the processing of the input.

Contextualization can also have negative effects. This happens if it provides participants with a "myriad of contextual cues" (Taguchi, 2022, p. 315) that add cognitive demands. Additionally, some researchers suggest that contextualization cannot positively affect learning and that the only influencing factor is the instructional method itself (Clark, 1994; Clark & Salomon, 1986). If contextualization plays any role at all, Clark (idem) reasoned that it only supports the instruction delivery, not student achievement, learning, or motivation. However, the affective feedback group outperformed the other two feedback groups. This being the case, it seems that the contextualization was beneficial for the participants' learning. This is supported by the results of the exit questionnaire, which showed that the affective feedback group gave a high rating to the usefulness of knowing the speech act scenario (M = 4.32 out of 5, SD = 0.61).

Impact of the PA's Social Presence and Social Agency

The PA also facilitated social presence and social agency, which can enhance learning. Lang et al. (2022) argue that these can be achieved through a sense of human-like intimacy, created through conversational interaction, eye contact and facial expressions such as smiling. Although this study's PA only appeared in the videos, the participants may have perceived it as having human characteristics and subsequently had a more "positive emotional experience, stronger learning willingness, and greater satisfaction" (Lang et al., idem, p. 2). This in turn, may have resulted in better learning performance compared to those who did not interact with the PA (Gunawardena & Zittle, 1997). This is supported by the participant responses to the exit questionnaire: eight of the twenty-eight participants in the affective feedback group specifically mentioned that the PA's facial expressions, tone of voice and mood were helpful in determining the correct pragmatic responses. One participant from the high-information affective feedback group wrote, "From the teacher's expressions, I was able to understand the feeling and emotion of the situation" (HI-A 4-1-8). Another participant wrote, "It was very easy to understand what the teacher was feeling" (HI-A 5-2-26).

A related avenue for explanation is offered by Social Agency Theory, which stipulates that social cues exhibited by PAs make learners perceive computer–human interaction as real, fostering and encouraging social interaction (Mayer et al., 2003; Atkinson et al., 2005). When this is the case, there is a greater likelihood that they will apply more mental effort to process and perform learning tasks (Mayer & DaPra, 2012; Fiorella & Mayer, 2021).

Additionally, the interaction was likely enhanced by the personalization effect. According to Moreno and Mayer (2004), this involves the use of personal pronouns such as *you* to improve learning outcomes when learning from multimedia materials. This can result in higher motivation (Rey & Steib, 2013), a factor that has not been often considered helpful in the reduction of cognitive load in the traditional framework of cognitive load theory. Paas et al. (2005) proposed that the introduction of a motivation component into cognitive theory could aid the understanding of the relationship between mental effort and performance. This was echoed by Moreno (2010), who argued that learning is enhanced when working memory is supported in its resource allocation and thus lowering cognitive load (Plass & Kalyuga, 2019). This study's results lend support to Moreno's (2010) argument that motivation can aid learning performance.

The benefits of interaction with the PA could also be explained by Mayer's modality principle which stipulates that people learn more deeply from a multimedia message when the words are spoken rather than printed. This is due to the offloading of information from the visual to the verbal channel in the brain. This results in the verbal information being processed separately from the visual information and therefore does not compete for the same cognitive resources (Mayer, 2001). This being the case, messages become more salient and meaningful to the learner (Wilson et al., 2016). In this study, the affective feedback was delivered to both auditory and visual channels from the PA videos. In the high information feedback, though, there was only text. This was an advantage for the affective feedback because its rich visual content more likely entered long-term memory (Burmark, 2002). This is because the human brain processes visual information more effectively. The positive effect of the modality principle on learning outcomes in multimedia learning environments has been supported by many studies (Ginns, 2005; Harskamp et al., 2007; Moreno, 2006). However, there are studies demonstrating that the modality principle can have no or even negative effects on learning outcomes (Inan et al., 2015; Tabbers & van der Spoel, 2011), which is also known as a reverse modality effect. According to Albus and Seufert (2023), this reverse modality effect can especially occur when there are long and complex texts or when the learning environment is self-paced. This is not what occurred in our study, however. This is likely because the treatments were limited to ten minutes and all the feedback texts in the treatments were relatively short and included translations into the participants' L1 language.

A PA's agency and presence may not always have positive effects. The phenomenon known as the "uncanny valley" involves people experiencing discomfort when interacting with human-like artificial characters (Mishra et al., 2022). In our study participants did not seem to experience this phenomenon, as they were observed laughing and enjoying themselves during the PowerPoint simulations. As mentioned before, several of this study's affective feedback group participants said that the PA's emotional reactions helped them to understand more and answer the questions during the treatment correctly. Oppositely, none of the participants in the affective feedback group nor high-information affective group reported being troubled in any way by the PA.

High-Information Affective Feedback's Poor Performance

According to the redundancy principle, when identical information is presented as both visually and auditory simultaneously, it can increase a learner's cognitive load. This is likely what the high-information affective feedback group participants experienced. In this group, the participants received both the high-information text and the emotional response feedback from the PA videos, which may have led to redundancy. In addition, being that both the text and

videos were presented on the same PowerPoint slide, this added to the complexity (Moreno & Mayer, 2005).

Although the redundancy principle seemed to negatively affect participants' performance, one might ask why the subtitles provided in the affective feedback slides did not have as much of a negative effect. Sorden (2005) asserts that depending on the learners' L2 proficiency and background, what constitutes redundant information can vary. According to Leslie et al. (2012), for example, for more proficient learners with more background knowledge, content redundancy can interfere with learning. However, if the audio is difficult for the learner to understand, which can often occur in foreign language learning, accompanying visual text can aid understanding. In this research, given that the participants had little exposure to the treatment and limited L2 background, it is very possible that additional text in the form of subtitles in the affective feedback treatment helped more.

Conclusion

This study has shown that if certain conditions are met, affective feedback can in fact outperform cognitive feedback and improve L2 learning performance, lending support to Moreno's (2010) argument that motivation can aid learning. Secondly, this study provided support for Scarantino's (2017) Theory of Affective Pragmatics, demonstrating that if its principles are followed and context for emotional responses is provided, affective feedback can be enhanced. It also showed that pragmatics learning can occur without the need for a language learning instructor or classroom. Thirdly, it was found that the inclusion of a PA can help to make simulations interactive and personalized. However, redundancy in simulation feedback should be reduced to avoid cognitive overload. Finally, this study's poorly performing high-information affective feedback showed that redundant feedback in multiple channels can result in extraneous cognitive processing.

Although this study lends support to the positive impact of affective feedback on learning, it is important not to overstate and to acknowledge several limitations which hopefully can be addressed in future research. Firstly, the sample sizes were small, lowering power and decreasing the likelihood of detecting statistically significant differences in performance. Secondly, like most studies concerning contextual immersion (Harp & Mayer, 1997; Upal et al., 2007), the study was carried out over a relatively short period of time. Future studies could adopt a more longitudinal design. Thirdly, the pragmatics content in the treatments was not always natural since it was constrained by our EFL learner participants' limited vocabulary and grammatical skills. This being the case, more research is needed that focuses on helping learners gain more authentic pragmatic skills. Lastly, this study did not take full advantage of the context (i.e. the PA and situation) to activate background knowledge. Future studies could include PAs and situations that are even more familiar to their participants.

Also, participants were limited to Japanese EFL high school students. Different populations may well respond quite differently to affective feedback, especially as there is little research on the relationship between feedback type efficacy and participants' L2 proficiency (Li & Vuono, 2019). With regards to the treatments, the simulations were made only with videos and PowerPoint, which produced a low immersive virtual environment. However, it is important also to design simulations in high immersive virtual environments (i.e. virtual reality (VR) and augmented reality (AR)) to determine to what extent affective feedback can enhance or hinder learning and what their effects are on the cognitive load and whether it can be further enhanced by CALL affordances. Finally, posttest interviews would have made it possible to delve deeper into participants' perceptions of the feedback types and to better understand their impact.

In conclusion, affective feedback has been traditionally viewed as ineffective for learning purposes. This study has shown that it can in fact be informative and lower cognitive load, especially when given in an immediate, well-understood context and with the help of certain CALL affordances. The role of affective feedback is promising and worthy of further investigation. We hope this study has provided other researchers with possible directions for future research.

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Appendix A

Treatment Scenarios and Answer Options

"Apologizing to a teacher" Situation ①

Situation:
You are going to meet with a teacher, Mr. Kent, but you are 30 minutes late! You knock on the teacher's door.
あなたはケント先生に会う予定ですが、30分遅れています！あなたは先生の部屋のドアをノックします。
この場面の状況が分かりますか。

Apology Part 1
teacher: It's 4:30. You are very late! You were supposed to be here half an hour ago.
先生: 4:30 です。大幅な遅刻です！あなたは30分前にここにいるはずだった.
a. I apologize for being late, Mr. Kent!
b. I'm very sorry I'm late, Mr. Kent!
c. Sorry about that, Mr. Kent!

Apology Part 2
teacher: I understand that you are sorry, but why are you late? (video)
先生:　申し訳ないという気持ちは分かりましたが、なぜ遅れたのですか?（ビデオ）
a. My train was late during rush hour.
b. It was my mistake. I accidentally slept in.
c. It was my mistake. I should be more careful.

Apology Part 3
teacher: Well, it is OK this time. But you should really leave earlier when you have to take a train during rush hour.
先生：まあ，今回もお咎めなしとしましょう。でもラッシュ時に電車に乗らないといけないときは，本当はもっと早く出発するべきです。）
a. I can't believe this happened.
b. Sorry. I hope it doesn't happen again.
c. I promise that it won't happen again.

"Making a Request to a Teacher Situation" ②

Situation:
You have to submit a report tomorrow, but you still have questions. You go to your teacher's office to request help. The teacher's office door is half open and you see your teacher inside busy typing at the computer...
シチュエーション：
明日レポートを提出しなければなりませんが、まだ質問があります。あなたは先生のオフィスに行き、助けを求めようとしています。先生のオフィスのドアは半開きで、先生がコンピューターで忙しくタイプしているのが見えます...

Request Part 1
teacher: (busy typing and glances over at the student) Yes, may I help you? (video)
先生:（タイピングに忙しく、生徒をちらっと見る）はい、どうしましたか。（ビデオ）
a. I wonder if you could review my report.
b. Can you review my report?
c. I wondered if you could review my report.

Request Part 2
teacher: I am very busy at the moment. So, I am not sure I can help you now.
先生: 私は今とても忙しいです。ですから、お手伝いするのは難しそうです。
a. I understand that you are busy, but could you review my report later?
b. I understand that you are busy, but I was hoping my report could be reviewed later.
c. I understand that you are busy, but please review my report later.

Request Part 3
teacher: I understand that you want help, but I AM really busy now.
先生: あなたが助けを求めているのは分かりますが、私は今とても忙しいです。
a. It should only take a little time to check. Please help me.
b. Is it possible, um, if I could come back later to get help?
c. Can I, um, uh... come back later and get help then?

Refusal to a teacher situation ③

Situation:
A teacher has invited you to attend a graduation party, but you realize that it conflicts with your schedule.
シチュエーション:
先生から卒業パーティーに招待されましたが、都合がつかないことに気づきました。

Refusal Part 1
teacher: Good morning! I wanted to tell you something. Today, after sixth period, your classmates are going to have a small graduation party! Would you like to come?
先生: おはようございます！あなたにお伝えしたいことがあります。今日、6限が終わった後、クラスメートはささやかな卒業パーティーをします！来ませんか?
a. Sorry, I can't come.
b. I would really like to go but I have something at that time.
c. No, I can't go. I have to do something at that time.

Refusal Part 2
teacher: Really? Well, I don't think that the party will be long. Are you sure you can't even come for 15 minutes or so?
先生: 本当ですか? まあ、パーティーは長くはないと思います。 １５分だけでも来られないって本当ですか。
a. Well, uh... I have a medical appointment at that time, so I don't think that I can go.
b. Well, uh... again, I am busy at that time, so I don't think that I can go.
c. Sorry! I don't think that I can come at that time.

Refusal Part 3
teacher: Well, it's too bad that you can't come. I am sorry for not telling you earlier. I am sure that you will be missed by the students.
先生：ええと、あなたが来られないのは残念です。もっと早くお伝えできずすみません。学生のみんなは，あなたがいなくてさみしがると思います。
a. Sorry that I can't come- I feel really bad about it.
b. Thank you for your understanding. That means a lot to me!
c. Thank you for your understanding. Again, sorry that I can't come. I wish I could!

Appendix B

Pre-post Test Scenarios and Answer Options

Please read the situation. If you have read and understand it, please turn to the next page.
シチュエーションを読んでください。それをご理解いただけましたら、次のページへお進みください。

Situation:
You are doing a homestay in Sydney, Australia for two weeks. You are staying with the Smith Family. Please read the scenarios below and choose the best answer.
シチュエーション：
あなたはオーストラリアのシドニーで二週間ホームステイをしています。あなたはスミス家に滞在しています。以下のシナリオで、最適な回答を選択して下さい。

Read the scenario and Mrs. Smith's words. Then choose the best response.
シナリオとスミスさんの言葉を読んでください。次に、最適な応答を選択して下さい。

Scenario 1:
Mrs. Smith has just put a lot of food on your plate for dinner. However, it is too much for you to eat. You decide that you will talk to her about the matter.
シナリオ３：
スミス夫人は夕食のためにあなたのお皿にたくさんの食べ物をのせたところです。しかし、それは食べられないほど多すぎます。あなたはその件について彼女と話すことにします。

1. Mrs. Smith: Here you are! Please enjoy your food!
スミス夫人：どうぞ。召しあがれ。
Your response: ベストアンサーを選んで下さい。
a. Sorry, but I can't eat all of that food.
b. No. Thanks, though. I can't eat it all. Sorry about that.
c. I am very sorry. Unfortunately, I can't eat it all.

2. Mrs. Smith: Really? Are you sure that you cannot?
スミス夫人：本当ですか。本当に食べられないのですか。
Your response: ベストアンサーを選んで下さい。
a. Well, uh... usually in Japan I never eat this much dinner.
b. Well, uh...sorry, again, but I can't eat all that food.
c. Sorry! I can't eat all that food for dinner. It's too much.

3. Mrs. Smith: Well, sorry about that. I made a lot of extra because I thought you would eat it all.
スミス夫人：それはごめんなさいね。全部食べてもらえると思ったので多めに作りました。
Your response: ベストアンサーを選んで下さい。
a. Sorry. I feel bad that I cannot eat it all.
b. I am sorry. Thank you! I wish I could eat it all.
c. I am sorry. Thank you for understanding.

Read the scenario and Mrs. Smith's words. Then choose the best response.
シナリオとスミスさんの言葉を読んでください。次に、最適な応答を選択して下さい。

Scenario 2:
You want to go enjoy a day at the Sea World Amusement Park on the Gold Coast in Australia. However, you need to drive a car to get there and your host family mother, Mrs. Smith, who can drive you, is very busy this week. You decide to ask her for help anyway.

シナリオ２：
オーストラリアのゴールドコーストにあるシーワールド遊園地で一日を楽しみたいと考えています。ただし、そこに行くには車を運転する必要があり、車を運転してくれるホストファミリーのマザー、スミス夫人は今週とても忙しいです。とにかく彼女に助けを求める事にします。

1. Mrs. Smith: Oh, hi there.
スミス夫人：ああ、こんにちは。
Your response: ベストアンサーを選んで下さい。
a. Hello, Mrs. Smith. Can I speak to you now?
b. Hello, Mrs. Smith. Could I speak to you now?
c. Hello, Mrs. Smith. I wondered if I could speak to you now.

2. Mrs. Smith: Sure I have a few minutes. How can I help you?
スミス夫人：もちろん。いまなら数分間話せます。どうしたの。
Your response: ベストアンサーを選んで下さい。
a. I wondered if you could take me to Sea World.
b. I wonder if you could take me to Sea World.
c. I wonder if you can take me to Sea World.

3. Mrs. Smith: I am very busy this week. I am not sure that there is enough time for that.
スミス夫人：今週はとても忙しいです。それに十分な時間があるかどうかは分かりません。
Your response: ベストアンサーを選んで下さい。
a. I understand that you are busy, but can you take me to Sea World?
b. I understand that you are busy, but it would be fun to go to Sea World.
c. I understand that you are busy, but please take me to Sea World.

4. Mrs. Smith: I understand that you want to go to Sea World, but I don't have much time this week.
スミス夫人：シーワールドに行きたいのは分かりますが、今週はあまり時間がありません。
Your response: ベストアンサーを選んで下さい。
a. Is it, uhm... possible to go there maybe next week?
b. Can we go there, uhm, uhm, uhm...maybe next week?
c. It would only be a few hours. Please take me next week.

Read the scenario and Mrs. Smith's words. Then choose the best response.
シナリオとスミスさんの言葉を読んでください。次に、最適な応答を選択して下さい。

Scenario 3:
During your homestay at the Smiths' home, you go out to do some shopping. However, you forget what time it is and return two hours later than you promised!

シナリオ１：
スミス家でのホームステイ中、あなたは買い物に出かけます。しかし、時間を忘れて約束より二時間遅れで帰ってきてしまいます。

1. Homestay mother (Mrs. Smith): You are very late! You were supposed to return two hours ago!
ホームステイのお母さん（スミス夫人）：とても遅いですね！二時間前に帰るはずだったのよ！
Your response: ベストアンサーを選んで下さい。
a. I apologize for being late, Mrs. Smith.
b. I am very sorry for being late, Mrs. Smith.
c. Sorry about that, Mrs. Smith.

2. Mrs. Smith: I understand that you are sorry, but why are you late?
スミス夫人：あなたが申し訳ないと思っているのは分かりますが、なぜ遅れたのですか。
Your response: ベストアンサーを選んで下さい。
a. My bus came late to the station.
b. It was my mistake. But the bus was late, too.
c. It was my mistake. I forgot the time.

3. Mrs. Smith: Well, it's OK this time, but you should be more careful and check the time more often.
スミス夫人：そうですね、今回は大丈夫ですが、もっと注意して時間をもっと頻繁に確認した方がいいでしょう。
Your response: ベストアンサーを選んで下さい。
a. I promise that I won't be late again.
b. Sorry. I hope that the bus is not late again.
c. I can't believe that I am late.