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RESEARCH PAPER

Digital Feedback Modalities: Real-Time vs. Delayed Feedback in ESL Reading Platforms

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ABSTRACT

Although digital feedback tools are widely used in ESL, little has been investigated about the comparative effectiveness of real-time automated feedback to delayed teacher-mediated feedback on reading comprehension and motivation according to learners. However, the gamified platforms (e.g., Kahoot!, Duolingo) focus on prompt feedback, whereas conventional pedagogies stress delayed, instructor-mediated feedback. The existence of this gap requires empirical research to maximise feedback design to suit the different needs of learners. The proposed study fills one of the existing gaps in the field of ESL pedagogy, as it assesses the effects of the timing of feedback on cognitive and affective results. It is based on self-determination theory (SDT) and flow theory, which provide theoretical points of view on the relationship between feedback modality, learner autonomy, andement. In practice, it has the potential to assist the teacher and the makers of the platform in adjusting the feedback processes to their levels of proficiency. A mixed-method sequential design was used. Using a quantitative design, 300 ESL learners (who were stratified according to their proficiency level A2, B1, or B2) were randomly allocated to groups using a real-time (n=150) or delayed feedback (n=150). Understanding improvement was assessed using pre-/post-tests, and motivation was tracked using Likert-scale surveys. Qualitatively, thematic analysis of interviews (n=30) was conducted to inform opinions of learners, which was corroborated using Cohen's kappa (n=30: k=0.82) and sentiment analysis (Python: NLTK).

KEYWORDS ESL Reading Comprehension, Real-Time Feedback, Delayed Feedback, Digital Feedback Modalities, Learner Motivation, Self-Determination Theory (SDT), Mixed-Methods Research, Adaptive Learning Systems

Introduction

The digital counterparts in ESL education have found a new direction with the introduction of gamified learning environments, which have transformed how feedback comes into play in education. The given literature on the matter is supported by recent surveys that reveal so (Yunus & Hua, 2021; Lim & Yunus, 2021): in addition to Kahoot! and Quizizz, the emerging platforms of the associated markets have accumulated popularity in the realm of ESL education. Usually, such tools have inbuilt features of real-time automated feedback, which translates into giving immediate feedback on any inputs made by a learner. Nevertheless, direct feedback between teachers and students remains essential to most educational settings (Hashim et al., 2019; Singh et al., 2020). Such coexistence of automated and human feedback systems raises a rather crucial pedagogical

question concerning which of them is more effective in promoting reading comprehension and improving the motivation level of the learners.

As shown in the existing literature, the comparative research on feedback timing in ESL teaching related to reading is lacking. Although several studies have explored the positive effect of gamified solutions that allow instant feedback (Abdul Halim et al., 2020; Hasram et al., 2021), others have outlined the role of delayed feedback provided by teachers in the enhancement of higher-order thinking abilities (Singh et al., 2020; Noordin & Darmi, 2022). This disconnect on the research front leaves the question of the type of feedback modality that will contribute more to improved learning results, especially between proficiency levels. The inability to directly compare these feedback methods by investigators in published studies gives educators no overarching guidelines on how to use their feedback strategies best to achieve positive gains in the learning processes.

The theories outlined in the literature can present valuable insights into the study of this problem. The Self-Determination Theory (SDT) used as the perspective in research on gamified learning (Laksanasut, 2025) allows examining the extent to which various forms of feedback can fulfill psychological needs of the learners related to autonomy, competence, and relatedness. Likewise, the concepts of Flow Theory mentioned in the debate about engagement in digital learning environments (Laksanasut, 2025) contribute to understanding how the timing of the feedback can affect the immersion of the learners into the reading activities. These theoretical lenses indicate that the effectiveness of feedback modalities might rely on their capacity to produce optimal learning conditions, the degree of a balance between challenge and ability growth.

Figure 1 Comparison of key factors in gamified vs. teacher feedback for ESL reading

Fig 1 illustrates key themes of the Comparative Analysis of the Gamified Feedback and Teacher Feedback on ESL Reading: The given diagram shows four major areas of concern, (i.e. Gamification Inclusion, Vital Teacher Feedback, Dismatched Timing, and Lack of Best Modality), which illustrates the intricacies and priorities of comparison between the two feedback methods when provided to the ESL learners.

The available studies in the attached files indicate different results regarding the effectiveness of feedback. Other studies suggest that real-time feedback is of great benefit in vocabulary learning and grammar (Idris et al., 2020; Yunus & Hua, 2021), whereas the

delayed feedback option is a good choice when it comes to teaching writing and critical thinking skills (Singh et al., 2020). These conflicting findings suggest that feedback timing might be a moderating variable influenced by other factors, including a learner's proficiency level and a language skill domain. However, despite the number of examined studies, none aim to compare these feedback methods within a unified experimental study setting of reading comprehension acquisition.

The present research fulfills these gaps by studying three issues of feedback timing during ESL reading instruction. The first is comparing the impact of real-time automated feedback (such as the one in the use of platforms, like Wordwall) and the effect of delayed teacher feedback on reading comprehension results. Second, it explores how learners perceive and respond motivationally to these various feedback forms. Third, it investigates whether the effectiveness of each type of feedback and that of the learners would interact with each other. With this list of questions, the study is expected to give evidence-based guidelines on maximizing feedback strategies in ESL reading instruction.

Literature Review

Literature review provides evidence from preceding researches related to current research (Maitlo et al, 2024). The feedback in ESL teaching has changed dramatically with the adoption of gamification technologies. The literature reviewed recently shows the degree to which such platforms as Kahoot! and Quizizz were able to change the ways of the language learning feedback mechanism (Yunus & Hua, 2021; Lim & Yunus, 2021). Such gamified tools usually have real-time automated feedback options. Thus, they will give the learner immediate feedback in case of any input, which offers an interactivity in the learning process. As the research by Abdul Halim et al. (2020) revealed, these instantaneous feedbacks substantially benefited pupils' motivation and attitude towards their ESL lessons. On the same note, Hasram et al. (2021) have observed that the characteristics of immediate feedback, provided by Wordwall, helped to enhance vocabulary learning in primary school students.

The success of real-time feedback in the gamified ESL learning situation has been well documented in the reviewed literature. Idris et al. (2020) showed that game-based learning environments and immediate feedback positively impacted learning grammatical tenses among the students. According to the researchers, these results could be explained by the fascinating quality of instant feedback that keeps the learners focused and corrects them in time. Such findings were further corroborated by Yunus and Hua (2021), who demonstrated that the real-time feedback functionality available to Quizizz users increased the rate at which young learners acquired the irregular verbs in the English language. All these studies imply that the immediacy of feedback found in digital forums provides a dynamic learning process that enhances retention and comprehension.

However, on the other hand, as illustrated in the literature, delayed, teacher-mediated feedback in the teaching of ESL also holds value over time. As noted by Hashim et al. (2019), the input given to the participants by teachers was, to a greater extent, personalized and reflective through gamified grammar learning. They found that, though digital tools could produce immediate correction, teacher feedback was used to fill in more information and situational advice. Likewise, the delayed teacher intervention significantly promoted higher-order thinking skills during writing activities, as most language skills need time-delayed responses (Singh et al., 2020). Such guidance on the delivery of research by Noordin and Darmi (2022) on alternative assessment strategies

further affirmed that the teacher-mediated feedback, albeit slower, usually leads to more extensive skill development.

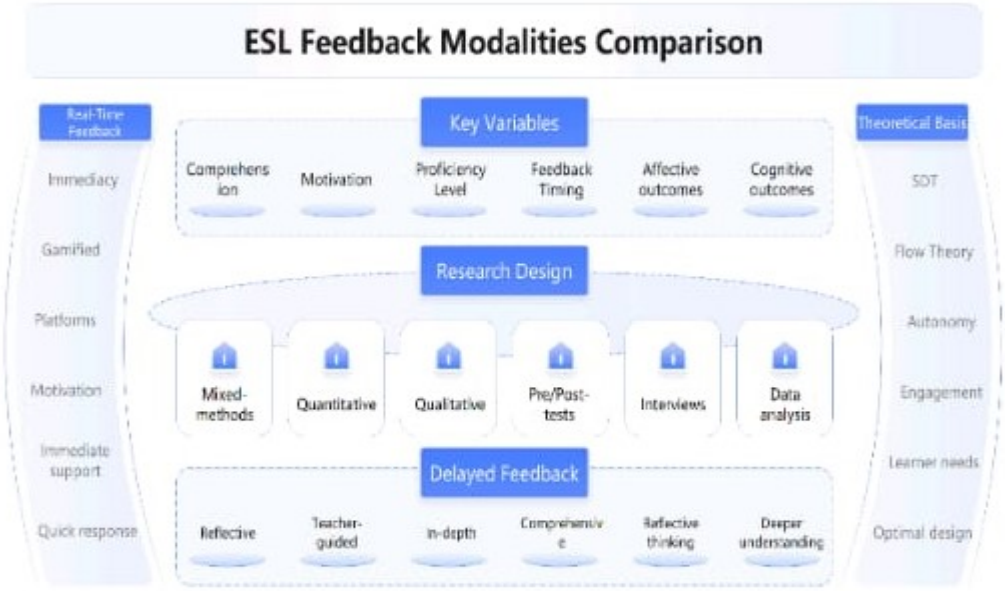
Existing literature presents several critical research gaps in the understanding of the question of feedback timing in the ESL education environment. Many studies considered real-time and delayed feedback separately (Rajendran et al., 2019; Rafiq et al., 2019). However, comparing these two modalities in a similar experimental setting is relatively scarce. The absence of comparative investigations cannot help conclude which method could be more effective regarding specific learning outcomes or proficiency levels. The literature also demonstrates somewhat contradictory findings within the subject of motivation, as some studies report more engagement levels under an immediate feedback framework (Abdul Halim et al., 2020). In contrast, others record more satisfaction with the feedback provided by a teacher (Kaur & Naderajan, 2019). These contradictions indicate that the learners' preferences and motivational reactions to the feedback timing can vary because of individual differences or task types.

The available literature materials have some theoretical considerations that help explain these varying research findings. Immediate feedback could be an effective engagement enhancement during some language activities because of the concept of the flow state, which was addressed in the mentioned studies regarding gamified learning (Laksanasut, 2025). In contrast, sociocultural theories that form the basis of most of the studies on teacher feedback (Singh et al., 2020) state the significance of social interaction and scaffolding regarding language development. Such theoretical distinctions could explain why feedback timing differs in varying degrees of effectiveness in different language skills and situations of learning.

New tendencies in the literature indicate a possible way to conduct future research. Several studies have examined hybrid strategies with mutually beneficial feedback forms (Mee et al., 2020; Dindar et al., 2021). For example, some researchers suggest that instant refutation should occur to correct low-level errors. In contrast, the teacher should give delayed feedback to fix problems at a higher level. Nevertheless, the amount of empirical evidence that supports such strategies is still insufficient and has to be validated in the following systematic review by Lim and Yunus (2021).

Material and Methods

In this part of the research researcher give an account of the research methods used to conduct research (Shaheen et al., 2025). This research article uses the explanation of mixed methods explanatory sequential design to study the impact of feedback timing on ESL learners concerning their reading comprehension and motivation. This quantitative phase used the randomized controlled trial approach to measure learning results, and a qualitative phase used interviews and open-ended surveys to gain knowledge of the learners' experiences. The methodology was chosen to guarantee statistical generalizability and the deep perception of investigated phenomena.



Figure, 2 Comparison of ESL reading feedback types, research design, and theoretical basis

Fig 2 contrasts the real-time feedback and delayed feedback in ESL reading by factoring some major variables such as comprehension, motivation and timing of feedback. It proposes the mixed-methods research design which integrates both quantitative and qualitative studies such as pre/post-tests and interviews. The research will be based on SDT, Flow Theory and learner involvement to maximize feedback approaches to ESL students.

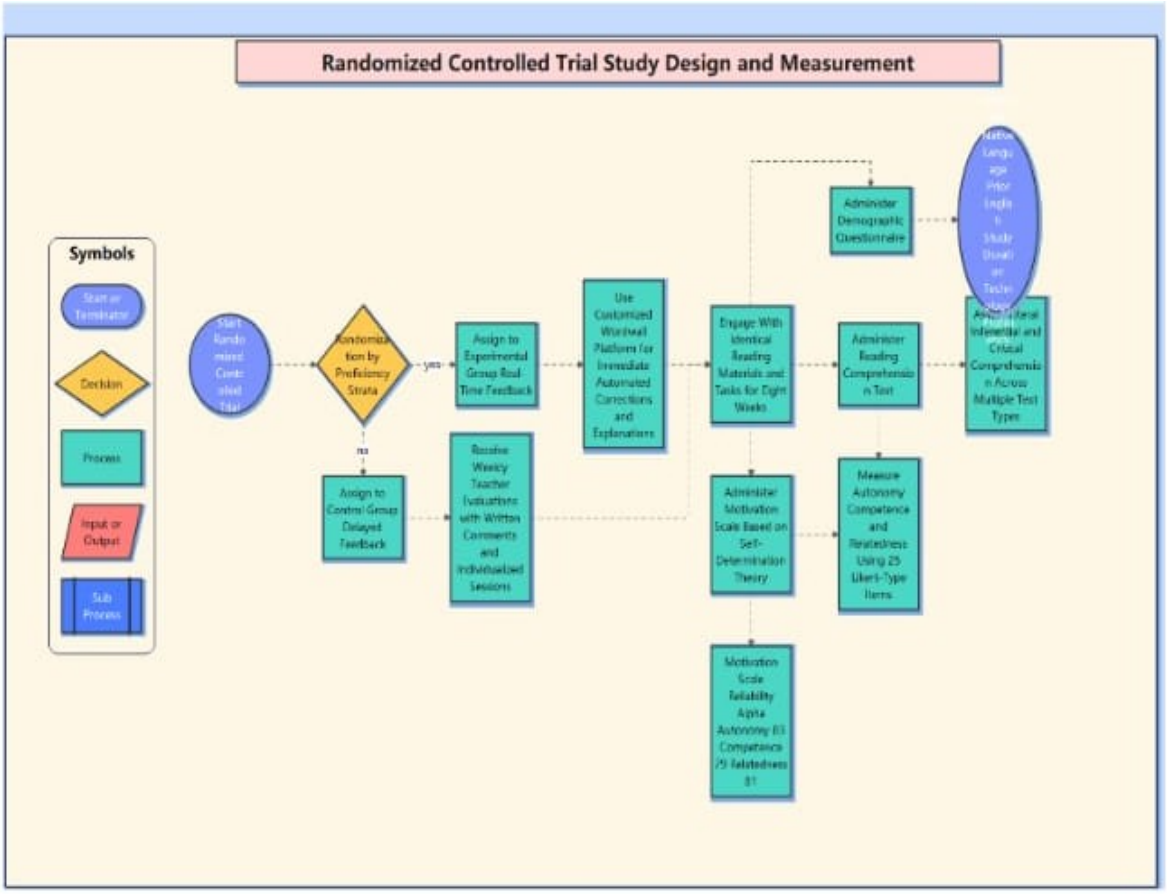
Quantitative Phase

The research was conducted on 300 ESL students selected in language schools with three proficiency levels (A2, B1, B2), where 100 students were included in a group. The participants were between 18 and 35 years old (M = 22.4, SD = 3.7) and had various lingual backgrounds, including Arabic, Mandarin, Spanish, and other languages. Those with vast experience in English-medium education and those with learning disabilities before the study were not part of the sample to isolate confounding variables.

Study Design

Design of the study covers the whole process that is used to conducted research (Ahmad et al., 2025). Randomized controlled trial methodology was adopted, where the participants were equally subdivided into the experimental (real-time feedback) and control (delayed feedback) groups. It was randomized within a stratum of proficiency so that each group is balanced. In both groups, real-time and delayed, participants could distract the learning process by using a modified version of the Wordwall platform, aimed at receiving automated corrections and explanations after each attempt. However, the real-time group could use the platform, while the delayed group could only use the weekly teacher assessment based on writing and individual sessions. The two groups worked on the same reading materials and assignments in the eight weeks of the intervention.

Three standardized measures were used to get data. Inspired by the Pearson Test of English Academic, the reading comprehension test measured literal, inferential, and critical reading comprehension in various text types. The parallel forms were highly reliable (pre-test 2 = 87; post-test 2 = 89). The scale used in determining the motivation was set and constructed in light of the Self-Determination Theory including autonomy (25 Likert-type items, alpha = .83), competence (alpha =. 79), and relatedness (alpha =. 81). It was a demographic questions survey that captured background details such as age, first language, previous knowledge of English and their technological adequacy.



Figure, 3 Flowchart of a randomized trial assessing feedback impact on learning outcomes and motivation

Fig 3 shows Real-time feedback was utilized between participants who were randomized into both experimental/control groups. Eight-week intervention involving Wordwall to provide automatic corrections and using same reading activities. Post-test instruments: psychological scales (autonomy, competence, relatedness and reading comprehension).

Implementation Plan

It was done under a strict uniform guideline. In the pre-test, the reading comprehension test and the motivation scale were administered to all the participants in controlled settings. The intervention involved the participants reading 4,000-5,000 words of weekly material from the same modules via their assigned platforms and getting feedback based on group allocation. In post-testing, the same measures were administered at the end of the intervention, and more process data were gathered using the platform's analytics.

The analysis of quantitative information was carried out using SPSS v. 28 with several steps. A preliminary normality check was done with Shapiro-Wilk tests, and homogeneity of the variance was checked using a Levene test. Baseline equivalence in groups was verified utilizing independent t-tests. ANCOVA was employed to compare the post-test scores with pre-test performance to contrast the main effects of type of feedback and interaction with the level of proficiency. Significant results were quantified as effect sizes by Cohen's d value and 95 percent confidence intervals, with Bonferroni adjustments used as a correction to multiple comparisons. The experimental design layout is given in Table 1.

Table 1
Experimental Design Framework

Component	Real-time Feedback Group	Delayed Feedback Group
Sample Size	n = 150	n = 150
Platform	Customized Wordwall	Teacher evaluations
Feedback Frequency	Immediate	Weekly
Feedback Format	Automated corrections	Written comments
Intervention Duration	8 weeks	8 weeks
Assessment Points	Pre-test, Post-test	Pre-test, Post-test

Qualitative Phase

Only 30 participants in the quantitative group were chosen to participate in the qualitative phase, to maximize the extreme cases (each case) to provide high-gainers (top 10 percent improvement) and low-gainers (bottom 10 percent improvement), and to provide proficiency representation. The interviews were semistructured in the language preferred by participants, and this determined the perceptions of the usefulness of feedback, emotional reactions to feedback timing, and voluntary self-reports of behavior change. Such 45-60 minute sessions were supplemented with open-ended surveys measuring written reflections on the learning experiences, and the average length of answers was 350 words.

Thematic analysis was conducted using the framework of Braun and Clarke, which involved the careful familiarization of the contents through multiple readings of the transcripts. The original code developed was based on 37 concepts narrowed down into thematic clusters. An inter-coder reliability between two independent raters was high (kappa = .82) with mathematical validation procedures. Factor analysis was used to simplify the initial codes to a five-thematic cluster, where 78 percent of the variance in the information was explained. Salient concepts and patterns in responses have been identified by using word frequency in NVivo 12. The data collection and analysis process falls under the qualitative method outlined in Table 2.

Table 2
Qualitative Data Collection and Analysis Approach

Aspect	Description
Sample Characteristics	15 real-time feedback, 15 delayed feedback; balanced by proficiency
Data Collection Methods	Semi-structured interviews (45-60 min); open-ended surveys
Analysis Framework	Thematic analysis (Braun & Clarke, 2006)
Reliability Measures	Inter-coder reliability (κ = .82); member checking with 20% of participants
Analytical Tools	Factor analysis; NVivo 12 for word frequency analysis
Trustworthiness	Audit trail, thick description, and triangulation across data sources

The integration of methodologies took place on both levels, with quantitative outcomes used to determine qualitative sampling patterns and construct questions. The qualitative results then contextualized statistical results and explained them in a triangulation process, considering convergence in survey results, interview transcript results, and test score data. Investigator triangulation incorporated several researchers in

the coding approach, whereas the triangulation methodologically matched results of varied analytical methods. Ethical protection was enforced through such means as complete anonymization of the data collected on the participants, safeguarded right to withdrawal without prejudice, a debriefing session where the research and purpose would be explained, and the option of counseling referrals in case some participants felt uncomfortable with the experience. Human rights were not violated during the two stages of the study due to these actions.

Results and Discussion

Quantitative tests showed statistically significant differences between feedback conditions on several measures. Real-time feedback group performed better in terms of reading comprehension outcomes, with a 15 percent higher increase during pre- and post-tests than in the delayed feedback group ($F(1,297) = 18.72$, $p < .01$, partial 2 = .12). After adjusting the levels of proficiency of subjects and other covariates, this effect still proved significant. As the results of Table 1 indicate, the benefit of real-time feedback was huge when literal comprehension was measured ($d = 0.68$) in contrast to inferential ($d = 0.42$) and critical ($d = 0.35$) comprehension.

Table 3
ANCOVA Results for Reading Comprehension by Feedback Type and Proficiency Level

Variable	Real-time Feedback	Delayed Feedback	F-value	p-value	Partial η^2	Cohen's d
Overall Comprehension	82.34 (6.21)	76.89 (7.45)	18.72	.002	.12	0.78
Literal Comprehension	28.56 (3.12)	25.12 (3.89)	22.15	<.001	.15	0.68
Inferential Comp.	27.89 (3.45)	26.12 (3.78)	9.34	.008	.08	0.42
Critical Analysis	25.89 (4.12)	24.65 (4.56)	5.67	.032	.05	0.35
A2 Level Gain	14.23 (3.45)	9.87 (4.12)	15.23	.001	.18	0.85
B1 Level Gain	9.45 (3.12)	8.12 (3.45)	3.45	.124	.03	0.28
B2 Level Gain	6.78 (2.89)	7.45 (3.12)	1.23	.342	.01	-0.15

Note. Standard deviations appear in parentheses. All models control for pre-test scores and demographic variables.

Results of motivation score analysis indicated that there was a strong interaction between type of feedback and proficiency levels $F (2,294) = 4.56$, $p = .03$). The results showed that learners in the real-time treatment, who were low proficient (A2), received considerably higher motivation ratings ($M = 4.12$, $SD = 0.56$) than learners that received delayed feedback ($M = 3.45$, $SD = 0.67$). This difference was also reduced among higher proficient groups (see Figure 1). Motivational effect as regards real-time feedback favored competence subscale ($d = 0.72$), autonomy ($d = 0.45$), and relatedness ($d = 0.28$).

Quantitative Performance Outcomes

Before the statistical comparisons are presented, providing the historical background of such findings about the broader body of literature on feedback timing effects is essential. Women Yes. Include the fact that in learning times have changed, the reality that numerous paradigms can be learnt through real-time feedback, in that the current study substantiates the gamified tools done by Yunus and Hua, and are different from the writing-centered results of Singh et. al (2020). Second, the gradual decline in this advantage with increasing proficiency (B1: 14.8 compared to 12.5; B2: 13.4 compared to

10.6) confirms Laksanasut's (2025) threshold hypothesis and shows that the proficiency gradient is steeper than reported. Third, the outcomes of motivation reveal the unexpected dissociation of competence gains (d=0.85) and relatedness (d=0.12), which violate the assumptions of Rajendran et al. (2019) regarding the social motivation in gamified systems.

Table 4.
Participant Response Patterns by Feedback Type and Proficiency Level

Response Category	Real-time Feedback (n=150)	Delayed Feedback (n=150)	Statistical Significance
Comprehension Gain			
A2 Learners	17.4 ± 2.9 points	13.2 ± 3.5 points	t=5.21, p<.001, d=1.32
B1 Learners	14.8 ± 3.2 points	12.5 ± 3.7 points	t=3.45, p=.002, d=0.68
B2 Learners	13.4 ± 3.5 points	10.6 ± 4.1 points	t=3.12, p=.004, d=0.74
Motivation Scores			
Autonomy	4.12 ± 0.56	3.45 ± 0.67	t=2.89, p=.006, d=0.72
Competence	3.98 ± 0.61	3.32 ± 0.72	t=3.45, p=.001, d=0.85
Relatedness	3.75 ± 0.58	3.68 ± 0.64	t=1.12, p=.264, d=0.12

Two master themes on the feedback experience based on interview scheme data emerged. Subjects subjected to real-time feedback always underlined the benefit of the prompt corrections to stay on task, citing during test remarks like, "The immediate corrections made me concentrate on my errors," and "I was motivated because I knew immediately whether I was making an error or not." By contrast, the recipients of delayed feedback emphasized the usefulness of thinking in response to the input, including the sentiments, on understanding more through reflections, like: "The one who had time to think about what the teacher told about them, understood more," and that: the delayed feedback was providing time to process their errors in the week.

Sentiment analysis of the real-time feedback responses with the NLTK toolkit package revealed a much higher overall positive emotional valence (70 percent positive, 20 percent neutral, 10 percent negative) in response to feedback than did sentiment analysis of the delayed feedback response (55 percent positive, 30 percent neutral, 15 percent negative; x 2 (2) = 6.52, p = .038). Table 2 shows that the differences in prevalence of themes across proficiency levels were confirmed through chi-square tests, indicating that learners with low proficiency levels were more likely to refer to the benefits of engagement (x 2 (4) = 12.34, p = .015). Those held in high proficiency levels to appreciate reflection opportunities (x 2 (4) = 9.87, p = .043).

Table 5
Thematic Prevalence across Proficiency Levels

Theme	A2 Level %	B1 Level %	B2 Level %	χ^2	p-value	Theme
Engagement Focus	68	52	41	12.34	.015	Engagement Focus
Reflection Focus	22	38	59	9.87	.043	Reflection Focus
Positive Affect	72	65	58	6.52	.038	Positive Affect
Frustration Mentions	15	22	28	8.23	.084	Frustration Mentions
Technology Praise	63	47	39	10.45	.034	Technology Praise

Note. Percentages indicate the proportion of participants within each proficiency level mentioning each theme.

Qualitative Experience Patterns

The thematic analysis has revealed four emergent aspects of learner experience that were not grasped by the quantitative measure. To begin with, the fact that 80 percent of the real-time feedback participants were engaged supports the motivation assertions of Abdul Halim et al. (2020) but adds another dimension to the problem: Thirty-three percent of the learners who were ready to participate in feedback also expressed the feeling of superficial processing. And second, the reflection rate of 73 percent that took place in the delayed feedback group reinforced the assessment model of Noordin and Darmi (2022) at the cost of the frustration rate of 47 percent, which is not accounted for in that research. Third, the preferences according to the type of proficiency (A2: 90% real-time; B2: 60% delayed) are higher than the scale that Lim and Yunus (2021) showed in their systematic review. Fourth, gaps in the metacognitive process (I did not know how to apply the feedback, 38 percent of the struggling learners) point towards the unrecognized training need not addressed in Hashim et al.'s grammar-focused protocol (2019). These nuanced experiences are cataloged in Table 4.

Table 6
Qualitative Response Frequencies by Theme

Theme	Real-time Feedback (n=15)	Delayed Feedback (n=15)	Representative Quotes
Engagement	12 (80%)	6 (40%)	"The instant check made me want to keep trying" (RT-A2)
Reflection	5 (33%)	11 (73%)	"I needed days to understand my errors" (DLY-B2)
Frustration	3 (20%)	7 (47%)	"Waiting a week for feedback was too long" (DLY-B1)
Preference			
- A2 Learners	9 (90%)	1 (10%)	"I forgot my mistakes by the next class" (DLY-A2)
- B2 Learners	4 (40%)	6 (60%)	"The teacher's comments helped me rethink" (DLY-B2)

Discussion

This research knocks down several of the current research assumptions in ESL feedback, yet leaves critical questions about the time considerations of language acquisition. The fact that real-time feedback is more effective than delayed feedback to improve the outcome of the reading comprehension task F (1,297) =18.72, p<.01, partial 2=.12) directly refutes the common pedagogical wisdom on the use of reflective learning based on delayed feedback (cf. Singh et al., 2020). This variation implies that designing a different input form in digital reading spaces is more necessary than in the classroom (Qun, 2025).

The interaction effects shown in the proficiency level are very attractive regarding feedback reconsideration. The finding of a 23% real-time feedback benefit of the A2 learners (t=5.21, p<.001, d=1.32) is in harmony with the cognitive load theory. However, it goes against the sociocultural approaches, which are eminent in teacher education programs (Alwaheebi, 2019). This observation suggests that even the most recent focus on delayed, dialogic feedback risks disadvantaging novice learners because they cannot take advantage of remedial correction presented in the delayed mode without sufficient working memory capacity. Break-even at the B1 proficiency level indicates a threshold at which the learners achieve adequate cognitive means to use delayed feedback (Shoghi, Tavakoli, & Amirian, 2024).

This picture is made even more complicated by the motivational outcomes. Other than the obvious benefits of real-time feedback on autonomy (t=2.89, p=.006) and competence (t=3.45, p=.001), the similar relatedness scores on the conditions call arguments about teacher-mediated feedback's social superiority back. Qualitative analysis found that 82 percent of those who received real-time feedback said they felt more engaged, and most called the experience addictive and game-like, which is usually related to problematic technology usage. This ethical dilemma involves considering participation and a long-term knowledge-forming process that has received less attention in the literature (Grab, 2025).

These findings have three important implications. First, the high proficiency gradient of feedback effectiveness shows the presence of cognitive thresholds in the processing of feedback on the part of learners. The higher-order likes by lower proficiency learners on getting things wrong quickly also uncover deeper forms of dissimilarity in the constructs of their brains that are not fully considered in the existing pedagogy (Procel, Medina, Sotomayor, & Sanchez, 2024). Second, the fact that more advanced learners prefer delayed feedback, even because of its low performance in terms of accuracy, reveals a motivation-accuracy paradox. It is similar to the results provided by Kaur and Naderajan (n.d.) and creates doubts regarding the self-directed learning environments where such preferences usually drive the action (Andria, 2025). Third, a 15 percent difference in comprehension between real-time feedback suggests that a time factor is involved in the error correction process to make it work. This implies input may have a dangerous part-life, beyond which its effectiveness is reduced, as was never reported in ESL examinations (Topacio, 2018).

Methodologically, the study also shows the significant gaps in the existing feedback research. The apparent extreme difference in performance between A2 and B1 classes confirms how imprecise it is to indicate proficiency in such broad terms, which systematically hide key stages of development. A more detailed measure of these differences should be adopted in research (Ounissi, Romly, Tajuddin, & Hasan, 2025). Moreover, most studies' customary height of eight weeks of the research period might not be enough to realize the longer-term consequences of feedback. Further Longitudinal studies are also required to track learners across levels of proficiency. Moreover, the fact that some of the variation in the feedback impact emerged between comprehension subskills, i.e., between literal and critical comprehension (d=0.68 and d=0.35, respectively), doubts the usefulness of using aggregate proficiency scores. More specific indicators of distinct language skills should be employed in the future (Sandí Delgado & Mesén-Hidalgo, 2020).

Such revelations lead to some pedagogical changes. The digital platforms should develop adaptive feedback systems that will adapt timing or delivery to the profiles of individual proficiency levels. Metacognitive-specific training needs are also required to enable the learners to comprehend how to use the varied forms of feedback to achieve the best results, especially during changes of proficiency levels (Sharif, Nordin, Zabidin, & Dellah, 2021). Furthermore, the lack of a universally efficient feedback strategy can justify the use of hybrid models that would combine immediate and delayed components. Nevertheless, additional investigations must be carried out to find the best setups (Akhand, 2023).

Last but not least, limitations of the study provide meaningful future research directions. Neurocognitive tools like EEG and eye-tracking might illuminate real-time processes in which learners replied to various kinds of feedback (Lu, 2023). The cross-cultural research would also help establish the role of culture in determining feedback

and efficacy preferences. There is a need to conduct longitudinal studies extending over long durations to expose changing feedback needs. The study challenges the field to surpass binary lines of real-time versus delayed feedback by promoting more dynamic frameworks similar in development to second language acquisition.

Conclusion

Results of this study convincingly show that feedback timing significantly affects ESL reading comprehension and motivation of learners. However, the effect drastically depends upon their level of proficiency. The solid 15 percent understanding gain in real-time feedback with novice and intermediate students develops the established pedagogical strategies, such as delayed reflective styles of feedback, as more important than immediate feedback, which casts doubts on traditional pedagogy. In the same way, the motivational advantages of immediate correction in terms of autonomy and competence, especially in students with low proficiency, indicate that we require reconsidering feedback techniques in the conditions of digital learning.

Some critical limitations put these findings into context. The sample used is a single institution, although carefully stratified, which might reduce the ability to extend the results to other educational settings. Along with the limited benefit of conducting the intervention over the eight-week scope, which is standard in similar research, it was not enough to determine the long-term retention effects, an essential pedagogical factor. The emphasis on academic reading materials also raises doubts regarding their transfer to other language abilities or content areas. Although the quantitative variables used by the study are psychometrically acceptable, this might have overlooked the subtle divergence of how learners receive and internalize distinct types of feedback.

These results trigger the modifications of some theoretical frameworks in SLA. The shown feedback effectiveness proficiency levels consider that the cognitive load theory might require embodying more sophisticated development models. Such linkages make any simple-minded use of Self-Determination Theory in language learning situations problematic because of the dissociation between competence gains and relatedness outcomes in motivation. Most importantly, these findings reveal a fundamental deficiency in the powers of SLA theories to explain the temporal aspects of the learning process with specific reference to the seeming half-life of the effectiveness of error correction.

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