

A CASE STUDY OF FEEDBACK-RICH ONLINE FORMATIVE ASSESSMENT IN BEGINNER KOREAN GRAMMAR LEARNING

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(Received 18th March 2026; revised 09th May 2026; accepted 20th May 2026)

Abstract. Technology-enhanced formative assessments deliver real-time, technology-mediated feedback that can markedly improve learner engagement and academic achievement. Despite these benefits, their specific impact on the acquisition of Korean as a Foreign Language grammar remains under-researched. This study addresses the persistent difficulties of Korean grammar through feedback-rich digital formative assessment. This study investigated the impact of feedback-rich online formative assessment on the multidimensional engagement and grammar proficiency of beginner Korean language learners. Adopting a pre-experimental one-group pre/post-test design, the study involved 18 students in Brunei during a seven-week intervention using the Quizizz platform. Data were collected via grammar proficiency tests, engagement questionnaires across four dimensions (emotional, behavioural, cognitive, and agentic), and open-ended questions about student perceptions. Findings revealed significant increases in both the grammar score (from 58.22 to 67.00) and all four dimensions of engagement ($p < .05$). Notably, agentic engagement showed marked improvement ($p = .002$). However, no significant correlation was found between engagement gains and test score differences, suggesting that while online formative assessment fosters a supportive learning environment, engagement alone may not directly predict mastery of complex linguistic structures. The study concludes that technology-mediated feedback is a high-impact strategy for enhancing both learner involvement and academic achievement.

Keywords: *agentic engagement, Quizizz, self-regulated learning, blended learning, Computer-Assisted Language Learning (CALL)*

Introduction

Formative assessment is a key element of higher education, providing the diagnostic feedback necessary to bridge the gap between current student performance and desired learning outcomes (Gan and Leung, 2020; Black and Wiliam, 2009). Feedback is an essential part of formative assessment, offering students information about their performance and motivating them to take action to close the gap (Nicol and Macfarlane-Dick, 2006). However, maintaining the quality of feedback in classroom settings can be challenging, and offering real-time, individualized feedback is time-consuming and not effectively used by the learners (Bahati et al., 2016; Higgins et al., 2010). To address these barriers, technology-enhanced formative assessments have gained popularity for their ability to deliver real-time, automated feedback that can markedly improve learner engagement and proficiency (McCallum and Milner, 2021). A recent systematic review confirms that such technology-mediated feedback optimizes the learning experience by enhancing both self-regulation and academic achievement (Solis Trujillo et al., 2025). Despite the benefits, empirical evidence regarding the impact of online formative assessment (OFA) in Korean as a Foreign Language (KFL) education is still limited. The COVID-19 pandemic accelerated the digital transformation, underscoring the need

for assessment strategies that address the specific difficulties of Korean grammar, which remains a primary hurdle for beginner learners (Son and Jung, 2022). This study contributes to the field of computer-assisted language learning (CALL) by examining the role of technology-mediated feedback in grammar acquisition. Furthermore, research on how multidimensional, emotional, behavioural, cognitive, and agentic engagement interact with grammar acquisition in digital spaces remains in its infancy (Mohammadi Zenouzagh et al., 2025; Zainuddin et al., 2020).

This study examined how feedback-rich OFA affected Korean language learners' engagement and grammar performance. It was hypothesized that the intervention would significantly improve student engagement and grammar proficiency. The assessments were created using an authoring tool, and data were collected through pre- and post-tests, engagement questionnaires, and open-ended responses. The research questions were: (1) What is the impact of feedback-rich OFA on student engagement and grammar proficiency? (2) Is there a significant correlation between multidimensional engagement and grammar gains? (3) What are students' perceptions of the immediate, technology-mediated feedback provided?

Review of literature

Formative assessment and feedback

Formative assessment plays a key role in language learning, supporting students in constructing their understanding, monitoring progress, and enhancing learning, while activating students as instructional resources and owners of their learning (Gan and Leung, 2020; Black and Wiliam, 2009). According to Wiliam (2011), successful learning requires active engagement and collaboration between teacher and student. Integrating assessment with instruction helps guide next steps and encourages learners to engage in actions that improve learning (Wiliam, 2011). Feedback is an essential part of formative assessment, offering students information about their performance and motivating them to take action to close the gap between their actual performance and the expected standard (Nicol and Macfarlane-Dick, 2006). Nicol and Macfarlane-Dick (2006) outline seven principles of good feedback practice, including promoting self-assessment, supporting dialogue, clarifying goals, and encouraging positive motivation, and highlight that feedback is most effective when learners act on it. The quality of feedback and students' active engagement are key moderators of formative assessment (Sortwell et al., 2024). In language learning, a range of feedback strategies has been shown to support acquisition. Corrective feedback with metalinguistic explanations and recasts is generally beneficial for improving linguistic accuracy (Ellis et al., 2006; Lyster and Ranta, 1997). However, in-class or face-to-face feedback can be challenging for students in real situations due to heavy workloads and delayed feedback, leading to students receiving feedback without effectively utilising it to enhance their performance (Bahati et al., 2016; Higgins et al., 2010). A shift from a teacher-does-it-all approach to formative assessment activities that involve learners and use technology to engage with feedback can address these challenges (Bahati et al., 2016). This suggests that technology-enhanced formative assessment has emerged as an alternative.

Online formative assessment and learner engagement

Online formative assessment offers multiple benefits compared to traditional assessment practices, including immediate feedback and opportunities for self-

monitoring (Baleni, 2015). These digital environments empower students to work independently, revisit feedback, retake questions, and prepare for summative assessments, while also providing teachers with timely information about learners progress (McCallum and Milner, 2021; Ogange et al., 2018). Research shows that online formative assessment enriched with feedback supports ongoing collaboration between teachers and students while promoting learner autonomy (Zainuddin et al., 2020; Holmes, 2018). A recent systematic review confirms that immediate, specific, technology-mediated feedback enhances academic performance and self-regulation in higher education, and that immediacy improves the learning experience and encourages students to engage more actively with the material (Solis Trujillo et al., 2025). However, there is mixed evidence regarding the effects of technology-based feedback on students academic achievement, and more experimental research is needed (Morris et al., 2021). Voinea (2018) emphasizes the importance of active engagement and continuous collaboration between teachers and students. Web-based assessments offer various advantages, such as being less time-consuming and fostering better relationships with students. Online formative assessments and self-assessment quizzes can enhance proficiency, provide effective feedback, and support autonomous learning. Online quizzes were beneficial for learners studying English as a Foreign Language (EFL) and contributed to improved exam performance. Similarly, Permana and Permatyawati (2020) discovered that the Quizizz application enhanced grammar and vocabulary mastery in the classroom, although novice students required additional tutoring.

In the formative assessment, active student engagement is crucial (Zhou et al., 2026; Higgins et al., 2010). This means that students understand the purpose of assessment and feedback (Higgins et al., 2010) and participate actively in learning activities. Zhou et al. (2026) state that strong engagement leads to better academic achievement, while disengagement can lead to passivity and poor persistence. Balta et al. (2018) define engagement as the quality of student participation in learning activities, investment, and commitment to improving their performance, including having an interest in the course materials and related attitudes, students work effort, hours spent on homework, meeting deadlines or not skipping classes (Balta et al., 2018). In second language acquisition, learner engagement is also an important element. For effective language learning, learner behavioural, affective, and cognitive engagement should be integrated with learning goals, tasks, and context (Zhang, 2022). Students engage with formative assessment with behavioural, emotional, and cognitive commitment, all of which support academic progress (Zainuddin et al., 2020). Acting agentically serves as an additional critical, student-initiated pathway when learners proactively express needs, seek clarification, or act on feedback, they contribute to a productive form of engagement that supports academic development (Reeve et al., 2020; Zainuddin et al., 2020; Reeve, 2013). Recent empirical work shows that digital tools prompting learners to interpret and act on feedback can increase all engagement dimensions, including agentic engagement, and improve L2 performance (Mohammadi Zenouzagh et al., 2025). Ultimately, immediate and technology-supported feedback optimizes the learning process by promoting both self-regulation and overall academic achievement (Solis Trujillo et al., 2025).

In language learning settings, online formative assessment has been shown to improve engagement and academic performance by supporting autonomous learning, providing opportunities for resubmission, and facilitating interactive feedback processes (Hysaj and Haroon, 2022; Kristiyanti et al., 2021; Joyce, 2018). Online quizzes and self-

assessment activities enhance grammatical proficiency, support learner reflection, and strengthen the assessment process (Hysaj and Haroon, 2022; Alharbi et al., 2021; Pinto-Llorente et al., 2017). Technology-enhanced learning environments also promote student-centred approaches, motivating learners to improve target language performance (Lu et al., 2023; Joyce, 2018). Digital corrective feedback, in particular, helps learners identify errors, reinforce grammatical knowledge, and resolve misunderstandings (Klimova and Pikhart, 2022; Enders et al., 2021). Furthermore, Quizizz-based weekly practice improved vocabulary scores and mastery (Liu et al., 2025). However, evidence regarding the effectiveness of technology-based feedback remains mixed, and teachers' limited knowledge of online formative assessment continues to be a challenge (Schluer and Brück-Hübner, 2025). Scholars also note the need for further empirical research to examine how online formative assessment influences academic achievement and to extend the investigation beyond writing and speaking to other language skills, such as grammar, in a foreign language learning context (Klimova and Pikhart, 2022; Vassiliou et al., 2022).

Online formative assessment with feedback in beginner KFL grammar learning

KFL education has been significantly impacted by digital transformation and changes in the social environment, particularly due to the effects of the COVID-19 pandemic. As a result, there has been increased interest in online formative assessment; however, readiness alone is not enough (Son and Jung, 2022). Regarding feedback practices in KFL, students value teacher feedback as a tool for learning (Shin, 2014) and have high expectations for using online tools such as assignments, quizzes, and exams that allow them to receive feedback from teachers or check their learning level to improve language ability and facilitate communication through online feedback (Son and Jung, 2022). Despite this rising recognition, further study is needed to examine how online assessment tools with effective feedback strategies influence KFL learning, especially in grammar acquisition (Son and Jung, 2022; Lee and Lee, 2021). In Brunei, the COVID-19 pandemic has resulted in changes in the educational environment, including a shift to blended learning and changes in the evaluation system for language modules to 100% coursework. This change has presented challenges in developing various evaluation methods. Additionally, the complexity of Korean grammar has been identified as a major challenge for learners of KFL outside of Korea, including Brunei (Lee, 2023; Song, 2019). Moreover, in Brunei, the beginner's course has limited contact hours, and students have varying levels of progress with a low continuation rate. This makes it challenging for teachers to provide individual feedback in class while students struggle to improve their Korean proficiency. To address the challenges of language difficulties and evaluation, various evaluation methods using technology-enhanced strategies, especially online formative assessments with feedback (Son and Jung, 2022; Shin, 2014), must be developed to enhance students' engagement and proficiency.

Therefore, the broader literature indicates that feedback-rich online formative assessment increases student engagement, encourages active learning activities, and enhances academic performance and achievement (Cai et al., 2023; McCallum and Milner, 2021). Such approaches also support a pedagogical shift from teacher-centred instruction to student-centred learning, enabling learners to reflect on and monitor their progress through regular quiz-based activities, while providing teachers with timely evidence to identify areas for improvement (Zainuddin et al., 2020). Given these affordances, feedback-rich online formative assessment offers a promising approach for

KFL contexts, including in Brunei, where it may help address persistent challenges in grammar learning and increase learner engagement in beginner-level Korean courses. The present study aims to investigate how specific formative feedback strategies can be integrated into the blended KFL curriculum in Brunei.

Conceptual framework of the study

Figure 1 shows that teachers and students collaboratively shape the learning process through formative assessment and feedback. This approach views formative assessment as an educational framework rather than a single pedagogical theory (Black and Wiliam, 2009). In this framework, teachers design effective learning environments and provide feedback, while learners actively engage in the process. This study adopted Nicol and Macfarlane-Dick (2006) feedback cycle model. This cycle involves two dimensions: internal feedback (identifying gaps between current progress and goals) and external feedback (teacher-provided feedback that students interpret). Students actively generate and internalize feedback to take action and monitor their progress. This study also integrated the concept of engagement across its behavioural, emotional, cognitive, and agentic dimensions to provide a holistic understanding of student engagement in this online environment (Zainuddin et al., 2020; Reeve and Tseng, 2011). The assessments were designed to align with the lower cognitive levels of the Revised Blooms Taxonomy remembering, understanding, and applying to facilitate foundational grammar acquisition. This study leveraged computer-assisted technology (Quizizz) to provide immediate, consistent feedback, enhancing the student learning experience and encouraging independent study (McCallum and Milner, 2021).

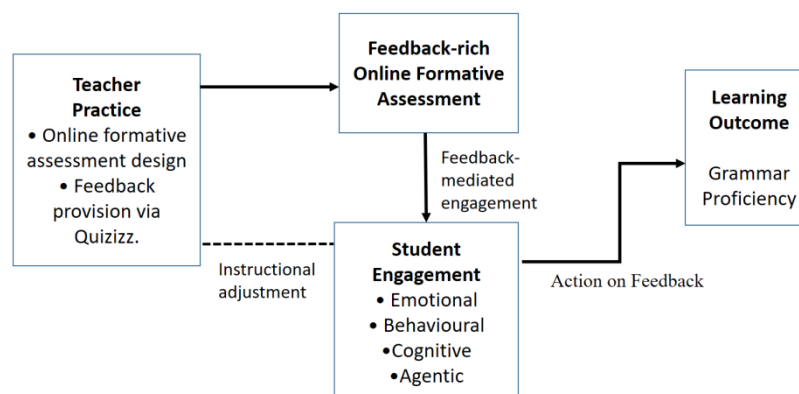


Figure 1. Conceptual framework of feedback-rich formative assessment.

Materials and Methods

This study was conducted as an internal classroom formative evaluation aimed at pedagogical improvement. As the activity was non-graded and anonymous to ensure participant confidentiality, it had no impact on students academic grades. All students received a participant information sheet and provided written informed consent for the use of their course data for research purposes. Participation was voluntary and non-evaluative, and students were informed of their right to withdraw prior to data de-identification. The study used a quantitative pre-experimental design with pre- and post-

tests. It examined correlations between student engagement and grammar skills, and included open-ended questions to explore perceptions of online formative assessments with feedback. It also examined correlations between multidimensional student engagement and grammar achievement, incorporating open-ended questions to explore learner perceptions of the technology-mediated feedback provided. The study was conducted using an online platform called Quizizz, a formative assessment platform that enabled the creation of interactive content through various question types, including multiple-choice, fill-in-the-blank, reordering, matching, and drag-and-drop. For this study, the lecturer authored custom corrective feedback for each item, which the platform delivered to learners in real time. This technology-mediated feedback enabled students to identify errors immediately and achieve mastery through multiple attempts. The feedback was multimodal, incorporating lecturer-recorded audio, video clips, and written explanations that were triggered immediately after each response. Furthermore, the platform generated automated, data-driven analytics that tracked both individual and collective student progress throughout the experiment, which was conducted from 27 September 2024 to 16 November 2024. Weekly quizzes were accessed via Canvas (the learning management system), and accuracy rates, response times, and attempt history were reported.

In this study, the population consisted of learners of Korean as a foreign language at a university in Brunei. Eighteen students participated in the study, 16 of whom were female and 2 male. Participants were non-randomly selected; however, this study employed a within-group experimental design in which only one group received the intervention and was measured again to assess whether there was a significant relationship between pre-test and post-test results, as well as between the pre-engagement and post-engagement questionnaires, and to identify and analyse correlations between students engagement in formative assessment and grammar proficiency scores. This study used online authoring tools to create formative assessments and quizzes with instant feedback, employing pre- and post-engagement questionnaires, pre- and post-tests on Korean grammar proficiency, and open-ended questions to elicit students' perceptions. The engagement questionnaire (*Table 1*), based on Zainuddin et al. (2020), included emotional, behavioural, cognitive, and agentic items, some adapted from Gibbs (2010), and was administered before and after the intervention using a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The grammar tests were designed at lower levels based on the revised Bloom's taxonomy. Data from open-ended questions on Quizizz were analysed, focusing on students' agentic engagement, such as active participation through input, suggestions, and questions to personalize learning (Reeve and Tseng, 2011).

Table 1. *Perceived engagement questionnaire for students.*

Number	Description
1	Emotional engagement When I worked on online quizzes, I felt interested Answering questions on online quizzes made me curious about my scores I found the online quizzes in this class to be enjoyable I was excited to participate in the online quizzes during class. When I reviewed my progress scores on online quizzes I felt engaged with my performance when I reviewed my progress scores on online quizzes
2	Behavioural engagement I worked hard to answer quiz questions I was able to answer quiz questions independently I tried to be active in asking and answering question during the learning process I used the feedback I received to go back over what I had done in my work The feedback I received prompted me to go back over material covered in the course I paid careful attention to feedback on my work and tried to understand what it was saying

3	Cognitive engagement I was able to track my achievement progress after the online quiz activity I was able to remember the knowledge I gained from the online quiz work Online quizzes helped me to improve my grammar skills through various types of quiz questions The feedback from online assessments helped me identify areas for improvement I actively used feedback from online quizzes to enhance my comprehension of the subject matter
4	Agentic engagement I actively communicated my needs related to online quizzes to my teacher to enhance my learning progress I reported to the teacher what I liked and disliked from online quiz activity I proposed suggestions about how to make online quizzes better and not so boring I proactively shared my interests with my teacher to better tailor online quizzes to my learning needs

Results and Discussion

Impact on student engagement

To evaluate the intervention's effects, four dimensions of engagement were examined using Wilcoxon signed-rank tests due to the non-parametric nature of the data. As shown in *Table 2*, overall engagement increased significantly from the pre-intervention ($M = 3.69$, $SD = .39$) to the post-intervention phase ($M = 4.11$, $SD = .43$, $Z = -3.24$, $p = .001$). Significant improvements were found across all dimensions: emotional ($Z = -2.73$, $p = .006$), behavioural ($Z = -2.29$, $p = .022$), cognitive ($Z = -3.03$, $p = .002$), and agentic engagement ($Z = -3.08$, $p = .002$).

Table 2. Pre-and post-engagement scores across four dimensions and intercorrelations.

Variable	PeMSD	PoMSD	Z	1	2	3	4	5
1.Grammar gain (Pre-Post test difference)	-	8.78 (14.09)	-	-				
2.Emotional engagement (PostEE)	4.19 (.46)	4.49 (.44)	-2.73	-.238	-			
3.Behavioural engagement (PostBE)	4.03 (.50)	4.24 (.44)	-2.29	-.040	.834**	-		
4.Cognitive engagement (PostCE)	3.94 (.43)	4.39 (.44)	-3.03	-.356	.745**	.746**	-	
5.Agentic engagement (PostAE)	2.60 (.66)	3.33 (.81)	-3.08	.261	.349	.585*	.365	-

*Note: Z and p values are from Wilcoxon Signed-Rank Tests. N = 18. Entries are Spearman's rank correlation coefficients (rs). SD = Standard Deviation. * $p < .05$. ** $p < .01$; PeMSD=Pre-Mean (SD); PoMSD=Post-Mean (SD).*

Impact on grammar proficiency

A paired-samples t-test was conducted to compare pre-test and post-test grammar scores. Participants showed a significant improvement in proficiency, with mean scores rising from 58.22 ($SD = 17.80$) to 67.00 ($SD = 18.00$), $t(17) = -2.59$, $p = .019$, $d = -0.61$. This indicates a medium effect size. Furthermore, a significant positive correlation was found between pre- and post-test scores, $r(16) = .68$, $p = .002$. Of 18 students, 15 (83.3%) showed measurable progress following the seven-week intervention (*Table 3*).

Table 3. Grammar proficiency results: Descriptive and inferential statistics.

Measure	N	Pre-Test Mean (SD)	Post-Test Mean (SD)	Mean Difference	t	Effect Size (Cohen's d)
Grammar Proficiency	18	58.22 (17.80)	67.00 (18.00)	-8.78	-2.59	-.61

Correlation between engagement and proficiency

Spearman's rank correlation (r_s) was used to examine the relationship between grammar gains and post-engagement dimensions. Results indicated no significant correlation between grammar improvement and any engagement measure (r_s range = $-.356$ to $.261$, all p s $> .05$). However, strong positive intercorrelations were found between engagement constructs, particularly between emotional and behavioural engagement ($r_s(16) = .834$, $p < .01$), between behavioural and cognitive engagement ($r_s(16) = .746$, $p < .01$), and between behavioural and agentic engagement ($r_s(16) = .585$, $p < .05$) (Table 1). Individual student participation was tracked throughout the seven-week intervention; a complete record of behavioural engagement (total Quizizz attempts) for each participant is provided in Table 4.

Table 4. Pre-and post-test grammar results of each participant.

Student	Pre-test	Post-test	Score difference	Performance level
S1	70	74	4	↑
S2	68	78	10	↑
S3	44	48	4	↑
S4	26	32	6	↑
S5	80	78	-2	↓
S6	44	62	18	↑
S7	52	74	18	↑
S8	80	84	4	↑
S9	26	76	50	↑
S10	50	54	4	↑
S11	52	38	-14	↓
S12	74	84	10	↑
S13	72	88	16	↑
S14	44	60	16	↑
S15	80	82	2	↑
S16	46	40	-4	↓
S17	66	88	22	↑
S18	74	66	-8	↓

Students perceptions of online formative assessment with feedback

Responses to open-ended questions collected each week were analysed using content analysis, as shown in Table 5. The open-ended questions included: "If there is any grammar you do not understand regarding this quiz, please write it here, and I will provide feedback in class. Additionally, let me know which aspects of the feedback you do not understand and what needs improvement on this quiz." Also, "We have been using Quizizz; how was your experience? Please share your thoughts on Quizizz, including your engagement with the feedback and any suggestions for improvements." Lastly, students were encouraged to provide suggestions for improving online quizzes. The most prevalent theme was a high level of student enjoyment, with 17 responses highlighting that the intervention was "fun" and "engaging." Students specifically pointed to the interactive functions of Quizizz such as game-like features and avatars as factors that increased their interest (Table 6). One student noted that the format was "much more interactive than Canvas," suggesting a preference for gamified formative assessment over traditional LMS tools. A total of 14 students explicitly mentioned that the explanations and feedback provided after each question were highly beneficial. Participants reported that the feedback helped them "understand mistakes better" and "summarized how to use the words." This qualitative evidence supports the quantitative findings regarding increased cognitive engagement, as students actively used the feedback to resolve confusion immediately after answering a question. In addition, ten responses reflected students' proactive learning strategies. Students reported using the quizzes for revision, studying harder, and learning from mistakes. Despite the positive

feedback, 11 responses indicated persistent confusion regarding specific grammar rules, particularly the distinction between causal connectors like -니까(-nikka; because/since) and -아서/어서(-aseo/eoseo; so/because). Additionally, 7 responses identified technical problems, such as the lack of a Korean keyboard on laptops, display issues on mobile phones, and occasional audio loading delays. When asked for suggestions, the majority of students (n = 5) reported no issues and showed satisfaction with the current implementation.

Table 5. *Students' perceptions of Quizizz.*

Theme	Subtheme	Representative quotes	No.
Enjoyment and engagement	Enjoyment	"Quizizz is a lot of fun."; "Overall, engaging and fun."	117
	Interactive features	"Helped me remember better."; "Very interactive."	111
Helpful for understanding	Clear understanding	"I understand everything."; "I understood all questions."	66
	Clear explanations and feedback	"Explanations very helpful."; "Feedback improves understanding."	114
Use of resources	Class materials	"Class materials helpful."; "Refer to textbook when needed."	22
Learning strategies	Learning strategies	"Improved grammar."; "Study harder after mistakes."; "Repeating questions helps."	110
Challenges in understanding	Grammar confusion	"Confused with some grammar."; "Unsure about 아서/어서(-aseo/eoseo; so/because) vs -니까(-nikka; because/since)»	88
	Sentence structure issues	"Not clear with sentence structures."; "Confused arranging directions."	33
Technical difficulties	Upload/display issues	"Screen blurry."; "Upload didn't work."	22
	Usability issues	"Hard on phone."; "Audio sometimes doesn't load."	55
Suggestions or improvements	No suggestions	"No problems."; "Quiz smooth."; "No suggestions."	55

Table 6. *Summary of student responses by theme.*

Theme	Students' quotes: English translation and original Korean	Number of responses
Enjoyment and Engagement		
Fun and enjoyment	"Quizizz is a lot of fun" [Quizizz는 정말 재미있어요] "I really like Quizizz" [저는 Quizizz를 정말 좋아해요] "I enjoyed Quizizz a lot. It was so much fun." [저는 Quizizz 정말 즐겨했어요. 너무 재미있어요] "Quizizz is really fun" ["Quizizz"가 정말 재미있어요] "my Quizizz experience is great" [제 경험은 좋아요] "I quite like the one we're doing right now." "i think the quizzes are fun to do." "Quizizz is fun" [quizizz는 재미있어요~😊] "I think the quizzes are already fun." "it was good" "Overall it is fun and i enjoyed it!" "I like all" [다 좋아요] "overall, it's very engaging and fun" "It has been great." "it was enjoyable and helpful" "It was good fun, and I have learned a lot" [재미있었고 많은 것을 배웠습니다] "I like Quizizz a lot" [저는 Quizizz를 정말 좋아해요] "Quizizz helped me learn and remember learning content better." "I like the quiz format, it was fun to do." "I have learned as well as enjoying the functions of Quizizz" [Quizizz의 기능도 즐기면서 배웠어요] "I like that we can automatically see our mistakes and learn after that."	17
Interactive, engaging format and functions		11

	“it also helps me to engage more and look forward to the weekly quizzes since there are other features that makes it more enjoyable like the outfits, collecting the money and most importantly how quizizz is so interactive as well.” “I prefer this format, easy to follow and understand.” “i also liked that we can repeat the question again if we got it wrong.” “Quizizz is definitely much more interactive than canvas quiz.” “This quizz is the most effective way of checking what I have learned in class,” “i really enjoyed using quizizz as it allows me to track my mistakes and improve better from it.” “Quizizz is very interactive and easy.”	
Helpful for Understanding		
Clear Understanding	“i understand everything.” “It is ok for me” [저는 괜찮습니다] “I understand” [알겠어요] “I understand most of the quiz.” “i understood all the questions and i understood the correct answer to my mistakes.” “None so far:)”	6
Clear Explanations and Feedback	“the feedback is clear enough for me to understand.” “The explanation after questions is very helpful.” “I think everything is clear after explanations.” “i think the feedback is good so that we can understand and learn our mistakes.” “the feedbacks are very helpful for my understanding.” “The quiz feedback feature is well-made, I understand my mistakes better now.” “i liked how with every question, there is always explanation which summarizes how to use the words.” “i liked the explanation” “Quizizz is great as it has given proper feedback with proper notes.” “The explanation after each question is very helpful.” “feedbacks from the quizzes are helpful.” “i liked how with every question, there is always explanation which summarizes how to use the words.” “I like the explanation after every question, it is helpful.” “It helps me learn better as it provides explanations right after every questions and I appreciate that it shows us the right answers, I feel like I learn better with it.”	14
Use of Additional Resources	“the materials from class were really helpful.” “I usually refer back to the textbook if I struggle on a question.”	2
Students’ learning strategies	“it is a great approach to see how far i understand korean and it slowly helped me to improve my grammar. “the questions were a bit difficult, but I am working hard on that” [질문이 조금 어려웠지만 저는 열심히 일을 해요] “i also liked that we can repeat the question again if we got it wrong.” “i will study harder!!” “but despite no audio, i understood from the text explanation.” “I have learned a lot when I make a mistake” [실수했을 때 많이 배웠어요] “However, I apologize for missing some quizzes throughout the weeks.” “i’m hoping to learn more korean in the future :) “I needed to try harder. Thank you for being patient with me. I will continue to love Korean. Thank you so much, teacher.” [정말 감사합니다 선생님] “i tried this quiz again as a revision and i think i still need to revise more on -니까 and -아서/어서” (when to use either).	10
Challenging for Understanding		
Confusion with Grammar Rules	“I am still confused with grammar styles.” “I’m a bit confused when to use 걸려요, 있을 거예요 or anything similar to that.” “i am a little bit confused with some of the grammars.” “The question about 일어났다: Do we not use 아서/아서?” “Besides that, I think everything is good.” “I don't quite understand when to use '-아서 in question number 10” [10번 문제에서 ‘-아서’를 언제 사용하는지 조금 이해하지 못하겠습니다] “I just got abit confused for the use of -니까 and 서” “-니까 and -아서/ -어서/ -해서 has the same meaning right? so does that	8

Sentence Structure Issues	means we can use either -니까 or -아서/ -해서 for any context?"	3
	"still confused when to use "-아서" & "-니까"	
	"I'm not clear with some sentence structures."	
	"I'm a bit confused on how to arrange proper sentences for direction." "making sentences"	
Technical Difficulties in Using Quizizz		
Upload Problems / Display issues	"Sometimes when i type my answers, the screen gets blurry" "And earlier I tried to upload the picture but it doesn't work."	2
Usability	"Its a bit hard to use on phone." "But is it hard to use the laptop because there is no korean keyboard." "sometimes when i type my answers, the screen gets blurry and when it does not go away, i cannot check the answer i've typed." "sometimes the slide proceed before audio of explanation is loading." "there are some audio explanations that cannot load"	5
Suggestions or improvements		
No suggestions	"so far, there is no problem i experienced with the quiz." "The quiz was done smoothly" "No" [없어요] "Not sure." "Sorry, teacher, I don't have any" [죄송해요 선생님 없어요] "No" "없어요 [No.]	5

The impact of feedback-rich OFA on engagement and proficiency

This study hypothesized that a feedback-rich OFA would increase student engagement and grammar proficiency. Results supported this hypothesis, showing significant increases in both. The seven-week Quizizz intervention improved students' grammar scores from 58.22 to 67.00 and increased engagement across four dimensions. However, no direct link between engagement and proficiency was found. 15 of 18 students improved their overall grammar skills. These outcomes align with recent findings that immediate, computer-assisted feedback is particularly potent for grammatical revision, as it allows learners to reinforce knowledge and resolve misunderstandings in real-time (Cai et al., 2023; Klimova and Pikhart, 2022). This immediate feedback function appears crucial for Korean grammar proficiency, where traditional, postponed feedback often fails to deal with complex structural errors effectively (Son and Jung, 2022). Furthermore, this study provides evidence that feedback-rich OFA can support lower-achieving students. While previous research noted mixed results regarding the benefits for this group, a recent systematic review confirms that technology-mediated feedback can specifically enhance self-regulation and academic performance for struggling learners (Solis Trujillo et al., 2025). In the present study, low-performing students who maintained consistent quiz attendance and demonstrated engagement showed significant gains. This suggests that, although these learners may require additional scaffolding, the digital environment allows them to identify mistakes and build confidence through repeated attempts (Vassiliou et al., 2022).

The role of feedback-rich OFA in enhancing student engagement

Boosting emotional engagement

The significant rise in emotional engagement (from 4.18 to 4.48, $Z = -2.73$, $p = .006$) suggests that students perceived feedback-rich OFA positively, particularly in terms of enjoyment, engagement, and learning support, including interest and enthusiasm, while reducing negative emotions such as anger and boredom (Reeve et al., 2020). The significant increase in student engagement can be explained by students. So, we can

conclude that emotional engagement enhances students' learning behaviors and perceptions of the intervention. The strongest theme emerging from the data was enjoyment and engagement, with students consistently reporting that Quizizz was fun, motivating, and interactive. Students also noted that this interactivity made Quizizz more appealing than traditional quiz platforms, suggesting that digital tools with game-like elements may increase motivation and sustain learner interest. They liked the Quizizz interactive and easy-to-follow functions, as seen in comments like I prefer this format, easy to follow and understand. One student mentioned, "It helps me engage more and look forward to the weekly quizzes since there are other features that make it more enjoyable, like the outfits, collecting money, and most importantly, how interactive Quizizz is." Findings align with Zainuddin et al. (2020), who reported positive feelings toward Quizizz, though they examined game-based elements, whereas this study examined the mastery-learning function. By providing a "low-stakes" environment in which students felt comfortable identifying points of confusion, I think I improved from my previous attempt because of the class today the intervention fostered a positive learning experience. The rise in emotional engagement also suggests that technology-mediated immediacy not only improves performance but also encourages students to engage more actively and emotionally with the instructional material (Solis Trujillo et al., 2025).

Improving behavioural engagement and mastery motivation

The significant increase in behavioural engagement ($Z = -2.29$, $p = .022$) confirms that immediate feedback encourages students to move beyond passive participation toward active problem-solving (Reeve et al., 2020). On the Quizizz platform, students demonstrated high "mastery motivation" by independently reviewing incorrect answers and attempting quizzes multiple times, a pattern of behavioural involvement described by Reeve (2013). Open-ended responses further illustrate this effort, with students noting, I also liked that we can repeat the question again if we got it wrong and I usually refer back to the textbook if I struggle on a question. Students' reflections on their learning strategies reveal that many used Quizizz not only as an assessment tool but also as a means of revision and self-improvement. Reattempting questions, reviewing mistakes, and revising grammar points indicate a level of metacognitive engagement encouraged by the platform. Moreover, many students felt they had improved their grammar proficiency due to the feedback paired with explanations after each question. One noted, I think the feedback is good because it helps us learn from our mistakes. This shift suggests that the technology-mediated feedback transformed "mistakes" from indicators of failure into chances for growth. The data suggest that this positive emotional engagement directly enhanced learning behaviors; students expressed renewed motivation to continue their KFL studies, reflecting a sense of progress and persistence that is often difficult to sustain in complex grammar learning. One student remarked, I really enjoyed using Quizizz, as it allows me to track my mistakes and improve from them,. So, we can conclude that emotional engagement enhances students' learning behaviours.

Particularly, the ability to repeat questions was cited as a key factor in helping them improve their grammar. Students expressed motivation to improve and continue studying Korean, showing that the assessment format contributed to their sense of progress and persistence. Students ability to track their own progress through the "Mastery Mode" appears to have fostered a sense of persistence. For instance, pre-and

post-test data revealed that 77.7% of the participants improved their grammar proficiency, with the most notable gain observed in S9 (+50 points) (9 attempts). Conversely, the most significant decline was recorded by S11 (-14 points), whose lower behavioural engagement (3 attempts) likely contributed to this outcome (*Table 7*). Even students who started high, like S14 (who gained +16) and S17 (who gained +22), showed that the OFA wasn't just for struggling learners, it helped high-performers refine their accuracy further. This illustrates that greater behavioural engagement (i.e., more attempts) was generally associated with higher learning gains. This aligns with Bulut et al. (2025), who found that the frequency of attempts in online formative assessments is a significant predictor of achievement. The results further highlight that exposure is a primary driver of success. Because participation was non-compulsory, exposure varied significantly; for example, S11 experienced a 14-point decline (52 to 38) after failing to participate in the final units. This confirms that even if a student feels "engaged" initially, a lack of consistent interaction with the feedback loops in the later stages of the learning cycle can negate earlier gains. Interestingly, previous research by Orsmond and Merry (2013) found that low-achieving students often read feedback without using it to plan. However, in this digital context, lower-performing students actively used the feedback for further learning, resulting in improved scores across the cohort. This indicates that while engagement is not a guarantee of immediate proficiency gains, it creates the essential self-regulatory environment required for long-term mastery (Black and Wiliam, 2009).

Table 7. Raw data for student behavioural engagement (*Quizizz attempts*).

Student ID	Total Quizizz Attempts
S1	8
S2	4
S3	7
S4	8
S5	6
S6	8
S7	7
S8	7
S9	9
S10	5
S11	3
S12	8
S13	8
S14	9
S15	5
S16	5
S17	6
S18	7

Significant rise in cognitive engagement

The findings demonstrate that feedback-rich OFA markedly boosts student cognitive engagement, with scores rising significantly from 3.94 to 4.38 ($Z = -3.03$, $p = .002$). This reflects the increased mental effort students invested in tracking their progress and applying technology-mediated feedback in real-time. As noted by McCallum and Milner (2021) and Zainuddin et al. (2020), digital formative tools provide the necessary scaffolding for students to move beyond rote memorization toward reflective thinking. Furthermore, the preference for audio feedback in this study supports research suggesting that multimodal cues help students revise their understanding better than traditional text-based methods (Klimova and Pikhart, 2022; Cavaleri et al., 2019). Students noted how they used strategies to improve their cognitive engagement. In

particular, students demonstrated increasing independent learning skills to close the gap between current performance and desired standards (Gan and Leung, 2020; Sadler, 1989), and timely feedback has positively influenced their engagement. The quiz feedback feature is well-made. I understand my mistakes better now. Quizziz helped me learn and remember learning content better. I like the explanation after every question, it is helpful. Many valued receiving immediate feedback, tracking errors, and retrying questions. These features foster active learning by enabling reflection on mistakes and progress monitoring. Students reported that Quizziz helped them understand the content, especially through explicit explanations and post-question feedback. Students also noted the role of feedback in clarifying errors, improving knowledge, and boosting performance. Some students identified confusion points, suggesting areas for further instruction. The frequent mention of explanations indicates feedback helped reinforce grammar concepts. Immediate access to correct answers and explanations, including supplementary explanations, increased comprehension and supported independent learning outside class, as evidenced by previous research (Enders et al., 2021; Corral and Carpenter, 2020).

The growth of agentic engagement

One of the most notable findings was the significant improvement in agentic engagement ($Z = -3.08$, $p = .002$) from 2.60 to 3.33, with most students becoming more proactive. By interacting with technology-mediated feedback, students in this study became "proactive seekers" of information rather than passive recipients (Reeve et al., 2020). The significant increase in agentic engagement scores in this study is consistent with the findings of Mohammadi Zenouzagh et al. (2025), which suggest that feedback-rich digital environments provide the necessary scaffolding for students to move beyond simple participation into proactive engagement. The qualitative data illustrate that students used the open-ended feedback opportunities to advocate for their own learning needs, specifically identifying complex linguistic hurdles: "I tried this quiz again as a revision, and I think I still need to revise more on -ㄴ|까(-nikka; because/since) and -아서/어서(-aseo/eoseo; so/because) (when to use either)." Others expressed their needs directly, stating, "I'm not clear with some sentence structures or I am a little bit confused. This level of transparency is a hallmark of agentic engagement, where learners initiate a dialogue to personalize their pedagogical experience (Reeve et al., 2020). Furthermore, students displayed agency by providing critical feedback on the digital interface itself, noting technical barriers such as, The fill-in-the-blank... is confusing because there could be more than one correct answer and Sometimes when I type my answers, the screen gets blurry. By reporting these issues, students acted as active contributors to the pedagogical process, helping to refine the digital learning environment. This behaviour aligns with the findings of Mohammadi Zenouzagh et al. (2025), which confirm that formative assessment in digital spaces enables students to take an active role in identifying their needs and addressing barriers to their success.

Engagement as a necessary but insufficient condition

However, the lack of a meaningful correlation between engagement and proficiency was initially unexpected. The qualitative data offer a critical explanation for the lack of a meaningful correlation between engagement and grammar proficiency. The qualitative

data offer a vital explanation for this lack of correlation. Despite Quizizz's 'fun' and 'interactive' nature, students frequently reported persistent confusion about complex grammar rules, such as the distinction between causal connectors such as -니까(-nikka; because/since) and -아서/어서(-aseo/eoseo; so/because). This demonstrates that while feedback-rich OFA effectively increases student affect and effort, it cannot entirely replace direct instruction for nuanced linguistic concepts. This suggests that although they were highly engaged in learning, engagement alone was insufficient to overcome the inherent difficulty of certain grammatical concepts for beginners within the study's timeframe. Interestingly, the results revealed a non-significant negative trend between cognitive engagement and grammar gains engagement ($r_s = -.356$, $p > .05$). This may suggest that learners who invested the greatest mental effort were those facing the most significant linguistic hurdles; for those students, high cognitive engagement was a response to the difficulty of the material rather than a direct predictor of immediate mastery within the seven-week timeframe. Similarly, the non-significant negative correlation between emotional engagement and grammar gains ($r_s = -.238$, $p > .05$) suggests that while the gamified, feedback-rich environment fostered a positive learning experience, high levels of emotional involvement did not automatically translate into immediate linguistic mastery. For beginner learners, the 'fun' and 'interactive' nature of the platform may have sustained motivation to persist through difficult content, but the cognitive complexity of Korean grammar remained a primary hurdle that emotional engagement alone could not overcome within the study timeframe.

Conclusion

This study shows that feedback-rich online formative assessment notably improves both multidimensional engagement and grammar proficiency among beginner Korean language learners. By integrating the Quizizz platform, the intervention promoted a student-centred environment in which immediate, technology-mediated feedback-particularly in audio format-functioned as a trigger for self-regulated learning. While overall engagement across emotional, behavioural, cognitive, and agentic dimensions increased significantly, the lack of direct correlation between engagement gains and grammar scores suggests that for complex grammatical constructs, engagement is a necessary but not sufficient condition for mastery. Ultimately, the study shows the powerful role of technology-mediated feedback in reducing the difficulties of Korean as a Foreign Language (KFL) grammar acquisition. The significant improvement in grammar proficiency following the intervention offers meaningful insights for educators and curriculum developers. These findings are particularly meaningful for KFL education, which often faces challenges with language difficulties, learner attrition, and integration of technology-enhanced instruction. This study contributes to the field by providing a unique conceptual framework that positions agentic engagement as a reciprocal process enabled by digital media. Furthermore, by showing the efficacy of feedback-rich OFA in a blended learning context in Brunei, this study provides an adaptable model for language programs seeking to balance learner motivation and academic rigour in the blended learning environment. The significant improvement in grammar proficiency following the intervention offers meaningful insights for educators and curriculum developers. These findings are particularly meaningful for KFL

education, which often faces challenges with language difficulties, learner attrition, and integration of technology-enhanced instruction. This study contributes to the field by providing a unique conceptual framework that positions agentic engagement as a reciprocal process enabled by digital media. Furthermore, by showing the efficacy of feedback-rich OFA in a blended learning context in Brunei, this study provides an adaptable model for language programs seeking to balance learner motivation and academic rigour in the blended learning environment.

Acknowledgement

The authors received no financial support or external funding for the research, authorship, or publication of this article.

Conflict of interest

The authors confirm that there is no conflict of interest involved with any parties in this research study.

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