



Integrating Multimodalities in Strengthening Students' EFL Grammar Knowledge

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Abstract. This study investigates the integration of multimodal learning platforms in enhancing students' English grammar knowledge in an EFL context. The research aimed to compare the effectiveness of two digital platforms—WhatsApp (WA) and Google Classroom (GC)—in supporting grammar instruction through multimodal resources such as text, audio, and visual materials. Employing a quasi-experimental design, fifty undergraduate students were purposively assigned to two groups: the experimental group learned through WA, while the control group used GC. Both groups received identical instructional content and activities, and data were collected through pre- and post-tests to measure their grammar achievement. Statistical analysis using the independent-sample t-test indicated significant improvement in both groups' post-test scores, demonstrating that learning through multimodal platforms effectively enhances grammar mastery. Although the mean score of the WA group was slightly higher than that of the GC group, the difference was not statistically significant. These findings suggest that integrating multimodal approaches through digital platforms facilitates students' engagement and comprehension of grammatical structures. The study implies that English teachers should adopt diverse multimodal strategies in digital learning environments to promote active learning and deepen students' understanding of grammar concepts.

Keywords: Multimodal learning, grammar instruction, digital platforms, WhatsApp, Google Classroom

1 Introduction

The ability to understand and use English grammar is the main foundation for mastering English as a foreign language (EFL). Grammar serves not only as a set of linguistic rules, but also as a means of constructing meaning, constructing sentences accurately, and expressing ideas clearly in academic and professional communication. For students

of the English Language Education Study Program, mastery of grammar is a prerequisite for developing comprehensive language competencies, encompassing writing, speaking, reading, and listening skills. A strong command of grammar enables students to understand complex discourse structures and produce grammatically cohesive texts—a crucial skill in both academics and language teaching.

However, various studies show that grammar learning in EFL contexts is still often oriented towards traditional approaches that emphasize rule memorization and isolated practice away from real-life communication contexts. As a result, students struggle to apply grammar knowledge to meaningful language use [1]. This challenge demands a more contextual, interactive, and student-centered learning approach, especially in the digital era, which provides a variety of learning resources and media.

Over the past two decades, advances in digital technology have transformed the way students learn and interact. Online platforms such as WA and GC have become integral parts of the English language learning ecosystem in higher education. WA, originally designed as a social communication application, is now widely used in learning contexts due to its accessibility, interactivity, and support for real-time communication [2], [3]. Several studies [4]–[7] have shown that using WA can increase student engagement, expand interactions beyond the classroom, and enrich the language learning experience.

In the context of grammar learning, WA allows lecturers to deliver materials in various formats—for example, PowerPoint (PPT) files, text, video links, or explanations via voice notes. Furthermore, the chat feature can be used for discussion and reflection on the grammatical structures being studied [8]. The use of voice notes, for example, helps students understand intonation, spoken structure, and the context in which grammar is used in real-life communication. Thus, WA functions not only as a medium for delivering material but also as a multimodal space for interactive meaning construction.

On the other hand, GC also makes a significant contribution to supporting digital-based grammar learning. This platform allows lecturers to upload materials such as PowerPoint presentations, assign structured assignments, provide feedback, and facilitate discussions through a chat box [9]–[11]. Various studies [12]–[14] highlight that GC strengthens collaboration, increases active student participation, and supports a flexible blended learning approach. [1] even emphasized that GC can be an effective medium for collaboration in contextual grammar learning, as it provides a space for students to practice, discuss, and construct understanding independently or in groups.

Learning approaches that combine multiple media reflect the principles of multimodal learning—a concept that emphasizes that learning occurs through the integration of various communication modes such as text, images, sound, and digital interactions [15]–[17]. In this context, each mode has different affordances in constructing meaning. Mayer (2009), through the Cognitive Theory of Multimedia Learning, explains that the combination of verbal modes (words, text) and visual modes (images, graphics, videos) can improve understanding because it utilizes two different cognitive channels. Meanwhile, the Multiliteracies Framework emphasizes that learning skills in the digital age require mastery of various forms of literacy—including the ability to interpret and produce meaning in various modes and media.

Several previous studies have highlighted the effectiveness of each platform in English learning. For example, [18] found that WA expands language learning opportunities outside the classroom, while [19] noted the WA increased interaction and learning convenience during the pandemic. Meanwhile, [20], [21] found GC to be effective as a Learning Management System (LMS) in increasing engagement and providing systematic learning feedback. However, most of these studies focused on a single platform and specific skills such as writing or reading.

There hasn't been much research exploring the integration of multimodality through WA and GC in the context of grammar learning in higher education, particularly in English Language Education study programs. However, the integrated use of both provides a richer form of multimodal learning: lecturers can utilize WA for synchronous and interactive communication, while GC is used for more formal and structured academic activities. This integration allows students to experience the grammar learning process holistically—through text, audio, images, and digital social interactions that support meaning-making.

This research gap is important to address because most previous studies have focused on the impact of student motivation, perception, or participation on the use of a single medium [2], [22], [23], while the integration of multimodality as a pedagogical strategy to strengthen grammar knowledge remains underexplored empirically. Furthermore, research on multimodal learning in EFL grammar instruction in the Indonesian context is still limited, despite the significant need to improve applied grammar understanding.

The novelty of this research lies in the integration of various media, such as written messages via chat boxes, voice chat, PPT sharing, and videos, to create a multimodal learning environment where students not only passively receive knowledge but also actively interact, listen, write, and visualize grammar concepts in various forms of communication. This approach aligns with the multimodal pedagogy perspective, which positions students as active meaning-makers [24], [25], as well as the findings of [26], which emphasizes the importance of multimodal feedback in strengthening English language learning in higher education.

Thus, this study aims to prove that the learning process using online media such as "WA" and "GC" can improve the learning outcomes of the Pre-Intermediate Grammar course. Also, this study aims to explore how multimodality integration through the use of various media can strengthen EFL students' grammar knowledge at the university level. The focus is not only on the effectiveness of the media but also on how students construct meaning and understanding of grammar through cross-mode and cross-platform interactions. Through this approach, it is hoped that this study can provide theoretical contributions to the development of a multimodal learning framework in the context of grammar learning, while also providing practical implications for English language lecturers in designing more interactive, contextual, and meaningful digital learning.

2 Research Method

This research employed a quantitative research approach through a quasi-experimental research method. This design includes two groups that were recruited purposively by considering their low grammar mastery in the previous grammar lesson. There are 25 students in each group. One group was manipulated by implementing WA, while the other group was taught by using GC. Table 1 describes the procedures of the treatment process.

Table 1. Instructional Activities

Instructional Activities assisted by WA	Instructional Activities assisted by GC
1. The research team made the WA (WAG) group a learning platform.	1. The research team designed the GC application as a learning platform.
2. The research team distributed teaching materials at WAG. Students study the materials for 50 minutes.	2. The research team distributed the Google Classroom CODE to students via short message service (SMS)
3. The research team and students discuss the material in WAG. The discussion was through chat and voice notes	3. The research team distributed teaching material in GC. Students learned the materials for 50 minutes before discussing in the "forum of GC."
4. The research team posted the exercise on the WAG.	4. The research team posted the exercise via the "forum of GC".
5. Students sent the answer in the WAG.	5. The students posted the answer on the forum before discussing it.
6. The research team and the students discussed the task in WAG through chat and voice notes.	6. The research team provides quizzes through GOOGLE FORM with a predetermined time limit.
7. A quiz was also distributed in WAG, but students sent the answer via personal chat to the research team during the predetermined time limit. Students are divided based on the number of teachers in the research team. Each teacher gave feedback personally to each student.	

This study aims to prove the effectiveness of the application of e-learning assisted by WA and GA, and the research team administered a multiple-choice grammar test as an instrument of data collection. Research data obtained through tests were statistically processed through inferential statistics, an independent sample T-test to determine whether this research hypothesis is accepted or not.

3 Findings

This study employed a quantitative approach with a quasi-experimental design, selected because the sample was obtained through purposive sampling. Two of three parallel classes were chosen as experimental groups due to their lower English grammar mastery in the previous semester. To test the research hypothesis, the researcher used paired-sample t-tests with SPSS version 24. Before running the independent t-test, prerequisite tests—normality and homogeneity—were conducted to ensure that the data met parametric testing assumptions. Normality is essential for parametric analyses such as regression, ANOVA, ANCOVA, MANOVA, Independent T-Test, and Paired T-Test. Homogeneity is also required when comparing two groups with different subjects. If the data fail to meet these assumptions, parametric tests such as t-tests cannot be applied.

Normality was examined using both Kolmogorov-Smirnov and Shapiro-Wilk tests, with the latter prioritized because each group consisted of only 25 students. Data were considered normal if the Sig. value exceeded the alpha level of .05. The results showed that the pretest and posttest values for both groups met this criterion: .134 and .801 for the WA group, and .303 and .280 for the GC group, all above .05, indicating normal distribution. The homogeneity test also showed Sig. values greater than .05—0.110, 0.465, 0.474, and 0.450—confirming equal variances across groups. Since both assumptions were met, the analysis proceeded using parametric hypothesis testing through the paired-sample t-test. However, before we do the paired-sample T-test, a statistical description of the data is provided as follows;

Table 2. Statistical Description

	N	Minnum	Maximum	Mean	Std. Deviation
WhatsApp_PreTest	25	7	77	38	15.215
WhatsApp_Post-Test	25	33	97	64	15.87
GoogleClass-room_PreTest	25	17	67	35.6	12.683
GoogleClass-room_PostTest	25	23	93	54.53	14.007
Valid N (listwise)	25				

Table 2 illustrates that there are differences in the average score of student learning outcomes before and after using the learning platform "WA" and GC. " It can be noted that the mean value of students' learning outcomes at pretest is 38 < Posttest 64 after experiencing WA as the learning platform, whereas the average means score of students' Pretest is 35 < Posttest 64.53 for the GC group. However, to prove whether the differences are significant or not, we need to interpret the results of the independent sample t-test (see Table 3).

Table 3. Independent Sample T-Test

		Levene's test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Students' Learning Achievement	Equal variances assumed	1.26	0.268	2.37	48	0.022	10.05333
	Equal variances not assumed			2.37	47.3	0.022	10.05333

The results of the Independent Sample T-Test are in Table 3. showed that the variance of both groups was homogeneous ($F = 1.268$; $p = 0.268 > 0.05$). Furthermore, there was a significant difference between the average learning achievement of the two groups ($t(48) = 2.347$; $p = 0.022 < .05$). The Sig. (2-tailed) is .022, which is less than 0.05 ($0.022 < 0.05$). Meaning H_0 is rejected, and H_a is accepted. Thus, it can be concluded that the treatment given to the experimental group (WA) had a positive impact on improving student learning outcomes compared to the control group (GC).

4 Discussion

The findings of this study revealed that both WA and GC effectively supported students' English grammar learning during online instruction; however, the WA-based learning group outperformed the GC group significantly ($t(48) = 2.347$; $p = .022 < .05$). This indicates that integrating multimodal resources through WA yielded a stronger impact on students' grammar achievement. These results confirm that multimodal learning environments, which combine linguistic, visual, and auditory elements, can enhance EFL learners' engagement and comprehension [15], [17], [27].

The effectiveness of WA as a grammar learning medium can be attributed to its high interactivity and multimodal affordances. In this study, WA enabled the teacher to provide PowerPoint slides, written explanations, and real-time discussions while also sending voice notes to clarify grammatical concepts. This combination of textual and auditory input aligns with Mayer's (2009) Cognitive Theory of Multimedia Learning, which posits that learning becomes more meaningful when verbal and visual information are integrated through dual coding processes. Students process information through two cognitive channels—verbal and visual—thereby increasing retention and understanding. Moreover, [15] emphasize that learning is inherently multimodal, and each semiotic mode (e.g., text, sound, image) contributes uniquely to meaning-making. Through WhatsApp, students could engage in simultaneous modes of learning—reading messages, listening to explanations, and discussing grammatical structures—thus fostering deeper cognitive engagement.

These results are consistent with previous studies that have highlighted the pedagogical benefits of WA in EFL learning. [8] and [5] found that WA facilitates language practice, enhances writing and reading skills, and promotes communicative interaction beyond the classroom. [2] also demonstrated that WA increases learners' motivation and participation through instant feedback and informal learning opportunities. Similarly, [6], [7] reported that WA extends language exposure outside the classroom and encourages learners to use English in authentic contexts. The current study extends these findings by showing that WA is not only beneficial for improving communication skills but also effective in reinforcing grammatical competence—a component often perceived as less interactive in online settings.

In contrast, while GC also improved students' grammar knowledge, the effect was less pronounced. This might relate to the nature of interaction afforded by each platform. GC primarily functions as a LMS that supports asynchronous learning, where materials and tasks are shared, but real-time communication is limited [9], [12]. Several studies [1], [13], [20] have confirmed that GC is effective for managing assignments, delivering structured grammar lessons, and providing feedback. However, its design often leads to a more formal and less conversational learning environment. In contrast, WA provides social immediacy, frequent micro-interactions, and personalized feedback, which are crucial in sustaining learners' motivation and cognitive engagement [3], [23].

The results also resonate with the Multiliteracies Framework proposed by The New London Group (1996), which argues that 21st-century literacy involves navigating multiple modes and media to construct meaning. By using both WA and GC, students in this study engaged in multimodal literacy practices—reading, writing, listening, and responding to digital texts across platforms. WA's multimodal immediacy complemented GC's formal structure, leading to a more comprehensive learning experience. However, the statistically significant difference suggests that synchronous and dialogic multimodal engagement, as afforded by WA, may have a stronger impact on grammar learning than the more static modes typical of GC.

This study's findings also echo [26] argument that multimodal dialogical feedback enhances EFL learners' understanding and self-regulation. The voice notes and chat-based discussions used in the WA group acted as multimodal feedback, providing students with immediate clarification and affective support—factors that may explain their higher post-test scores. Similarly, [25] assert that multimodal learning environments foster both cognitive and emotional engagement, leading to better learning outcomes.

From a broader pedagogical perspective, these results demonstrate that integrating multimodal communication tools can transform grammar instruction from being rule-based and mechanical to interactive and meaningful. The quasi-experimental evidence from this study strengthens the argument that mobile-assisted language learning (MALL), when designed with multimodal principles, can improve grammatical proficiency and student motivation simultaneously. The use of multiple devices (smartphones and computers) and platforms (WA and GC) reflects an authentic, flexible learning ecology that accommodates students' diverse learning preferences and access conditions.

Despite its promising results, this study also highlights the need for balanced integration between synchronous multimodal interaction and asynchronous academic management. While WA promotes immediacy and participation, GC ensures organization

and continuity. Therefore, future EFL instruction could combine both platforms strategically to optimize multimodal learning experiences—using WA for interaction and discussion, and GC for structured assignments and assessment.

In conclusion, this study provides empirical support for the effectiveness of multimodal integration in strengthening students' EFL grammar knowledge. The significant improvement in the WAG underscores the importance of adopting multimodal, mobile-based learning environments that align with students' communicative habits and cognitive needs. By embracing the multimodal affordances of technology, EFL educators can design grammar instruction that is not only accurate and structured but also dynamic, interactive, and engaging.

5 Conclusion

This study concludes that integrating multimodal digital platforms—particularly WA and GC—positively enhances students' English grammar achievement in an EFL setting. Both platforms improved students' grammar comprehension, yet the independent sample t-test ($t(48) = 2.347, p = .022 < .05$) shows that students using WA achieved higher gains than those using GC. The interactive, real-time, and multimodal features of WA—such as text, images, and voice notes—enabled more immediate feedback and richer engagement, contributing to more effective knowledge construction than the more structured and asynchronous environment offered by GC.

The findings highlight the pedagogical importance of multimodal learning design in EFL grammar instruction. Teachers are encouraged to incorporate diverse digital modes—short videos, chat-based discussions, visual aids, and audio annotations—to make grammar learning more contextual and engaging. The study also reinforces the growing relevance of MALL, showing that platforms like WA can create flexible learning spaces that blend formal and informal learning, enhancing students' motivation, interaction, and autonomy. While GC remains valuable for managing materials and assessments, strategically combining both platforms may create a more balanced and effective multimodal ecosystem.

Although promising, the study has limitations, including a small sample size, a single-institution context, a short treatment duration, and a focus limited to grammar achievement. Future studies should include larger samples, longer interventions, and qualitative approaches to deepen insights into students' experiences with multimodal learning. Overall, the study provides empirical support for multimodal digital integration as a means to make grammar instruction more interactive, meaningful, and aligned with 21st-century learning demands.

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