

Enhancing EFL students' vocabulary learning through Quizizz-based formative assessments

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Abstract

Mastering vocabulary is fundamental to learning English as a Foreign Language (EFL); however, students often struggle with various vocabulary components. This study aims to: (1) identify which vocabulary components show the most significant improvement in students' learning outcomes through Quizizz-based formative assessments, and (2) explore individual differences in EFL students' vocabulary performance across these assessments. This descriptive quantitative study involved 30 students from an EFL vocabulary class at a private university in Jakarta. Students completed nine Quizizz-based formative assessments covering various vocabulary topics, including word classes, word formations, synonyms, antonyms, idioms, collocations, phrasal verbs, and context-specific terms related to education and social media. The data were analysed using descriptive statistics consisting of the minimum and maximum scores, the mean, the standard deviation, and the variance. The results showed that social media and synonyms were the easiest vocabulary units because they had the highest average scores. In contrast, the units on phrasal verbs and word formations were the most challenging, as indicated by the lowest average scores. Most students demonstrated improvement across the assessments. Nevertheless, a small number of students revealed inconsistent performance across the various assessments, as evidenced by individual variability in performance. These findings suggest that Quizizz-based formative assessments can enhance students' vocabulary learning outcomes and help teacher educators design responsive instructional strategies to meet the diverse needs of EFL students.

Keywords: EFL; vocabulary learning; Quizizz; formative assessment; student performance

INTRODUCTION

Vocabulary is one of the basic components of language learning and use. Vocabulary knowledge supports language skills and is a prerequisite for communication (Lei & Reynolds, 2022; Nugraheni & Fakhurriana, 2023). When students have a limited vocabulary in a foreign language, their ability to communicate successfully is greatly restricted. Vocabulary knowledge is therefore regarded as one of the most critical skills for foreign language learners. It enables them to construct both spoken and written texts and to use language effectively in different contexts. To communicate meaningfully through various structures and functions, students need access to a wide range of words. These reasons underscore the importance of systematic vocabulary instruction, which enables students to develop both receptive and productive word knowledge, particularly those with limited exposure to English (Rahmawati et al., 2022; Telaumbanua et al., 2024). Hence, it is essential to prioritize vocabulary learning to accelerate the acquisition of any foreign language and to address the challenges that EFL students encounter.

EFL students in Indonesian higher education institutions face persistent challenges in vocabulary learning. Telaumbanua et al. (2024) identified two primary contributing factors. The first psychological factor involved low motivation, limited interest, lack of confidence in oral communication, reluctance to use English vocabulary in daily contexts, mood-dependent learning, and insufficient study time. The second factor is linguistic, including difficulties with word meanings, grammatical structures, and pronunciation. In addition, prior studies indicated that undergraduates confront problems in precisely spelling, using correct grammar, pronouncing English words, growing vocabulary, applying vocabulary appropriately, and grasping word connotations (Aida et al., 2024; Lutfiah et al., 2022). Inadequate and repetitive vocabulary-teaching media fail to sufficiently engage students, limiting their vocabulary learning and achievement (Hendrawaty et al., 2024). Hence,

utilising gamified instructional media in the digital era allows lecturers to select appropriate teaching platforms that align with students' needs and interests.

Since the beginning of the 21st century, technology literacy has been a concern in many aspects, including education. Advances in technology have introduced numerous innovations in language teaching and learning (Hien, 2024). Introducing digital tools in education has several common purposes that can help educators monitor students' potential by providing specific individual feedback or gaining insights into their progress to develop a more effective work plan. Advancements in educational technology have facilitated the development of digital learning assessments, including a formative assessment platform such as Quizizz. Quizizz demonstrates the transition from traditional assessment methods to technology-based approaches. The platform enables educators to design customised quizzes, employ diverse question formats, integrate gamified elements, assign classwork or homework, deliver immediate feedback, and automate student scoring. These functionalities support educators in monitoring student progress and promoting student engagement and autonomy in the learning process (Moreira & Lara Freire, 2024).

Quizizz has become increasingly popular in English Language Teaching (ELT) at multiple educational levels. Researchers have examined both the perceptions and effects of Quizizz in tertiary-level English language instruction in several countries. In Spain, students in the Education Program had more positive perspectives on how Quizizz gamification experiences enhanced their learning (Hernanz et al., 2024). In Vietnam, most students found Quizizz effective for reviewing lessons, contributing to increased motivation, engagement, and satisfaction (Hien, 2024; Pham, 2022). In Thailand, incorporating Quizizz facilitated vocabulary learning, promoted the development of learner autonomy, and enhanced students' vocabulary knowledge (Castro et al., 2024; Panmei & Waluyo, 2023). In Indonesian higher education contexts, Quizizz significantly improved students' vocabulary learning and facilitated greater access to the learning activity (Nugraheni & Fakhurriana, 2023). Evidence from the English Education Program in Sulawesi suggested that Quizizz contribute most significantly to psychomotor, followed by cognitive and affective outcomes; however, it did not substantially affect student engagement (Munawir & Hasbi, 2021). Similarly, students in Central Java described Quizizz as interactive, practical, engaging, and enjoyable, positively impacting vocabulary and grammar development (Safitri & Wahyuningsih, 2024).

As a formative assessment platform, Quizizz allows students to evaluate their knowledge and track progress (Permana & Permatawati, 2020). Prior studies highlight its benefits in promoting feedback, learner responsibility, and English language comprehension (Angelina et al., 2022). Regular use of Quizizz for daily or weekly assessments supports students in completing tasks and monitoring their learning progress (Maryo & Pujiastuti, 2022). Furthermore, integrating formative assessments into Quizizz provides insights into individual learning, supports personalized instruction, and fosters autonomy (Moreira & Lara Freire, 2024).

Despite these advantages, research on Quizizz in EFL higher education has largely focused on general learning outcomes, with limited attention to vocabulary development. Few studies have examined how Quizizz can track vocabulary progress across multiple instructional units or capture individual variations in performance. This gap highlights the need to investigate which vocabulary components demonstrate the most significant improvement through Quizizz-based formative assessments and how students vary in their vocabulary performance across units.

The theoretical foundation for this study is Vocabulary Learning Strategies (VLS), as stated by Oxford (1990) and Schmitt (1997, 2000), cited in Ghalebi et al. (2020). VLS encompasses the actions, behaviours, and techniques students employ to acquire, store, retrieve, and use new vocabulary. Three strategy types are particularly relevant: memory strategies, which involve creating associations such as mnemonics or imagery; cognitive strategies, including repetition, analyzing word forms, and reviewing responses; and metacognitive strategies, which involve planning, monitoring, and evaluating one's learning. Quizizz supports these strategies by providing repeated exposure to lexical items, opportunities for analysis through immediate feedback, and performance tracking that enables students to reflect on progress and adjust study efforts.

Building on VLS and addressing the identified research gap, this study seeks to answer two research questions:

1. Which vocabulary components show the most significant improvement and consistency in EFL students' learning outcomes through Quizizz-based formative assessments?
2. How do individual EFL students vary in their vocabulary learning performance through Quizizz-based assessments?

The novelty of this study lies in its focus on utilizing Quizizz to support vocabulary learning in EFL higher education, an area that has been underexplored in prior research. Rather than concentrating solely on general learning outcomes, the study examines both collective patterns and individual differences in vocabulary performance across instructional units. It also identifies the vocabulary components that show the most significant and consistent improvement through Quizizz-based formative assessments. This perspective positions Quizizz not merely as a gamified platform but as a systematic tool for tracking and supporting sustained vocabulary learning.

Finally, this study contributes to advancing research on gamification and digital formative assessment in ELT by examining detailed patterns of vocabulary progress. Analyzing students' development across multiple instructional units provides insights into how Quizizz can serve as both an engaging instructional tool and a systematic method for monitoring and supporting vocabulary learning. The findings are expected to inform EFL pedagogy by demonstrating how Quizizz-based formative assessments can be effectively integrated to enhance and sustain vocabulary learning.

METHODS

Research design

The present research employed a quantitative descriptive method. Descriptive quantitative analysis describes, explains, predicts, or regulates phenomena using statistical or numerical data (Gay et al., 2012). The study identified which vocabulary components showed the greatest improvement in students' learning outcomes through Quizizz-based formative assessments and analysed individual differences in the vocabulary performance of EFL students across these assessments using descriptive statistical analysis. While this design did not allow for causal inference, it provided rich descriptive data on how students' vocabulary performance changes in response to regular, unit-based formative assessments.

Participants

Thirty undergraduate students in the third semester of the 2024-2025 academic year from the English Education Program at a university in Jakarta were chosen as the participants using purposive sampling. Researchers use their judgment to purposively select a sample, informed by prior information, that they anticipate will produce the requisite data (Fraenkel & Wallen, 2009). The selection criteria included enrolment in the third-semester vocabulary course and a class mean score of 62.00 compared to the overall mean score of 64.88 across six classes.

Ethical standards were maintained throughout the study. Prior to data collection, participants were completely informed about the study's purpose and procedures through a consent form. Confidentiality and anonymity protocols protected participants' identities and personal information.

Data collection

The formative assessments consisted of individual assignments to investigate EFL students' progress in understanding vocabulary. The materials related to parts of vocabulary building encompassed seven units, including content words, word formations, synonyms, antonyms, phrasal verbs, collocations, and English idioms in use. Vocabulary in contexts was divided into two units: education and social media. The investigation was conducted entirely online and required twelve meetings. The students participated in interactive exercises and activities on Quizizz after finishing each vocabulary unit. Each unit included ten multiple-choice questions, for which the correct answer was worth 10 points. The response time was limited to 10 seconds for vocabulary-building components and 20 seconds for context-based vocabulary.

The formative assessments were designed as low-stakes, instructional tools to monitor learning progress and provide immediate feedback at the end of each unit, rather than as high-stakes examinations for summative or certification purposes. Content validity was established through qualitative expert judgement by two ELT specialists, who reviewed each item for relevance, clarity,

alignment with learning objectives, and appropriateness of difficulty. Reliability was assured procedurally through consistent test construction, delivery, and scoring, with all units developed under the same criteria agreed upon by the experts and administered under identical online conditions via Quizizz, making the instrument sufficiently reliable for monitoring students' vocabulary progress after each unit.

Data analysis

Quantitative descriptive statistics were used to evaluate data from formative assessments administered via Quizizz. A table summarizes nine vocabulary units, reporting the number of units, participants, range, minimum and maximum scores, mean, standard deviation, and variance. A graphical representation depicted the progression of formative assessment scores across units. The descriptive analysis of individual EFL student performance consisted of the participant, total number of vocabulary units, minimum and maximum scores, mean, standard deviation, and variance, all presented in a table. Statistical analysis was performed utilizing Statistical Package for the Social Sciences (SPSS) version 27 for Windows.

FINDINGS AND DISCUSSION

The results of Research Question (RQ) 1 demonstrate the descriptive analysis of various vocabulary components and illustrate graphical representation of progress in formative assessments across units.

Descriptive analysis of vocabulary components

The descriptive analysis of vocabulary components consists of performance across different vocabulary components measured through mean scores and variability of performance measured through variance scores. The following table shows the data description of each tested unit.

Table 1. Descriptive analysis of vocabulary components

Vocabulary Units	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Word Classes	30	40.00	60.00	100.00	88.00	15.18	230.34
Word Formations	30	60.00	40.00	100.00	70.00	18.57	344.82
Synonyms	30	30.00	70.00	100.00	90.67	10.48	109.88
Antonyms	30	50.00	50.00	100.00	83.67	16.08	258.51
Collocations	30	60.00	40.00	100.00	88.33	15.10	228.16
Phrasal Verbs	30	80.00	20.00	100.00	59.67	21.25	451.61
Idioms	30	50.00	50.00	100.00	83.00	17.25	297.59
Education	30	50.00	50.00	100.00	74.67	16.13	260.23
Social media	30	30.00	70.00	100.00	94.33	8.58	73.68

Table 1 provides descriptive statistics on nine formative assessments of vocabulary units covering parts of vocabulary building: word classes, word formation, synonyms, antonyms, collocations, phrasal verbs, idioms and vocabulary in contexts such as education and social media. These data include the number of participants, score range, minimum and maximum scores, mean, standard deviation, and variance.

Performance across different vocabulary components

Performance across various vocabulary components measures mean and variance scores. Based on Table 1, the mean scores revealed distinct levels of vocabulary learning depending on the analysis of undergraduate students' performance on various vocabulary components:

Highest mean scores

The highest mean scores for vocabulary units were social media, synonyms, collocations, and word classes. Social media scored the highest, with a mean of 94.33 and a standard deviation of 8.58. Synonyms made the second highest, with a mean of 90.67 and a standard deviation of 10.48. Collocations became the third, with a mean of 88.33 and a standard deviation of 15.10. The last was word classes with a mean of 88.00 and a standard deviation of 15.18.

Moderate mean scores

The moderate mean scores of vocabulary units were antonyms, idioms, dan educations. The first moderate mean score of antonyms was 83.67 and a standard deviation of 16.08. The second moderate mean score of idioms was 83.00 and a standard deviation of 17.25. Education was the last or third moderate mean score, with a mean of 74.67 and a standard deviation of 16.13.

Lowest mean scores

Phrasal verbs and word formations exhibited the lowest mean scores among vocabulary units. Phrasal verbs had a mean score of 59.67 with a standard deviation of 21.25. Word formations had a mean score of 70.00 and a standard deviation of 18.57.

Variability in performance

Phrasal verbs, word formations, and idioms demonstrated the highest variances with values of (451.61), (344.82), and (297.59), indicating students showed an inconsistent level of performance in these units. The least variance was observed in social media and synonyms (73.68) and (109.88), suggesting students showed a consistent level of performance in these units. These results revealed that students find phrasal verbs, word formations, and idioms more challenging to understand.

Progress in formative assessments across units

The results of formative assessments performed after the end of each unit during online vocabulary class were classified from lowest to highest average scores, were as follows: phrasal verbs, word formations, education, idioms, antonyms, word classes, collocations, synonyms, and social media. The mean score of each data unit was illustrated in the graphical representation below.

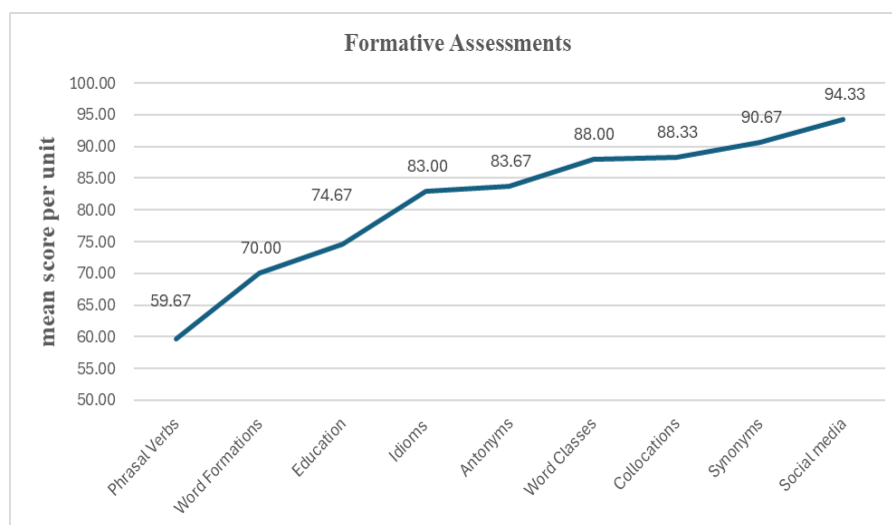


Figure 1. Formative assessments: Progress across units

Figure 1 presents that, among the nine vocabulary units, the lowest mean score was 59.67 for phrasal verbs, while the highest was 94.33 for social media. The assessments revealed that phrasal verbs were the most challenging unit, while social media represented the least complicated unit in the vocabulary course.

The results of Research Question (RQ) 2 demonstrate the descriptive analysis of individual student performance. The descriptive analysis illustrates the improvement of each undergraduate student in finishing each unit of vocabulary components. The following table in the data description presents the mean and standard deviation scores to measure achievement at various levels. In addition, performance variability, as tested in the standard deviation and variance scores, indicates how consistently or inconsistently each undergraduate student performed across formative individual assessments.

Table 2. Descriptive analysis of individual student performance

Respondent	N	Minimum	Maximum	Mean	Std. Deviation	Variance
R1	9	60	100	88.89	13.64	186.11
R2	9	50	100	77.78	19.22	369.44
R3	9	70	100	92.22	10.93	119.44
R4	9	40	90	67.78	17.87	319.44
R5	9	60	100	88.89	12.69	161.11
R6	9	40	100	82.22	24.89	619.44
R7	9	70	100	91.11	12.69	161.11
R8	9	50	100	75.56	20.07	402.78
R9	9	50	100	86.67	19.36	375.00
R10	9	40	100	81.11	22.61	511.11
R11	9	70	100	93.33	11.18	125.00
R12	9	50	100	84.44	16.67	277.78
R13	9	60	100	78.89	15.37	236.11
R14	9	50	100	91.11	16.91	286.11
R15	9	30	100	77.78	23.86	569.44
R16	9	40	100	85.56	20.07	402.78
R17	9	60	100	80.00	17.32	300.00
R18	9	40	100	75.56	24.04	577.78

R19	9	40	90	72.22	18.56	344.44
R20	9	60	100	86.67	15.81	250.00
R21	9	50	100	80.00	17.32	300.00
R22	9	50	100	78.89	18.33	336.11
R23	9	20	80	56.67	18.03	325.00
R24	9	70	100	90.00	13.23	175.00
R25	9	50	100	86.67	18.03	325.00
R26	9	50	100	65.56	15.90	252.78
R27	9	40	100	78.89	19.65	386.11
R28	9	50	100	75.56	18.10	327.78
R29	9	70	100	94.44	11.30	127.78
R30	9	40	100	76.67	16.58	275.00

Table 2 provides descriptive statistics on 30 individual students' performance in implementing online vocabulary class using Quizizz. These data include the minimum and maximum scores, mean, standard deviation or SD, and variance per respondent (R1–R30) based on the sample size of 9 assessments (N = 9).

The minimum and maximum mean scores were 56.67 and 94.44, respectively. The mean scores of the six students were around 90.00, which represented excellence. Eleven students achieved mean scores of around 80.00. Ten students achieved mean scores of roughly 70.00. Two students scored about 60.00 on average, and one about 50.00. The items demonstrated moderate variability, as evidenced by the overall mean scores, which ranged from 56.67 (R23) to 94.44 (R29).

Specifically, six students achieved high scores. R29 reached the highest score (Mean = 94.44) and SD = 11.30), followed by R11 (Mean = 93.33 and SD = 11.18) and R3 (Mean = 92.22 and SD = 10.93). R7 and R14 scored an average of 91.11, despite slightly different SD scores— 12.69 and 16.91, respectively. R24 also performed well (Mean = 90.00 and SD = 12.23). These students demonstrated consistent vocabulary learning over the course.

A few students, however, struggled more. The average score was lowest for R23 (Mean = 56.67 and SD = 18.03), the second lowest was R26 (Mean = 65.56 and SD = 15.90), and the last was R4 (Mean = 67.78 and SD = 17.87). Therefore, 3 of the 30 students experienced difficulties completing formative assessments using Quizizz in an online vocabulary course.

Analysis of variability in performance demonstrated that R6 achieved the highest standard deviation (SD = 24.89) and variance (619.44), followed by R18 (SD = 24.04, variance = 577.78) and R15 (SD = 23.86, variance = 569.44). These results indicate that R6, R18, and R15 had the most inconsistent performance across the assessments. In contrast, R3 recorded the lowest standard deviation (SD = 10.93) and variance (119.44), followed by R29 (SD = 11.30, variance = 127.78) and R11 (SD = 11.18, variance = 125.00), reflecting the most consistent performance across the nine assessments.

The data demonstrate that the majority of English as a Foreign Language (EFL) students achieved moderate to high levels of success using Quizizz as a mobile learning application. However, three of the thirty students, representing approximately 10 %, encountered substantial difficulties. Additionally, the vocabulary learning of students improved significantly as a result of formative assessments conducted during the online vocabulary class at a private university in Jakarta.

Discussion

The first results addressing Research Question (RQ) 1 indicate that the most substantial and consistent improvements in students' learning outcomes, as measured by Quizizz-based formative assessments, occurred in the areas of *social media*, *synonyms*, *collocations*, and *word classes*. These categories consistently ranked highest, with student scores closely clustered, suggesting consistent progress among students. This pattern of high achievement and minimal variation provides strong evidence of stable learning gains in these areas. In contrast, *antonyms*, *idioms*, and *education* fall in the middle range and exhibit moderate consistency, indicating that while learning progress is evident, individual outcomes vary more widely. *Phrasal verbs* and *word formations* appear lower in the ranking and show broader score distributions, suggesting these units have not yet achieved the same level of strong and consistent improvement. These contrasts help identify which vocabulary units benefit most from the

current Quizizz-based instruction and where additional instructional support is needed to ensure balanced progress across all vocabulary components.

Social media applications have become an integral part of daily life, particularly among Generation Z students, whose average age in this study is 19 years. All participants are active social media users and are familiar with terminology related to these platforms. Previous research underscored that the use of social media in English language learning had a positive impact on students' language skills, vocabulary acquisition, grammar, motivation, creativity, and critical thinking (Ariantini et al., 2021). High levels of engagement are evident, as most students maintained two or more social media accounts. As a result, they perceived social media as an effective tool for foreign language learning, particularly for vocabulary development and enhancing English language skills in higher education (Domingo & Aguillon, 2021; Rinaldy Malik & Ashar Asnur, 2019). This is indicative of the fact that students apply metacognitive strategies, including assessing whether social media is useful for learning and how to engage with various platforms. The use of social media-based vocabulary teaching yielded significant improvements in students' vocabulary acquisition, memory, and enhancement (Alharthi et al., 2020; Rajayi & Maleki, 2023; Zainal & Rahmat, 2020), indicating the use of some memory strategies, such as using multimedia content and repeating them in authentic situations several times. As a result, students have regularly shown better skills in the usage of the vocabulary associated with social media and expressed it correctly and appropriately within relevant situations, which implies the involvement of such cognitive processes as the contextualized application of new words, training in practical interactions to achieve a new word, and its application to communicative tasks in real life.

On the contrary, phrasal verbs were recognized by the students as one of the most challenging units of vocabulary learning. It has been found that students experienced difficulties with mastering phrasal verbs due to their complicated and somewhat non-transparent structure (Alhammadi & Rabab'ah, 2025). The use of phrasal verbs was challenging even for native speakers, who often referred to the literal translation of the predicate or confused phrasal verbs with similar ones. Without knowing the cultural context of the target language, and with strong influence from their first language, it became even harder to comprehend these expressions. It is believed that this ignorance was one of the contributing factors to that confusion and subsequent failures (Amret & Yousif, 2018). Difficulties encountered by students with phrasal verbs were predominantly interpretive rather than grammatical. The use of phrasal verbs varies culturally across different varieties of English, including American English, British English, Canadian English, and Australian English (Al Nasarat, 2018). These challenges are further intensified by the subconscious and fluency with which native speakers use phrasal verbs in their day-to-day communication, and the students find them challenging to reproduce precisely (Thyab, 2019).

It is possible to explain the differences in outcomes related to specific vocabulary types by referring to the learning strategies adopted by students. This variation can be explained most effectively by taking the lens of vocabulary learning strategies. The consistent high results in social media, synonyms, collocations, and word classes indicate that students successfully combined both metacognitive (planning and monitoring their learning, strategies of memory, e.g., forming associations, learning new words with living contexts or repeated exposure), and cognitive (contextualized practice of learning new words, use of these words) tactics. Conversely, poorer scores and variability in components like phrasal verbs and word formations indicate that these strategies are not used frequently or regularly. In particular, students can fail to exercise metacognitive awareness of the necessity of constructive planning in approaching difficult expressions, or may not have employed the correct memory techniques to remember and distinguish similar multi-word constructions. These results suggest the necessity of teaching vocabulary learning strategies directly, by implementing the teaching of VLS and Quizizz-based formative assessment, which would enable students to handle more abstract or culturally embedded vocabulary with greater control, awareness, and confidence.

The results of Research Question 2 (RQ) show that EFL students demonstrated definite variability in accomplishing vocabulary learning tasks in formative assessments based on Quizizz. Such variation was reflected in two key aspects: (1) the mean level of vocabulary performance achieved and (2) the consistency of performance across units. Most students fell into the moderate to high category, indicating a high frequency and increasing vocabulary recall; a smaller number of students demonstrated very consistent high scores with minimal fluctuation, indicating good retention and effective study habits. However, a few students performed below the mean or exhibited large variability across assessments, indicating inconsistency and difficulty that may be due to a lack of familiarity with the content, poor time management, or ineffective learning strategies.

A more in-depth examination of consistency in scores reveals that students with a lower standard deviation demonstrated reliability in their progression during the course. This stability may be attributed to structured learning routines and alignment with the format and content of the assessments. Their performance suggests reliable vocabulary retention and smooth transitions across units. Conversely, students with greater variability in scores may have experienced inconsistent study patterns, difficulties with specific vocabulary topics, or distractions during online learning. For these students, frequent feedback, re-reviewing previously learned material, and continual practice are likely to stabilize their performance.

The findings highlight important practical implications for EFL vocabulary instruction, particularly in the context of using Quizizz-based formative assessments. Quizizz, as a vocabulary learning application, has significantly influenced instructional practices and student achievement through vocabulary learning and retention (Huyen, 2022). This application demonstrated measurable improvements in students' vocabulary knowledge and yielded positive results regarding perceived usefulness, concentration, engagement, and motivation (Bui & Vu, 2022; Noviasmy et al., 2023; Rofiah & Waluyo, 2024). Since students varied in both their average performance and consistency, instruction should be differentiated accordingly. High-achieving and stable students can be offered enrichment-type activities, such as sentence creation or peer teaching. Other students with steady and moderate scores should be directed to apply vocabulary in context, while struggling students with low and stable scores need routine structures, spaced repetition, and intensive drilling activities on focused practice on previously missed words. Students whose scores fluctuate across assessments may need pacing support, warm-up tasks, and exit checks to reinforce learning and improve focus. Regular, short formative assessments combined with immediate feedback and targeted follow-up activities can strengthen retention and help stabilize progress. Moreover, it is important to offer flexibility in the time and to enable retries to minimize the effects of external limitations (insufficient availability of devices). Generally, using assessment data to monitor both achievement levels and consistency allows lecturers to offer personalized support that promotes equitable and sustained vocabulary learning outcomes.

Another important dimension to consider in interpreting individual performance is the role of students' strategic behavior during online assessments, particularly the use or absence of vocabulary learning strategies. High-performing and consistent students likely relied on metacognitive strategies such as setting learning goals, managing their study schedule, and monitoring their progress across multiple units. These strategies enable learners to remain aware of their learning patterns and adjust their approach accordingly, which contributes to consistent outcomes. In addition, students who performed well may have employed memory strategies that involved forming associations, reviewing vocabulary with self-testing tools, or repeatedly encountering vocabulary in meaningful contexts. The structure of Quizizz, with its immediate feedback and gamified repetition, likely supported these strategies and further encouraged independent learning and progress tracking.

In contrast, students with lower or more inconsistent performance may not have consistently applied effective strategies or may have relied on less efficient learning behaviors, such as rote memorization without contextual understanding. This issue becomes more apparent in assessments that cover a variety of vocabulary types, such as collocations, idiomatic expressions, and multi-word units, which require a deeper grasp of usage. Students in this category may not have developed the metacognitive awareness needed to identify specific weaknesses or adjust their methods accordingly. The fluctuations observed in their scores may also reflect limited ability to transfer learning strategies from one vocabulary unit to another. These findings highlight the importance of explicitly embedding

strategy instruction into vocabulary learning activities. Encouraging students to reflect on their learning process and to adopt consistent techniques across different vocabulary units can improve both retention and performance. For instance, lecturers can prompt students to consider what techniques they will use to remember and apply new words or invite them to reflect on which strategies contributed to successful performance after each assessment. These approaches foster metacognitive engagement and strengthen students' ability to apply vocabulary learning strategies with greater awareness and consistency. While the interactive features of Quizizz promote engagement and repeated exposure, their impact is maximized when students are guided to apply strategies intentionally before, during, and after assessments.

The results of the current study present several implications concerning EFL vocabulary teaching in the context of digital learning. Formative assessment in the form of quizzes on Quizizz was identified to help develop vocabulary and consistency in assessment results across disciplines. The difference in the performance of different students indicates that instructions should not just react to the general level of achievement but also to the consistency of progress. Assessment information enables lecturers to differentiate instruction by offering enrichment opportunities to students with the best performances, contextual practice to those with a medium level of performance, and structured review routines to those with a lower level of performance. The findings underscore the importance of integrating vocabulary learning strategies into both instructional materials and assessment measures. Students will have better retention and autonomy when they plan and monitor their study and apply memory strategies. Motivating students to evaluate their study strategies and vocabulary practice can enhance the effectiveness of digital tools, such as Quizizz, for meaningful and sustained vocabulary learning.

This study has several limitations that should be acknowledged. The study involved only one purposively selected class of thirty undergraduates, and this sample size cannot be used to generalise the results of the study to wider contexts. There was no analysis of item difficulty, and the item chosen for testing was a short, timed, multiple-choice measure. Additionally, the lack of qualitative interview data limits the depth of analysis. Nevertheless, the findings offer implications for vocabulary learning outcomes in a Quizizz-based EFL setting, as well as for lecturers seeking to enhance formative assessment practices in digital learning.

CONCLUSION

Based on the findings, this study addresses two objectives: identifying vocabulary components that show the most significant improvement and exploring individual differences in vocabulary learning through Quizizz-based formative assessments. The results showed that students had the highest and most consistent learning of vocabulary units on social media, synonyms, collocations, and word classes. These elements returned high means and low standard deviation, indicating that students were more familiar with these categories and benefited from repeated exposure and contextual relevance. Word formations and phrasal verbs proved the most challenging, as their average values ranked low, and the standard deviation was significantly larger in comparison. This reflects the complexity of these vocabulary types and the need for more targeted instructional support. Moreover, individual performance data revealed that while most students showed moderate to high achievement, a smaller group consistently excelled, and a few struggled or showed inconsistent progress. These differences suggest that students employed vocabulary learning strategies at varying levels of effectiveness, influencing both the consistency and depth of their learning across units.

The pedagogical implications emphasise the effectiveness of Quizizz as a formative assessment tool that supports vocabulary learning by fostering engagement, repeated exposure, and student autonomy. Lecturers can use assessment results not only to observe and track the progress of learning but also to identify patterns in student performance, providing enrichment to top-achieving students, contextualised practice activities to those with moderate scores, and individualised assistance to those students with inconsistent or low scores. However, this research has limitations that need to be considered. The participants consisted of only one class purposively selected from the study group,

which does not allow for generalising the findings to EFL contexts. In addition, assessments consisted only of multiple-choice, short, timed tasks, which did not capture productive vocabulary use or students' perspectives. Future research should involve larger populations, incorporate qualitative data such as student interviews or reflective journals, and explore long-term vocabulary retention and transfer to productive language skills. Such experiments would give a better insight into how formative assessments conducted in digital forms can sustainably benefit EFL education in terms of vocabulary learning.

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