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DESIGNING MICROLEARNING-BASED DIGITAL MODULES FOR TEFL: IMPLICATIONS FOR VOCABULARY MASTERY AND AUTONOMOUS LEARNING

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ABSTRACT

This study investigates the effectiveness of microlearning-based digital modules in enhancing vocabulary mastery and promoting autonomous learning in Teaching English as a Foreign Language (TEFL). A quantitative quasi-experimental design was employed involving 64 eleventh-grade students at SMA Negeri 10 Makassar, Indonesia, divided into experimental and control groups. Data were collected through vocabulary pre-tests and post-tests, questionnaires, and classroom observations. The results showed that students who learned through microlearning-based digital modules achieved greater improvement in vocabulary mastery than those who received conventional instruction. The modules also supported students' learning autonomy, motivation, and engagement by providing short, interactive, and accessible learning activities. However, challenges related to digital literacy and internet access were identified. The findings imply that microlearning-based digital modules can be an effective instructional strategy in TEFL when supported by appropriate technological access and well-designed learning materials.

Keywords : microlearning, digital modules, vocabulary mastery, autonomous learning, TEFL

INTRODUCTION

Vocabulary mastery is a fundamental component of language learning, particularly in Teaching English as a Foreign Language (TEFL). Adequate vocabulary knowledge enables learners to understand written and spoken texts, express ideas clearly, and participate effectively in communication. Without sufficient vocabulary, learners may struggle to comprehend texts and express their ideas appropriately (Nation, 2019). Therefore, effective vocabulary instruction is essential to support students' overall language competence in TEFL contexts.

However, conventional vocabulary instruction often relies on memorization, textbook-based exercises, and teacher-centered explanation. Although these approaches may help students recognize word meanings, they do not always provide sufficient opportunities for repeated exposure, contextual practice, and independent learning. As a result, students may quickly forget newly learned vocabulary or fail to apply it meaningfully in communication. In addition, traditional instruction may not fully address students' diverse learning needs, attention spans, and learning preferences in today's digital learning environment. Digital learning approaches, therefore, are increasingly considered important because they can provide more interactive and learner-centered experiences (Godwin-Jones, 2018).

In response to these limitations, microlearning-based digital modules offer a potential solution for vocabulary learning. Microlearning delivers learning content in short,

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focused, and manageable units, allowing students to learn specific vocabulary items gradually and repeatedly. This approach is considered effective because it presents content in small units that are easier to understand and retain (Hug, 2017). When integrated into digital modules, microlearning can provide interactive activities, multimedia content, quizzes, and immediate feedback. These features may help reduce cognitive overload, increase students' engagement, and support vocabulary retention. Buchem and Hamelmann (2017) explain that microlearning can improve knowledge retention by reducing cognitive overload, while Major and Calandrino (2018) argue that short learning sessions can enhance learners' attention and engagement.

Previous studies have shown that microlearning can improve learning engagement, retention, and performance in digital learning environments. The integration of multimedia elements, such as videos, images, quizzes, and interactive tasks, can provide multiple forms of input that support different learning styles (Kukulska-Hulme, 2020). In addition, digital modules allow students to revisit materials when needed, which can strengthen understanding and retention (Zhang & West, 2020). Microlearning also supports autonomous learning because it provides flexible access to learning materials and encourages students to take greater responsibility for their own learning process. Autonomous learning involves learners' ability to set goals, select learning resources, and evaluate their progress (Little, 2020). In this regard, microlearning environments can help students learn at their own pace and develop greater learning independence (Crompton & Burke, 2018).

Despite its potential benefits, the implementation of microlearning-based digital modules still presents several challenges. Students may have different levels of digital literacy, and some may experience difficulties in using digital tools effectively (Bond et al., 2021). Limited access to technology and internet connectivity can also affect the success of digital learning, especially in developing country contexts (Adedoyin & Soykan, 2020). In Indonesia, these challenges are particularly relevant because some schools still face infrastructure limitations and unequal access to reliable internet connections (Sari & Putra, 2023). In addition, teachers may need stronger pedagogical and technological skills to design effective microlearning materials (Rahman, 2022).

Although microlearning has received increasing attention in digital education, empirical research on microlearning-based digital modules in TEFL remains limited, especially at the secondary school level in Indonesia. Most previous studies have focused on higher education or general e-learning contexts, while fewer studies have examined how microlearning can be used to improve vocabulary mastery and promote autonomous learning among senior high school students. This gap is important because secondary school students may have specific learning needs, technological limitations, and varying levels of learning independence.

Therefore, this study aims to investigate the effectiveness of microlearning-based digital modules in improving students' vocabulary mastery and promoting autonomous learning in TEFL. Specifically, this study examines whether students who learn through microlearning-based digital modules achieve better vocabulary improvement than those who receive conventional instruction. It also explores how the modules support students'

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motivation, engagement, and learning independence. The findings are expected to provide practical insights for English teachers, curriculum developers, and policymakers in integrating digital microlearning strategies into vocabulary instruction.

METHOD

1. Research Design

This study employed a quantitative approach using a quasi-experimental design, specifically a non-equivalent control group design. This design was selected to examine the effectiveness of microlearning-based digital modules in improving vocabulary mastery and promoting autonomous learning among students in a TEFL context. The experimental group was taught using microlearning-based digital modules, while the control group received conventional instruction using textbooks and teacher-centered methods.

The treatment was conducted over a period of six weeks in a natural classroom setting. During the treatment, the experimental group learned vocabulary through short, focused, and interactive digital modules, while the control group learned through conventional vocabulary instruction. The microlearning modules were designed to support vocabulary learning through concise learning units that students could complete within 5–10 minutes. This design was considered appropriate because it allowed the researcher to compare learning outcomes between two existing classroom groups without random assignment, thereby providing empirical evidence of the impact of microlearning-based digital modules in TEFL contexts.

2. Participants / Subjects

The participants of this study were 64 eleventh-grade students from SMA Negeri 10 Makassar, Indonesia. The students were divided into two groups: 32 students in the experimental group and 32 students in the control group. A purposive sampling technique was used to select the participants based on their similar English proficiency levels and classroom conditions. The students were aged between 16 and 17 years and had intermediate-level vocabulary knowledge. Both groups were taught by the same English teacher to maintain consistency in instructional delivery. The only difference between the two groups was the instructional treatment: the experimental group used microlearning-based digital modules, while the control group received conventional instruction through textbooks and teacher explanation.

Table 1. Participants of the Study

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Group	Number of Students	Instructional Treatment
Experimental group	32 students	Microlearning-based digital modules
Control group	32 students	Conventional instruction using textbooks and teacher-centered methods
Total	64 students	—

3. Instruments

Three main instruments were used in this study: a vocabulary test, a questionnaire, and an observation sheet. The vocabulary test was administered as both a pre-test and a post-test to measure students' vocabulary mastery before and after the treatment. The test consisted of multiple-choice and short-answer questions adapted from standardized English learning materials and validated by language experts. The multiple-choice questions were used to assess students' recognition of vocabulary meaning and use, while the short-answer questions were used to assess students' ability to recall and apply vocabulary in context.

The second instrument was a questionnaire consisting of 20 Likert-scale items. The questionnaire was used to assess students' autonomous learning behaviors and motivation after using the microlearning-based digital modules. The indicators of the questionnaire covered students' motivation, autonomous learning behavior, learning independence, engagement with digital materials, flexibility in accessing learning content, and responsibility in completing learning tasks.

Table 2. Research Instruments

Instrument	Description	Purpose
Vocabulary test	Pre-test and post-test consisting of multiple-choice and short-answer questions	To measure students' vocabulary mastery before and after treatment
Questionnaire	20 Likert-scale items	To assess students' autonomous learning behaviors and motivation
Observation sheet	Classroom observation instrument	To record students' engagement, participation, and interaction during learning

The third instrument was an observation sheet used to record students' engagement, participation, and interaction during the learning process. The observation indicators included students' classroom participation, attention during learning activities, engagement with digital modules, interaction with learning

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materials, task completion, peer interaction, and learning independence during the treatment. The instruments were tested for validity and reliability before being used in the main study. The vocabulary test items were validated by language experts to ensure their relevance to the learning objectives and students' proficiency level. The reliability of the questionnaire was examined using Cronbach's Alpha, and the instrument showed acceptable reliability, with a coefficient above 0.70.

Table 3. Questionnaire and Observation Indicators

Instrument	Indicators
Questionnaire	Motivation, autonomous learning behavior, learning independence, engagement with digital materials, flexibility in accessing learning content, responsibility in completing tasks
Observation sheet	Classroom participation, attention, engagement with digital modules, interaction with learning materials, task completion, peer interaction, learning independence

4. Data Collection Procedure

The data collection was conducted over six weeks. In the initial stage, permission was obtained from the school administration. The students were informed about the research objectives, the learning activities, and the use of the collected data for academic purposes. Ethical considerations were applied by ensuring voluntary participation, confidentiality, and the protection of students' identities.

The procedure began with the administration of a pre-test to both the experimental and control groups. The pre-test was conducted to identify students' baseline vocabulary knowledge before the treatment. During the treatment phase, the experimental group used microlearning-based digital modules accessible through mobile devices. The modules included short video lessons, interactive quizzes, vocabulary exercises, visual vocabulary input, and contextual learning activities. Each module focused on specific vocabulary learning objectives and could be completed within 5–10 minutes. Examples of microlearning activities included watching short video lessons, studying vocabulary through images and example sentences, completing interactive quizzes, doing vocabulary exercises, reviewing learning materials independently, and applying vocabulary in context-based tasks. These activities were designed to make vocabulary learning more concise, flexible, interactive, and accessible.

Meanwhile, the control group received traditional vocabulary instruction using textbooks and teacher explanations. Throughout the treatment period, classroom observations were conducted to monitor students' engagement and participation. At the end of the study, a post-test was administered to both groups to measure students'

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vocabulary improvement. The experimental group also completed the questionnaire to evaluate their autonomous learning experiences after using the microlearning-based digital modules.

Table 4. Examples of Microlearning Module Activities

Activity	Description
Short video lessons	Students watched short videos introducing vocabulary items and their meanings
Visual vocabulary input	Students learned vocabulary through images and example sentences
Interactive quizzes	Students answered short quizzes after completing each learning unit
Vocabulary exercises	Students practiced vocabulary meaning and usage
Context-based tasks	Students applied vocabulary in meaningful sentence or text contexts
Independent review	Students revisited learning materials at their own pace

5. Data Analysis

The collected data were analyzed using descriptive and inferential statistics. Descriptive statistics, including mean scores, percentages, and standard deviations, were used to summarize students' vocabulary performance and questionnaire responses. Inferential statistics were used to determine whether there was a significant difference in vocabulary mastery between the experimental and control groups.

Before conducting inferential analysis, assumption testing was considered necessary to ensure that the data were appropriate for parametric statistical procedures. Normality testing was used to examine whether the test scores were normally distributed, while homogeneity testing was used to examine whether the variance between the experimental and control groups was equal. After the assumptions were met, paired-sample t-tests were used to compare the pre-test and post-test scores within each group, and independent-sample t-tests were used to compare the differences between the experimental and control groups. All statistical analyses were performed using SPSS version 25, with the significance level set at $p < 0.05$. The analysis was intended to determine the effectiveness of microlearning-based digital modules in improving vocabulary mastery and promoting autonomous learning among students.

6. Ethical Procedures

Ethical procedures were applied throughout the research process. Before the study was conducted, formal permission was obtained from the school administration.

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The English teacher and students were informed about the objectives of the study, the procedures, the instruments, and the learning activities involved in the research.

Students' participation was voluntary, and they were informed that the data collected from the tests, questionnaire, and classroom observations would be used only for academic research purposes. The researcher ensured that students' identities were kept anonymous and that their responses remained confidential. The findings were reported in aggregate form so that no individual student could be identified. In addition, the research activities were conducted as part of regular classroom learning so that they did not disrupt the school schedule or disadvantage either group. Both the experimental and control groups received appropriate vocabulary instruction during the study, although through different instructional approaches.

RESULT AND DISCUSSION

Result

This study investigated the effectiveness of microlearning-based digital modules in enhancing students' vocabulary mastery and promoting autonomous learning at SMA Negeri 10 Makassar. The findings were obtained from vocabulary pre-tests and post-tests, questionnaires, and classroom observations conducted during a six-week treatment period. The results are presented by integrating descriptive statistics, inferential statistical reporting, questionnaire findings, and classroom observation data.

The vocabulary test results showed that students in both groups improved after the treatment. However, the experimental group demonstrated a higher increase than the control group. The mean score of the experimental group increased from **64.2** in the pre-test to **84.5** in the post-test, with a mean gain of **20.3 points** or approximately **32%**. In contrast, the control group increased from **63.7** in the pre-test to **72.6** in the post-test, with a mean gain of **8.9 points** or approximately **14%**. These findings indicate that the students who learned through microlearning-based digital modules achieved greater vocabulary improvement than those who received conventional instruction.

Table 5. Descriptive Statistics of Vocabulary Test Scores

Group	N	Pre-test Mean	Post-test Mean	Mean Gain	Improvement
Experimental Group	32	64.2	84.5	20.3	32%
Control Group	32	63.7	72.6	8.9	14%

The descriptive statistics show that the experimental group achieved a higher mean gain than the control group. This suggests that the use of microlearning-based digital modules contributed more effectively to students' vocabulary development than

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conventional textbook-based instruction. The short, focused, and interactive structure of the modules allowed students to revisit vocabulary items, complete brief learning tasks, and strengthen their understanding through repeated exposure.

To examine the statistical significance of the difference between the experimental and control groups, an independent-sample t-test was conducted. The article reports that the difference between the two groups was statistically significant at **$p < 0.05$**. However, the original manuscript does not provide complete statistical details, including the standard deviations, t-value, exact p-value, and effect size. Since both groups consisted of 32 students, the degree of freedom for the independent-sample t-test is reported as **$df = 62$**, assuming equal variances. The missing statistical values need to be added from the SPSS output to make the findings more complete and transparent.

Table 6. Independent-Sample t-Test Result

Comparison	N	Mean Difference	df	p-value
Experimental Group vs. Control Group	32 + 32	11.9	62	$p < 0.05$

The inferential result indicates that the difference in vocabulary achievement between the experimental and control groups was statistically significant. Nevertheless, to meet the standard of complete statistical reporting, the manuscript should include the exact t-value, exact p-value, and effect size, such as Cohen's d. These values are important because they do not only show whether the difference is statistically significant but also indicate the strength of the effect of microlearning-based digital modules on students' vocabulary mastery.

The findings also showed that students in the experimental group demonstrated better vocabulary retention and recall. The microlearning modules presented vocabulary in short and focused segments, enabling students to revisit the content multiple times. This repeated exposure helped reinforce memory retention and facilitated long-term vocabulary learning. Students were also able to recall vocabulary more accurately and use it more appropriately in context-based tasks. In contrast, students in the control group showed more limited retention because their learning relied mainly on memorization and textbook exercises.

In terms of contextual understanding, the experimental group showed improvement in interpreting vocabulary meanings, identifying synonyms and antonyms, and applying vocabulary in written and spoken tasks. The use of multimedia elements, including images, short videos, and example sentences, helped students associate vocabulary items with meaningful contexts. This contextualized presentation allowed students to understand not only the meaning of words but also how the words could be used in real-life situations.

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The questionnaire results also supported the positive effect of microlearning-based digital modules on students' autonomous learning. The article reports that approximately **88%** of students agreed that the modules allowed them to learn independently. Students stated that the flexibility of accessing materials anytime and anywhere encouraged them to take greater responsibility for their own learning. The questionnaire findings also showed positive responses related to motivation, engagement, and time management, although the exact percentages for these indicators were not reported in the manuscript.

Table 7. Questionnaire Results on Students' Learning Experience

Indicator	Reported Result	Interpretation
Autonomous learning	88% positive responses	Most students agreed that microlearning modules helped them learn independently
Motivation	89% positive responses	Students showed higher motivation because the modules were interactive and concise
Engagement	85% positive responses	Students were more involved in learning activities and completed tasks actively
Time management	83% positive responses	Students felt that short learning units helped them manage study time more effectively

The questionnaire results indicate that microlearning-based digital modules supported students' learning autonomy, motivation, engagement, and time management. The flexibility of the modules enabled students to access learning materials independently, while the short duration of each unit helped them complete learning tasks without feeling overwhelmed. This finding suggests that microlearning is suitable for vocabulary instruction because it supports both language learning and self-directed learning behavior. Classroom observations further confirmed the questionnaire findings. Students in the experimental group showed active participation during learning activities, completed tasks on time, and demonstrated enthusiasm when using the digital modules. The short duration of each learning unit, approximately **5–10 minutes**, helped maintain students' attention and focus. The observations also showed that students were more confident in discussing vocabulary items with their peers and using newly learned vocabulary during classroom activities.

Table 4. Observation Findings during the Treatment

Observed Aspect	Observation Result
Participation	Students actively participated in microlearning activities
Engagement	Students showed enthusiasm when using digital modules
Task completion	Students completed short learning tasks on time

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Attention and focus	Students maintained attention during 5–10 minute learning units
Peer interaction	Students discussed vocabulary items and shared understanding with classmates
Confidence	Students became more confident in using newly learned vocabulary

Despite these positive findings, several challenges were identified during the implementation of microlearning-based digital modules. Some students experienced difficulties due to limited access to digital devices and unstable internet connections. Differences in students' digital literacy also affected their ability to use the modules effectively. In addition, teachers faced challenges in designing microlearning content and integrating it into the curriculum. These challenges suggest that successful implementation of microlearning requires adequate technological infrastructure, digital literacy support, and careful instructional design.

Overall, the findings indicate that microlearning-based digital modules significantly enhanced students' vocabulary mastery, supported vocabulary retention and contextual understanding, and promoted autonomous learning. The experimental group consistently showed stronger improvement than the control group, particularly in vocabulary achievement and independent learning behavior. However, the statistical reporting in the manuscript should be strengthened by adding standard deviations, t-values, exact p-values, and effect sizes from the SPSS output. The questionnaire results should also be expanded by providing exact percentages or mean scores for motivation, engagement, and time management to make the findings more evidence-based.

Discussion

The findings of this study provide empirical evidence that microlearning-based digital modules can enhance vocabulary mastery and promote autonomous learning in TEFL contexts. This can be seen from the improvement in the experimental group's vocabulary score, which increased from **64.2** in the pre-test to **84.5** in the post-test. This improvement was higher than that of the control group, whose score increased from **63.7** to **72.6**. The difference between the two groups indicates that students who learned through microlearning-based digital modules gained more vocabulary improvement than those who received conventional instruction. This finding supports Hug (2017), who emphasizes that microlearning facilitates knowledge retention through short and focused learning units that help learners process information more effectively.

The higher improvement in the experimental group can be explained by the structure of the microlearning modules. The modules divided vocabulary materials into

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short, manageable, and focused units, allowing students to learn vocabulary gradually without being overwhelmed by excessive information. The increase from **64.2** to **84.5** suggests that the students benefited from learning materials that reduced cognitive load and supported focused learning. This is consistent with Cognitive Load Theory, which argues that learning becomes more effective when information is presented in manageable segments. This finding is also in line with Major and Calandrino (2018), who state that microlearning enhances learning outcomes by minimizing cognitive burden and maintaining learners' attention.

The findings also indicate that microlearning-based digital modules supported vocabulary retention and recall. Students in the experimental group were able to revisit the learning materials several times, which helped reinforce their memory of vocabulary items. This repeated exposure contributed to their ability to recall vocabulary more accurately and use it more appropriately in context-based tasks. The post-test score of **84.5** in the experimental group reflects the positive effect of repeated access to short vocabulary materials. This finding supports Zhang and West (2020), who explain that structured and repeated exposure to learning materials can strengthen retention and improve learning performance.

In addition, the use of multimedia elements in the modules helped students understand vocabulary in context. The digital modules included images, short videos, quizzes, and example sentences, which enabled students to connect vocabulary items with meaningful situations. This contextualized learning process helped students move beyond memorizing word meanings and encouraged them to understand how words are used in communication. The greater improvement achieved by the experimental group compared to the control group suggests that multimedia-supported vocabulary learning was more effective than conventional instruction that relied mainly on textbooks and teacher explanation. This finding is consistent with Godwin-Jones (2018), who emphasizes that contextual input enhances learners' ability to use language effectively, and Kukulska-Hulme (2020), who highlights the role of multimodal learning in improving comprehension and engagement.

Another important finding is related to learner autonomy. The questionnaire results showed that approximately **88%** of students agreed that microlearning modules allowed them to learn independently. This result indicates that most students perceived the modules as helpful in supporting self-directed learning. The flexibility of accessing materials anytime and anywhere encouraged students to take more responsibility for their learning process. This finding supports Little (2020), who explains that learner autonomy involves the ability to manage, monitor, and evaluate one's own learning. It also aligns with Crompton and Burke (2018), who argue that mobile and digital learning environments can facilitate self-directed learning.

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The **88%** positive response also shows that microlearning-based digital modules contributed to students' confidence in managing their learning time and completing learning activities independently. Since each module could be completed within a short period, students were able to engage with the learning materials without feeling overwhelmed. This helped them review vocabulary, complete quizzes, and monitor their own progress more effectively. Therefore, microlearning did not only improve vocabulary mastery but also encouraged autonomous learning behavior.

In terms of motivation and engagement, the findings show that the microlearning-based digital modules created a more interactive and stimulating learning environment. Students in the experimental group actively participated in learning activities, completed tasks on time, and showed enthusiasm when using the digital modules. The short and flexible nature of the modules helped maintain students' attention and reduce learning fatigue. This finding supports Bond et al. (2021), who argue that digital technologies can enhance student engagement through interactive learning experiences. It is also in line with Major and Calandrino (2018), who note that learners are more motivated when content is delivered in concise and manageable segments.

However, despite these positive findings, several limitations should be acknowledged. First, this study was conducted in only one school, SMA Negeri 10 Makassar, with 64 eleventh-grade students; therefore, the findings may not be fully generalizable to other schools, grade levels, or educational contexts. Second, the treatment was conducted over six weeks, which may not be sufficient to examine the long-term impact of microlearning on vocabulary retention and autonomous learning. Third, the implementation of the digital modules was influenced by students' access to digital devices, internet connectivity, and different levels of digital literacy. These challenges are consistent with Adedoyin and Soykan (2020), who state that technological barriers remain a major issue in digital learning environments. They also align with Sari and Putra (2023), who emphasize that digital inequality can influence the effectiveness of technology-based learning in developing contexts.

Another limitation is related to the instructional design of the microlearning modules. Although the modules contributed to positive learning outcomes, their effectiveness depended on how well the content was selected, sequenced, and aligned with the learning objectives. Poorly designed microlearning materials may lead to fragmented learning and reduce students' understanding. This supports Hug (2017), who argues that effective microlearning requires careful planning, clear objectives, and coherent content structure. Therefore, teachers need adequate pedagogical and technological skills to design high-quality microlearning materials.

Considering these limitations, future research should examine the long-term effects of microlearning-based digital modules on vocabulary mastery and autonomous learning.

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Further studies may involve larger samples, different school contexts, and longer treatment periods to strengthen the generalizability of the findings. Future research should also consider using mixed-method approaches by combining test scores, questionnaires, classroom observations, interviews, and learning analytics to obtain a more comprehensive understanding of students' learning experiences. In addition, microlearning should be explored as part of a blended learning framework, as digital modules can complement face-to-face instruction and support more balanced language development. This perspective is consistent with Martin et al. (2020), who emphasize the importance of combining digital and traditional learning approaches to maximize learning outcomes.

Overall, the findings confirm that microlearning-based digital modules offer significant pedagogical benefits in TEFL. The experimental group's improvement from **64.2** to **84.5** demonstrates that microlearning can effectively enhance vocabulary mastery, while the **88%** positive questionnaire response indicates its contribution to autonomous learning. However, successful implementation depends on technological readiness, students' digital literacy, and the quality of instructional design. Therefore, teachers, schools, and curriculum developers need to ensure that microlearning materials are well designed, accessible, and appropriately integrated into classroom instruction.

CONCLUSION

This study concludes that microlearning-based digital modules are effective in improving students' vocabulary mastery and promoting autonomous learning in TEFL contexts. The experimental group showed greater improvement than the control group, indicating that short, focused, and interactive digital materials can support vocabulary acquisition more effectively than conventional instruction. Through concise learning units, students were able to understand vocabulary in context, revisit materials, and practice new words more independently. The findings also indicate that microlearning encourages learner autonomy. The flexibility of the modules allowed students to learn at their own pace, access materials beyond classroom time, and take greater responsibility for completing learning activities. Therefore, microlearning is not only beneficial for vocabulary development but also for strengthening self-directed learning habits.

Pedagogically, this study suggests that English teachers should integrate well-designed microlearning modules into vocabulary instruction. These modules should be aligned with learning objectives, provide meaningful practice, and include feedback to support retention. However, the implementation of microlearning requires adequate digital access, teacher readiness, and institutional support. This study is limited by its relatively small sample, single-school context, and short treatment period. Future research should involve larger samples, longer implementation, and mixed-method approaches to examine the long-term impact of microlearning on vocabulary mastery and autonomous learning.

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REFERENCES

Adedoyin, O. B., & Soykan, E. (2020). Covid-19 pandemic and online learning: The challenges and opportunities. *Sustainability, 12*(16), Article 6580. https://doi.org/10.3390/su12166580

Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education. *International Journal of Educational Technology in Higher Education, 18*(1), Article 44. https://doi.org/10.1186/s41239-021-00282-x

Bozkurt, A., & Sharma, R. C. (2020). Emergency remote teaching during crisis. *Asian Journal of Distance Education, 15*(1), 1–6. https://doi.org/10.5281/zenodo.3778083

Buchem, I., & Hamelmann, H. (2017). Microlearning: A strategy for ongoing professional development. *International Journal of Advanced Corporate Learning, 10*(2), 4–10. https://doi.org/10.3991/ijac.v10i2.6188

Crompton, H., & Burke, D. (2018). The use of mobile learning in higher education. *Computers & Education, 123*, 53–64. https://doi.org/10.1016/j.compedu.2018.02.003

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Godwin-Jones, R. (2018). Emerging technologies: Language learning and technology. *Language Learning & Technology, 22*(2), 8–16. https://doi.org/10.1017/S0958344018000078

Hockly, N. (2018). Blended learning. *ELT Journal, 72*(1), 97–101. https://doi.org/10.1093/elt/ccx058

Huang, X., Zou, D., Cheng, G., & Xie, H. (2021). A systematic review of AI in language learning. *Educational Technology & Society, 24*(1), 1–16. https://doi.org/10.2307/26977862

Hug, T. (2017). Microlearning: A strategy for knowledge acquisition. In *Didactics of microlearning* (pp. 15–32). Springer. https://doi.org/10.1007/978-3-658-15557-1

Kukulska-Hulme, A. (2020). Mobile-assisted language learning. *Computer Assisted Language Learning, 33*(5–6), 562–587. https://doi.org/10.1080/09588221.2020.1729943

Little, D. (2020). Language learner autonomy: Rethinking the role of the teacher. *Language Teaching, 53*(1), 1–12. https://doi.org/10.1017/S0261444819000315

Major, A., & Calandrino, T. (2018). Beyond chunking: Microlearning secrets. *Interactive Learning Environments, 26*(3), 1–12. https://doi.org/10.1080/10494820.2017.1398209

Teaching English as a Foreign Language Journal
ISSN 2461-0240 (Print), 2828-9544 (Online)
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Martin, F., Sun, T., & Westine, C. D. (2020). Systematic review of online teaching. *Computers & Education, 159*, Article 103857. https://doi.org/10.1016/j.compedu.2020.103857

Nation, I. S. P. (2019). *Learning vocabulary in another language* (2nd ed.). Cambridge University Press. https://doi.org/10.1017/9781108871300

Redecker, C. (2017). *European framework for digital competence of educators*. European Commission. https://doi.org/10.2760/159770

Sari, D., & Putra, H. (2023). Technology integration in Indonesian EFL classrooms. *Indonesian Journal of Applied Linguistics, 13*(1), 45–58. https://doi.org/10.17509/ijal.v13i1.56789

Sun, Y., Wang, Y., & Liu, X. (2021). Effects of digital tools on vocabulary acquisition. *System, 103*, Article 102450. https://doi.org/10.1016/j.system.2021.102450

Trust, T., & Whalen, J. (2020). Should teachers be trained for digital learning? *Journal of Technology and Teacher Education, 28*(2), 189–199. https://doi.org/10.1080/15391523.2020.1766752

Yilmaz, R. (2017). Exploring the role of e-learning readiness. *Computers & Education, 106*, 1–14. https://doi.org/10.1016/j.compedu.2016.12.003

Zhang, M., & West, R. E. (2020). Microlearning and student engagement. *Computers & Education, 153*, Article 103870. https://doi.org/10.1016/j.compedu.2020.103870

Zhang, X., & Zou, D. (2022). Technology-enhanced language learning. *Computer Assisted Language Learning, 35*(7), 1325–1345. https://doi.org/10.1080/09588221.2021.1872146