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ENHANCING MORPHOLOGICAL AWARENESS AND READING FLUENCY IN EFL LEARNERS THROUGH AI TOOLS

by

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Abstract:

Morphological awareness, which involves understanding word structure and formation, plays a pivotal role in developing reading fluency among English as a Foreign Language (EFL) learners. This study investigates the effect of AI-based tools on morphological awareness and reading fluency among 25 third-semester English as a Foreign Language (EFL) students at STAIN Mandailing Natal. Using a quantitative pre-test and post-test design, students completed a 30-item morphology awareness test and a fluency reading test before the intervention, which involved using Grammarly and ReadTheory for eight weeks. Grammarly provided feedback on morphology-related errors, while ReadTheory adapted reading passages to proficiency levels. A post-test was used to measure improvements, which were analyzed using a paired t-test. Results show a significant increase in post-test scores, confirming the effectiveness of AI tools in enhancing morphological understanding and reading fluency. Compared to previous studies, this research reinforces the correlation between morphological awareness and reading skills, while highlighting the role of AI as an interactive learning tool. These findings suggest that integrating AI into EFL instruction enhances self-directed learning, improves linguistic accuracy, and fosters reading proficiency.

Keywords: *AI-based tools; Grammarly; morphological awareness; reading fluency; ReadTheory*

Abstrak:

Kesadaran morfologis, pemahaman tentang struktur dan pembentukan kata, memainkan peran penting dalam mengembangkan kefasihan membaca di antara pelajar Bahasa Inggris sebagai Bahasa Asing (EFL). Studi ini menyelidiki pengaruh alat berbasis AI terhadap kesadaran morfologi dan kefasihan membaca di antara 25 siswa semester ketiga English as a Foreign Language (EFL) di STAIN Mandailing Natal. Menggunakan desain pra-tes dan pasca-tes kuantitatif, siswa menyelesaikan tes kesadaran morfologi 30 item dan tes membaca kefasihan sebelum intervensi dengan Grammarly dan ReadTheory selama delapan minggu. Grammarly memberikan umpan balik tentang kesalahan terkait morfologi, sementara ReadTheory mengadaptasi bagian membaca ke tingkat kemahiran. Pasca-tes mengukur perbaikan, dianalisis menggunakan uji-t berpasangan. Hasil menunjukkan peningkatan yang signifikan dalam skor pasca-tes, mengkonfirmasi efektivitas alat AI dalam meningkatkan pemahaman

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morfologi dan kefasihan membaca. Dibandingkan dengan penelitian sebelumnya, penelitian ini memperkuat korelasi antara kesadaran morfologi dan keterampilan membaca sekaligus menyoroti peran AI sebagai alat pembelajaran interaktif. Temuan ini menunjukkan bahwa mengintegrasikan AI ke dalam instruksi EFL meningkatkan pembelajaran mandiri, meningkatkan akurasi linguistik, dan menumbuhkan kemahiran membaca.

Kata kunci: *kesadaran morphologies, kefasihan membaca, alat berbasis AI, Grammarly, ReadTheory*

INTRODUCTION

Recent advancements in educational technology have highlighted the growing use of Artificial Intelligence (AI)-based tools in supporting English as a Foreign Language (EFL) instruction (Situmorang & Sulistyaningrum, 2024). Tools such as Grammarly, ReadTheory, and other adaptive platforms offer real-time, personalized feedback, enabling learners to identify morphological structures, enhance vocabulary knowledge, and improve reading fluency. Studies have increasingly recognized the significance of morphological awareness in facilitating reading proficiency, particularly for EFL learners who struggle with complex word forms and unfamiliar vocabulary (Deacon et al., 2014; Kieffer & Lesaux, 2012). AI tools, through automated analysis of learners' written and reading outputs, have the potential to bridge instructional gaps by reinforcing word formation skills and decoding strategies that may be overlooked in traditional classrooms. Their adaptive nature allows for differentiated instruction tailored to individual learner needs. This integration of technology into language learning reflects a significant shift towards more data-driven and learner-centered approaches (Firdaus & Rahmawati, 2024). As such, AI-based instruction is emerging as a promising method for enhancing morphological awareness and fluency among EFL learners (Nunes & Bryant, 2006; Snow & Kim, 2007).

Despite these promising developments, a notable gap remains in empirical studies that systematically evaluate the long-term effectiveness of AI tools in promoting morphological awareness and reading fluency among EFL learners. Existing research tends to focus on immediate or short-term improvements without assessing whether learners can internalize AI-generated feedback and apply it independently beyond the digital learning environment (Harris et al., 2011). Moreover, most studies are conducted in well-resourced educational settings, resulting in a scarcity of research within non-native English-speaking contexts, particularly in rural or under-resourced institutions. Compared to earlier research, this study

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not only strengthens the established link between morphological awareness and reading proficiency but also emphasizes the emerging significance of AI as an adaptive and interactive medium for enhancing language learning. These gaps underscore the need for context-specific, longitudinal research that examines both the direct and sustained effects of AI-assisted learning. Addressing these issues is crucial for informing pedagogical decisions and optimizing the integration of AI tools in diverse EFL educational settings (Levesque et al., 2017; McBride–Chang et al., 2005).

Several critical gaps remain in existing research on the role of AI-based tools in enhancing morphological awareness and reading fluency among EFL learners. First, there is limited empirical evidence on the long-term effectiveness of AI feedback in supporting learners' internalization of morphological knowledge and its transfer to independent reading tasks (Harris et al., 2011). Second, most studies have been conducted in well-resourced contexts, leaving a lack of research in non-native English-speaking regions with limited access to high-quality language instruction (Goodwin & Ahn, 2010). Third, few studies examine how different types of AI-generated feedback (e.g., corrective vs. explanatory) affect learners' morphological development. In response to these gaps, this study aims to investigate the impact of AI-based tools, such as Grammarly and ReadTheory, on the morphological awareness and reading fluency of EFL students in under-resourced educational settings. The findings are expected to contribute both practically and empirically. Practically, the study may guide EFL teachers in effectively integrating AI tools to support word structure instruction. Empirically, it will offer new insights into the specific mechanisms through which AI influences language learning, particularly in non-dominant English-speaking contexts (Bowers & Kirby, 2010; Suadi et al., 2024; Thaqi et al., 2024), thus enriching the current body of literature in digital-assisted language learning.

While these gaps highlight the need for research on AI-based interventions, previous empirical work on morphological awareness and reading fluency has primarily focused on traditional instructional methods. For example, Kieffer and Lesaux (2012) emphasized the correlation between morphological awareness and vocabulary growth, suggesting that students who understand word parts can better decode and comprehend complex texts. Similarly, Deacon et al. (2014) found that morphological skills contribute significantly to

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reading proficiency. However, these studies often employed traditional classroom-based interventions with limited integration of technology. The designs were predominantly quasi-experimental, involving small groups of school-aged learners as participants in controlled settings. Instruments commonly used included paper-based morphological awareness tests and reading fluency assessments, with data analyzed using basic inferential statistics. While these findings underscore the relevance of morphology in reading, they often lacked attention to digital or AI-supported learning environments and did not explore the dynamic impact of real-time feedback.

Recent studies involving AI tools such as Grammarly and Read Theory (Suadi et al., 2024; Thaqi et al., 2024) have begun to explore the role of technology in language learning. These studies typically focused on grammar correction or general reading improvement, but few isolated morphological awareness as a primary variable. Moreover, the designs often lacked longitudinal depth, making it challenging to assess sustained impacts. Participant samples were frequently drawn from technologically advanced institutions, which limited the generalizability of the findings to under-resourced EFL settings. Given that third-semester EFL students at STAIN Mandailing Natal are at the stage of learning English Morphology, they serve as an ideal group to examine how AI-assisted instruction supports their morphological development and reading proficiency. By analyzing their progress, this study aims to determine whether AI tools effectively enhance students' ability to identify morphemes, decode complex words, and improve reading speed and comprehension (Apel & Diehm, 2014).

This study is grounded in two interrelated theoretical frameworks: morphological awareness theory and AI-assisted language learning theory**.** Morphological awareness theory emphasizes the importance of understanding the structure of words, such as roots, prefixes, and suffixes, in developing reading fluency and vocabulary (Bowers & Kirby, 2010; Carlisle, 2000). In the context of EFL learners, who often struggle with decoding unfamiliar words, recognizing morphemes enables them to interpret meaning more efficiently and read with greater accuracy (Deacon et al., 2014; Kieffer & Lesaux, 2012). Meanwhile, AI-assisted language learning theory posits that digital tools can enhance language development by providing personalized, adaptive, and immediate feedback (Suadi et al., 2024; Thaqi et al.,

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2024). In EFL classrooms, where teacher feedback is often delayed or generalized, AI-based tools like Grammarly and ReadTheory offer a potential solution to foster individual learning, especially in mastering word structures that influence reading performance.

Based on these theoretical underpinnings, this study aims to explore how AI-supported platforms contribute to enhancing morphological awareness and reading fluency among EFL learners. It aims to fill empirical and practical gaps by examining the specific impact of AI-generated feedback on learners' ability to identify and utilize morphemes in reading tasks. The study addresses the following research questions. Through these questions, the research will clarify the role of AI in supporting linguistic proficiency and provide recommendations for practical implementation in language education.

1. Do AI-based tools influence EFL learners' morphological awareness?
2. What are the effects of improved morphological awareness on learners' reading fluency?

METHOD

Design

This study employs a quantitative pre-test/post-test experimental design to rigorously examine the impact of AI-based tools, such as Grammarly and Read Theory, on the morphological awareness and reading fluency of EFL students (Creswell & Clark, 2018). By comparing students' performance before and after the intervention, this design allows for a precise measurement of the tools' effectiveness in enhancing linguistic skills. The pre-test provides a baseline assessment of students' initial abilities. At the same time, the post-test captures any improvements resulting from their engagement with AI-based learning platforms. This method not only supports the identification of causal relationships but also offers empirical evidence on how AI technologies influence specific aspects of language development. Through statistical analysis, the study aims to determine whether the observed changes are significant and generalizable to similar EFL contexts. The quantitative approach ensures objectivity, replicability, and the ability to draw measurable conclusions about the role of AI in supporting morphological and reading competence.

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Participant

The subjects of this study consist of 25 third-semester students from STAIN Mandailing Natal who are currently enrolled in the English Morphology course. These students were selected because they are at the stage of learning about morphological structures, making them suitable participants for examining the relationship between morphological awareness and reading fluency.

Instrument

The first instrument was a Morphological Awareness Test which is administered to students at STAIN Mandailing Natal. It consists of 30 structured items designed to measure the ability to identify prefixes, suffixes, and root words within given sentences, analyze word formation by breaking words into their constituent morphemes, and generate new words using affixation and derivational morphology. Each item aligns with cognitive levels of understanding, application, and analysis, ensuring a comprehensive assessment of students' morphological processing abilities in English as a Foreign Language (EFL) settings.

This test design is grounded in established instruments used in prior research on morphological awareness by Carlisle (2000), Kieffer and Lesaux (2012), and Deacon et al. (2014), who affirm that explicit tasks targeting morphological skills significantly enhance reading fluency and vocabulary development. Moreover, the structure of the test reflects the methodological framework proposed by Goodwin and Ahn (2010), which advocates for explicit and contextualized morphological instruction for EFL learners. The number of items is sufficient to ensure both content validity and reliability, while also maintaining practical feasibility, as the test can be completed within a 45-minute session. This test serves not only to diagnose students' current level of morphological awareness but also to track measurable growth after exposure to AI-based instructional tools.

The second instrument was reading fluency passages. It was for ***s***tudents who were given reading passages that were graded based on difficulty level and word count to assess various dimensions of reading fluency. Specifically, these passages were used to measure reading speed (in words per minute), accuracy (in terms of the number of errors in pronunciation or word recognition), and comprehension (via questions based on the passage).

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The passages were selected from Read-Theory, ensuring a structured and adaptive approach to evaluating fluency.

Data collection technique

The procedure for this study is organized into three distinct phases, spanning eight weeks, to measure the impact of AI-based tools on morphological awareness and reading fluency in EFL learners.

Prior to the intervention, participants completed a test designed to assess various aspects of morphological awareness. This assessment included tasks such as morpheme identification, which involves recognizing and isolating individual morphemes within words; word formation analysis, which evaluates the ability to understand how words are constructed from morphemes; and affix recognition, which requires identifying prefixes, suffixes, and infixes and understanding their roles in modifying word meanings (Varga et al., 2022). The study by Varga et al. (2022) highlights that online assessments of morphological awareness can effectively measure these subskills, providing reliable data for linguistic research.

In addition, participants took a standardized reading fluency test that measures multiple dimensions of their reading skills. The test evaluates speed by determining the rate at which students read, assesses accuracy through the precision of word recognition and pronunciation, and gauges comprehension by examining the ability to understand and interpret reading passages. Research has shown that AI-based fluency assessment tools, such as MAP Reading Fluency, provide accurate and adaptive measurements, helping educators track students' reading progress efficiently (NWEA, 2024). Furthermore, previous studies have indicated that AI-driven learning platforms significantly enhance morphological awareness and reading fluency by providing personalized, data-driven feedback (Suadi et al., 2024). These platforms allow students to practice morphological skills interactively, reinforcing their understanding of word structures and improving their reading performance.

The second phase involves a six-week AI-based learning intervention, during which students engage in structured activities utilizing Grammarly and ReadTheory. With Grammarly, students submit short essays or sentences and review AI-generated feedback that focuses on aspects such as affixation, derivational morphemes, and overall word formation.

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Weekly exercises are designed to reinforce these concepts, enabling students to refine their understanding of morphological structures. Simultaneously, ReadTheory is employed to enhance reading fluency through adaptive reading exercises tailored to individual proficiency levels. This platform tracks progress by measuring reading speed, accuracy, and comprehension, while encouraging students to work with increasingly challenging texts. Throughout this period, weekly reflections and guided discussions further support students in monitoring and articulating their linguistic progress.

In the final phase, conducted during the eighth week, students retake the same morphological awareness and reading fluency tests administered in the pre-test phase. The post-test data, compared with the baseline measurements, will be analyzed using a paired sample t-test to identify statistically significant improvements. This systematic pre-test, intervention, and post-test design is intended to yield quantifiable insights into the effectiveness of AI-based tools in enhancing both morphological awareness and reading fluency among EFL learners.

Data analysis technique

To evaluate the impact of AI-based tools on morphological awareness and reading fluency, this study employs quantitative statistical methods to compare pre-test and post-test results. First, descriptive statistics will be used to summarize overall student performance. Specifically, the mean, standard deviation, and range of scores from both the pre-test and post-test will be calculated, providing a general overview of any improvements in morphological awareness and reading fluency following the AI-based learning intervention.

Next, a paired sample t-test will be conducted to determine whether there is a statistically significant difference between the pre-test and post-test scores. This test will help ascertain if the observed changes in student performance can be attributed to the AI-based intervention rather than random variation, with a significance level set at 0.05.

RESULT AND DISCUSSION

Result

The implementation of AI-based tools in the learning process has demonstrated a significant positive impact on students' morphological awareness and reading fluency. The

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notable improvements in students' performance on the post-test compared to the pre-test suggest that the use of platforms such as Grammarly and ReadTheory effectively supports learners in recognizing morphemes, understanding word structures, and reading with greater accuracy and speed. The statistical findings are visually presented in the tables and charts below, clearly illustrating the measurable gains in both morphological awareness and reading fluency following the intervention.

Table1. Comparison of pre-test and post-test scores

Test Type	*Pre-Test Mean Score*	*Post-Test Mean Score*	*Mean Difference*	*p-value (Paired t-test)*
Morphological Awareness Test	*65.2*	*78.6*	*+13.4*	*0.002 (significant)*
Reading Fluency Test	*68.4*	*82.1*	*+13.7*	*0.001 (significant)*

The data indicate that a substantial and statistically significant improvement in students' morphological awareness and reading fluency follows the integration of AI-based tools into the learning process. As displayed in Table 1, the mean score for the Morphological Awareness Test increased from 65.2 in the pre-test to 78.6 in the post-test, showing a gain of 13.4 points. Likewise, students' performance in the Reading Fluency Test also showed marked progress, with the mean score rising from 68.4 to 82.1, a difference of 13.7 points. These consistent improvements across both skill areas demonstrate the effectiveness of the AI-based intervention in enhancing students' linguistic capabilities.

Furthermore, the statistical analysis using paired t-tests yielded p-values of 0.002 for morphological awareness and 0.001 for reading fluency. Both values fall well below the 0.05 significance level, indicating that the improvements observed are not only substantial but also statistically reliable. It means that the observed differences in test scores were unlikely to have occurred by chance. The positive shift in students' post-test results suggests that the AI tools provided meaningful support in helping learners identify word structures more effectively, decode texts more efficiently, and engage more confidently in reading tasks. Overall, the quantitative data strongly support the conclusion that the integration of AI-based platforms can significantly contribute to the development of EFL students' morphological skills and reading fluency in higher education contexts such as STAIN Mandailing Natal.

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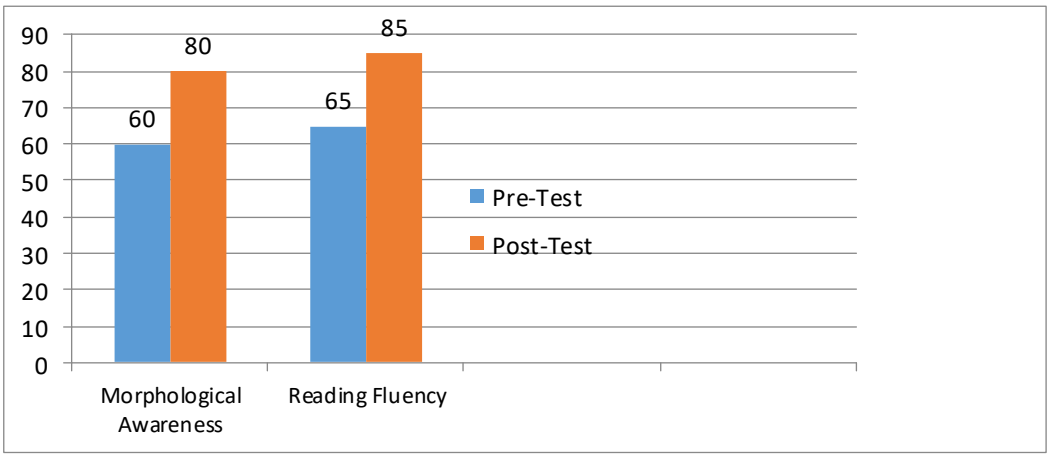

Figure 1. Pre- and Post-Test Scores on Morphological Awareness and Reading Fluency

Figure 1 illustrates the comparative progress of students' performance in morphological awareness and reading fluency before and after the use of AI-based tools. The bar chart displays apparent differences between pre-test and post-test scores across both skill areas. In morphological awareness, the pre-test average score was 60, which significantly increased to 80 in the post-test. Similarly, for reading fluency, the students' pre-test average score was 65, rising to 85 after the intervention. These results indicate that the integration of tools like Grammarly and Read Theory had a tangible and positive impact on students' learning outcomes. The visual trend confirms that learners benefited considerably from targeted, technology-enhanced instruction, with a 20-point improvement in both areas being a strong indicator of instructional effectiveness.

Further analysis of students' engagement with the tools revealed distinct patterns in skill development. Students using Grammarly showed marked improvement in morphological awareness, especially in their ability to accurately identify affixes, root words, and construct derived word forms. This suggests that Grammarly's real-time feedback on word structure helped students internalize morphological rules. Meanwhile, those who practiced with Read Theory demonstrated increased reading fluency, as evidenced by faster reading speeds, reduced pronunciation errors, and improved comprehension during assessments. These functional gains suggest that the AI platforms provided not only corrective support but also fostered independent learning strategies. Moreover, a correlation analysis could further confirm that students who made greater progress in morphological awareness tended to

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perform better in reading fluency as well, highlighting a complementary relationship between the two competencies. This synergy underlines the potential of AI tools to deliver multifaceted improvements in EFL contexts, particularly for learners in higher education institutions such as STAIN Mandailing Natal.

Discussion

The impact of AI-based tools on morphological awareness and reading fluency

The results indicate that the use of Grammarly and ReadTheory significantly improved both morphological awareness and reading fluency among third-semester EFL learners. The post-test scores show a statistically significant increase, suggesting that AI-assisted learning plays a crucial role in enhancing these linguistic skills.

In terms of morphological awareness, students demonstrated improved recognition of morphemes, including prefixes, suffixes, and root words, after receiving Grammarly's real-time feedback on their writing. It suggests that instant error correction and AI-generated explanations contribute substantially to their ability to understand and effectively apply morphological structures.

Regarding reading fluency, students who used Read Theory exhibited notable improvements in reading speed, accuracy, and comprehension, as evidenced by the increased post-test scores. The adaptive nature of ReadTheory likely helped students engage with texts that matched their proficiency levels, thereby reducing reading anxiety and fostering gradual improvements in fluency.

The findings of this study demonstrate that AI-based tools such as Grammarly and ReadTheory significantly enhance morphological awareness and reading fluency among third-semester EFL learners. These results align with those of Kirby et al. (2025), who highlighted the critical role of morphological awareness in reading comprehension, particularly among upper elementary students. Just as Kirby et al. identified morphological awareness as a key contributor alongside phonological awareness and naming speed, this study confirms that real-time, AI-generated feedback on morphological elements can strengthen learners' understanding and application of morphemes, which in turn supports reading development.

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Furthermore, the cross-linguistic findings of Lee and Kim (2025) reinforce the importance of morphological awareness as a transferable skill across languages. Their study demonstrated that morphological awareness in Korean has a positive influence on English reading skills, particularly through enhanced reading comprehension. The current study supports the implication that tools like Grammarly, which provide morphological feedback, can be particularly beneficial for EFL learners by reinforcing underlying linguistic structures applicable across both first and second languages.

Xia et al. (2023) emphasize the role of both phonological and morphological awareness in reading comprehension, even in unique contexts such as Braille literacy among visually impaired children. This complements the present study's findings, which show that morphological awareness gained through AI tools corresponds with improved reading fluency, including reading speed and accuracy. The adaptive and personalized nature of ReadTheory likely facilitated engagement with texts appropriate to learners' proficiency, paralleling Xia et al.'s observation that tailored interventions support gradual skill development.

The neurological perspective offered by Xu et al. (2024) and Marks et al. 2024) provides an additional layer of understanding regarding the impact of morphological awareness on reading skills. Their findings on brain activity and white matter pathways involved in morphological processing suggest that interventions enhancing morphological awareness, such as AI-driven feedback systems, might support cognitive and neurological mechanisms underlying fluent reading. This study's demonstration of improved morphological recognition through Grammarly may thus reflect not only educational gains but also potential cognitive benefits associated with targeted linguistic practice.

Supporting the practical application of morphological awareness, Gibson and Wolter (2015) showed that interventions focusing on this skill can improve vocabulary, decoding, and reading comprehension. Similarly, the current research demonstrates that Grammarly's instant corrections and explanations serve as an effective intervention tool, enabling learners to internalize morphological rules and apply them directly in their writing and reading activities. This real-time correction likely accelerates the learning process and reinforces the connection between morphological knowledge and reading fluency.

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The mediational models explored by Pang and Son (2024) and Hasumi and Chiu (2024) emphasize the complex relationship between morphological awareness, vocabulary knowledge, character recognition, and reading fluency. The current study aligns with these models by demonstrating how morphological awareness, enhanced through AI-based tools, supports improvements in reading fluency, which in turn contribute to enhanced reading comprehension. Notably, ReadTheory's adaptive reading exercises may help consolidate these interrelated skills by providing scaffolded practice that encourages automaticity and confidence in reading.

Finally, the effectiveness of AI-based learning platforms, as documented by Chang et al. (2021), provides a strong technological and pedagogical framework that supports the present findings. Their research highlights that AI tools, through technology-enhanced feedback and personalized learning paths, can accelerate language acquisition and improve proficiency at various learner levels. By demonstrating significant gains in both morphological awareness and reading fluency among intermediate-level EFL students, this study extends the applicability of AI tools beyond advanced learners, contributing valuable insights for educators seeking to implement technology-supported instruction in diverse learning contexts (Andriani & Bram, 2022).

The study's findings offer several key implications for teaching English morphology in EFL settings. One significant implication is the integration of AI tools in morphology instruction. Given the positive impact of Grammarly on students' ability to recognize and manipulate morphological structures, educators are encouraged to incorporate this tool into writing exercises. The real-time feedback provided by Grammarly helps students internalize morphological concepts by correcting errors in spelling, grammar, and word formation, which supports a deeper understanding of language structure.

Another important implication is the enhancement of reading practice through AI-based resources. ReadTheory's adaptive reading comprehension exercises offer a self-paced learning approach that can significantly improve reading fluency. By matching texts to individual proficiency levels and providing immediate feedback, ReadTheory enables students to develop their reading speed, accuracy, and comprehension, making it a valuable resource for EFL instructors seeking to bolster reading skills.

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Furthermore, the observed correlation between morphological awareness and reading fluency underscores the importance of bridging these two areas in language instruction. The findings suggest that explicit instruction in morphology should be integrated into reading lessons, allowing students to apply their understanding of word structures to improve overall fluency. This integrated approach not only enhances language acquisition but also provides a more holistic framework for teaching English morphology in EFL contexts.

CONCLUSION AND IMPLICATION

Conclusion

This study investigated the impact of AI-based tools on morphological awareness and reading fluency among third-semester EFL learners, yielding several significant findings. First, Grammarly enhanced students' morphological awareness by providing instant feedback on word formation, affixes, and derivational structures. Second, ReadTheory improved reading fluency by offering adaptive reading passages tailored to individual proficiency levels, thereby increasing reading speed and comprehension. Statistical analysis revealed a significant increase in post-test scores compared to pre-test results, confirming the effectiveness of these AI-based tools in supporting language acquisition.

Furthermore, the findings reaffirm the strong link between morphological awareness and reading fluency, emphasizing the value of explicit morphology instruction in developing EFL reading skills. AI-based tools should be systematically integrated into curriculum planning for EFL instruction to support personalized learning, promote student engagement, and improve linguistic outcomes. By leveraging the adaptive and feedback-driven features of such technologies, educators can enhance instructional effectiveness and better meet the diverse needs of EFL learners in the digital age.

Limitation

This study has several limitations that should be acknowledged. First, the sample size was relatively small and limited to students from STAIN Mandailing Natal, which may affect the generalizability of the findings to other EFL contexts. Second, the duration of the intervention using AI-based tools was relatively short, which may have limited the

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observation of long-term effects on morphological awareness and reading fluency. Additionally, the study focused primarily on quantitative measures. It did not include qualitative data that could provide deeper insights into students' experiences and challenges while using AI tools. Finally, external factors such as students' prior exposure to technology and individual learning differences were not controlled, which might have influenced the outcomes.

Implication

Based on the findings of this study, several important implications can be drawn for policy, practice, theory, and future research. Practically, the demonstrated positive impact of AI-based tools on morphological awareness and reading fluency suggests that educational institutions, especially in EFL contexts, should consider integrating these technologies into their language learning curricula to enhance students' linguistic skills more effectively. From a policy perspective, stakeholders and curriculum developers can utilize this evidence to support investments in AI-driven educational resources and teacher training, thereby maximizing their benefits. Theoretically, this study supports the existing framework that links morphological awareness to reading proficiency. It highlights the emerging role of AI as an interactive learning aid, contributing to the expansion of second language acquisition models. However, given the study's limitations, such as a limited sample size and short intervention period, these implications should be applied cautiously and within similar educational settings. Future research should aim to replicate the study with larger and more diverse populations, explore the long-term impacts, and incorporate qualitative methods to deepen the understanding of how learners engage with AI tools. This balanced approach ensures that conclusions are evidence-based while acknowledging the parameters of the current study to avoid overgeneralization.

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REFERENCES

Andriani, E., & Bram, B. (2022). Technology use in teaching literature amid and post-pandemic: Teachers' perceptions. *Premise: Journal of English Education*, *11*(2), 279-296. https://doi.org/10.24127/pj.v11i2.4908

Apel, K., & Diehm, E. (2014). Morphological awareness intervention with kindergarteners and first and second grade students from low SES homes: A small efficacy study. *Journal of Learning Disabilities*, *47*(1), 65–75. https://doi.org/10.1177/0022219413509964

Bowers, P. N., & Kirby, J. R. (2010). Effects of morphological instruction on vocabulary acquisition. *Reading and Writing*, *23*(5), 515–537. https://doi.org/10.1007/s11145-009-9172-z

Carlisle, J. F. (2000). Awareness of the structure and meaning of morphologically complex words: Impact on reading. *Reading and Writing*, *12*(3/4), 169–190. https://doi.org/10.1023/A:1008131926604

Chang, T.-S., Li, Y., Huang, H.-W., & Whitfield, B. (2021). Exploring EFL students' writing performance and their acceptance of AI-based automated writing feedback. *2021 2nd International Conference on Education Development and Studies*, 31–35. https://doi.org/10.1145/3459043.3459065

Creswell, J. W., & Clark, V. L. P. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Deacon, S. H., Kieffer, M. J., & Laroche, A. (2014). The relation between morphological awareness and reading comprehension: Evidence from mediation and longitudinal models. *Scientific Studies of Reading*, *18*(6), 432–451. https://doi.org/10.1080/10888438.2014.926907

Firdaus, M. W. M. A., & Rahmawati, E. (2024). The impact of Wordwall online games on English vocabulary mastery in reading. *Premise: Journal of English Education*, *13*(3), 985-1000. https://doi.org/10.24127/pj.v13i3.10838

Gibson, F., & Wolter, J. (2015). Morphological awareness assessment and intervention to improve language and literacy. *Seminars in Speech and Language*, *36*(01), 31–41. https://doi.org/10.1055/s-0034-1396444

Goodwin, A. P., & Ahn, S. (2010). A meta-analysis of morphological interventions: Effects on literacy achievement of children with literacy difficulties. *Annals of Dyslexia*, *60*(2), 183–208. https://doi.org/10.1007/s11881-010-0041-x

Harris, M. L., Schumaker, J. B., & Deshler, D. D. (2011). The Effects of Strategic Morphological Analysis Instruction on the Vocabulary Performance of Secondary Students With and Without Disabilities. *Learning Disabilities Research & Practice*, *26*(3), 149–159. https://simvilledev.ku.edu/sites/default/files/researc/07319487110340010 2(1).pdf

http://creativecommons.org/licenses/by/4.0

Kieffer, M. J., & Lesaux, N. K. (2012). Direct and indirect roles of morphological awareness in the English reading comprehension of native English, Spanish, Filipino, and Vietnamese speakers. *Language Learning*, *62*(4), 1170–1204. https://doi.org/10.1111/j.1467-9922.2012.00722.x

Kirby, J. R., Deacon, S. H., Georgiou, G., Geier, K., Chan, J., & Parrila, R. (2025). Effects of morphological awareness, naming speed, and phonological awareness on reading skills from Grade 3 to Grade 5. *Journal of Experimental Child Psychology*, *253*, 106-188. https://doi.org/10.1016/j.jecp.2024.106188

Lee, J. W., & Kim, Y.-S. G. (2025). Cross-linguistic relations of morphological awareness between Korean and English to language and reading skills for Korean adolescents. *Journal of Experimental Child Psychology*, *249*, 106-118. https://doi.org/10.1016/j.jecp.2024.106118

Levesque, K. C., Kieffer, M. J., & Deacon, S. H. (2017). Morphological awareness and reading comprehension: Examining mediating factors. *Journal of Experimental Child Psychology*, *160*, 1–20. https://doi.org/10.1016/j.jecp.2017.02.015

Marks, R. A., Eggleston, R., & Kovelman, I. (2024). Brain bases of morphological awareness and longitudinal word reading outcomes. *Journal of Experimental Child Psychology*, *238*, 105802. https://doi.org/10.1016/j.jecp.2023.105802

McBride–Chang, C., Wagner, R. K., Muse, A., Chow, B. W.-Y., & Shu, H. (2005). The role of morphological awareness in children's vocabulary acquisition in English. *Applied Psycholinguistics*, *26*(3), 415–435. https://doi.org/10.1017/S014271640505023X

Nunes, T., & Bryant, T. (2006). *Improving literacy by teaching morphemes*. Routledge.

NWEA. (2024). *MAP reading fluency with coach evidence base*. NWEA Research.

Pang, D., & Son, S. (2024). The relationship between morphological awareness and reading comprehension among early grade Chinese children with reading difficulties: A path analysis. *Contemporary Educational Psychology*, *77*, 102268. https://doi.org/10.1016/j.cedpsych.2024.102268

Situmorang, R. K., & Sulistyaningrum, S. D. (2024). Cognitive competencies in digital english reading: A systematic reviewcognitive competencies in digital english reading: a systematic review. *Premise: Journal of English Education*, *13*(3), 1163. https://doi.org/10.24127/pj.v13i3.10447

Snow, C. E., & Kim, Y. S. G. (2007). Large problem spaces: The challenge of vocabulary for English language learners. In R. K. Wagner, A. E. Muse, & K. R. Tannenbaum. In *Vocabulary Acquisition: Implications for Reading Comprehension* (pp. 123–139). Guilford Press.

Suadi, S., Sahyoni, Siregar, A. M. P., & Anggoro, K. J. (2024). AI-based English learning applications to skyrocket students' English morphological awareness. *SALEE: Study of Applied Linguistics and English Education*, *5*(2), 465–478. https://doi.org/10.35961/salee.v5i2.1370

http://creativecommons.org/licenses/by/4.0

Thaqi, E., Mantawy, M. O., & Kasneci, E. (2024). SARA: Smart AI reading assistant for reading comprehension. *Proceedings of the 2024 Symposium on Eye Tracking Research and Applications*, 1–3. https://doi.org/10.1145/3649902.3655661

Varga, S., Pásztor, A., & Stekács, J. (2022). Online Assessment of Morphological Awareness in Grades 2–4: Its Development and Relation to Reading Comprehension. *Journal of Intelligence*, *10*(3), 1-19. https://doi.org/10.3390/jintelligence10030047

Xia, Y., Xie, R., Wu, X., Zhao, Y., Sun, P., & Chen, H. (2023). The role of phonological awareness, morphological awareness, and rapid automatized naming in the braille reading comprehension of Chinese blind children. *Learning and Individual Differences*, *103*, 102272. https://doi.org/10.1016/j.lindif.2023.102272

Xu, X., Song, X., Lin, L., Pan, N., Jin, Y., Tan, S., Cao, M., Chen, Y., Zhao, J., Su, X., Yang, K., Jing, J., & Li, X. (2024). White matter substrates underlying morphological awareness deficit in Chinese children with developmental dyslexia. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *134*, 111083. https://doi.org/10.1016/j.pnpbp.2024.111083

http://creativecommons.org/licenses/by/4.0