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Measuring the Impact of Meta-AI on English Reading Comprehension Score Enhancement: A Study Within Social Media Application

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***Abstract*—The integration of AI with social media platforms is significantly influencing English language skills, reshaping how users engage with and learn the language. So far, no studies have specifically examined how AI affects English reading for first-year non-English major undergraduates in Saudi Arabia. This study investigates how Meta-AI combined with WhatsApp enhances reading comprehension. Two intact classes were randomly chosen and assigned to experimental (N=43) and control (N=49) groups in a quasi-experimental study. The experimental group received instruction through AI-enhanced social media, namely WhatsApp, while the control group continued with a conventional approach. Data were collected before and after treatment. Statistical analysis revealed that the experimental group enhanced reading comprehension significantly more than the control group, which received conventional teaching. The study implies that integrating AI with social media platforms like WhatsApp can improve substantially English reading comprehension, suggesting a beneficial shift towards technology-driven learning methods in education.**

***Index Terms*—AI-enhanced social media, conventional approach, integrating AI with social media, technology-driven learning methods**

I. Introduction

The mastery of the English language holds substantial global importance, serving as a linchpin in international communication, academia, and business. As the most widely learned second language, English proficiency is essential for global participation and success (Crystal, 2013; Alam & Usama, 2023). Reading is the foundation for language development, along with writing, speaking, listening, and other fundamental skills (Grabe, 2009). These input skills are critical not only for language comprehension but also for facilitating the improvement of output skills such as speaking and writing (Grabe, 2009). The ability to read comprehensively enhances cognitive language proficiency, which in turn, supports higher levels of thinking and expression necessary for personal, academic, and professional success (Cummins, 2000; Alam et al., 2024). The emphasis on reading is also validated by numerous studies that link these skills directly to the enhancement of communication abilities in both first and second-language contexts (Nation, 2001).

The digital revolution, especially the integration of AI with social media, has altered methods of instruction while opening new language teaching avenues (Chen et al., 2024). AI's potential to personalize learning and make it more interactive presents unprecedented opportunities for enhancing English language skills through these platforms (Singh & Lee, 2024; Thompson et al., 2024; Usama et al., 2024). Despite the widespread use of social media applications in everyday communication and their emerging role in education, there remains a gap in empirical research exploring the impact of AI-enhanced social media on language learning, especially among non-English major undergraduates in contexts like Saudi Arabia. This study addresses this gap by focusing on the effectiveness of AI integration within WhatsApp, a popular social media application, for improving English reading comprehension among first-year non-English major undergraduates in Saudi Arabia. This research is significant as it offers the potential to add to the existing reservoir of knowledge by demonstrating how contemporary technology—specifically, artificial intelligence—can be employed to enhance language learning results. By leveraging the ubiquitous nature of social media and the adaptive

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capabilities of AI, this study explores a novel approach to language education that could align with the digital natives' learning preferences and lifestyles.

Furthermore, this study is based on the Input Hypothesis by Stephen Krashen, which highlights the importance of comprehensible input in language learning (Krashen, 1982). This theory suggests that when learners are exposed to language that is just beyond their current skill level, it helps them improve. Using an AI-enhanced platform like WhatsApp can provide a customized learning experience that adjusts the language input to suit each learner's needs. This method optimizes learning by making sure learners receive language input that is both understandable and challenging. Such personalized, interactive learning environments can greatly speed up the acquisition of reading skills. By integrating AI, this approach not only follows Krashen's theory but also leverages modern technology to enhance educational outcomes.

In exploring how Artificial Intelligence (AI) integrated with social media platforms can enhance language learning, this study aims to provide significant insights into using technology to improve reading skills, which are key for mastering a language. Focusing on tools like WhatsApp that blend into daily life, the research investigates how AI can customize language learning to fit individual needs and learning styles, potentially making language teaching more effective (Alam et al., 2023). The results may also guide educational policy and suggest ways to incorporate technology into language curricula, helping to fill a gap in current research and paving the way for future educational strategies (Harper & Chen, 2023). This study could help create new, more efficient language learning techniques to fulfill today's learners' many needs by highlighting technology's benefits.

A. Research Problem

Multiple studies have been carried out on how AI and social media enhanced English language proficiency from primary to higher school. Mobile-based social media integration could make language learning more personalized and accessible. Although current research has concentrated on AI and social media alone, little is known about how AI linked with WhatsApp affects reading skills. Researchers can study how mobile AI-social media apps enhance reading in this unexplored field. This study analyzes how AI and WhatsApp on mobile devices improve English language learners' reading and enhance personalized learning and skill development.

B. Research Purpose Statement

This study aims to measure the impact of Meta-AI on enhancements in English reading comprehension scores via social media applications.

II. Literature Review

A. Meta's AI-Enhanced WhatsApp

Meta-AI WhatsApp represents a cutting-edge integration of artificial intelligence with the widely-used messaging platform, WhatsApp, designed specifically to enhance educational experiences. This AI-driven tool utilizes sophisticated algorithms to analyze users' interactions and tailor English language learning content according to individual proficiency levels. Functionally, Meta's AI-enhanced WhatsApp not only delivers personalized language exercises but also provides immediate feedback and corrections, significantly aiding in the improvement of reading skills. Its interactive nature engages users in a conversational learning format, which simulates real-life communication scenarios, thereby promoting practical language use. English learners receive advantages from frequent practice and contextually relevant language exposure. The platform's advantages could be balanced by its dependence on digital interfaces, which could restrict personal interactions, and its privacy and data security concerns. Its efficacy also depends on the learner's starting competency level and learning style, which might differ from the AI's teaching strategy.

B. Impact of AI on EFL/ESL Learners

The integration of Artificial Intelligence (AI) into English language learning (ELL) environments has yielded notable improvements across various educational contexts. Chea and Xiao (2024) found that AI tools significantly enhanced reading among university students, though they also warned of potential overreliance and ethical concerns. Similarly, Wang and Yan (2022) demonstrated that AI, when combined with the Production Oriented Approach, effectively improved English reading skills, especially for learners with higher initial proficiency. Zhao and Nazir (2022) discussed the broad application of AI in enhancing English multimodal production and online reading, indicating its capacity to adapt learning processes to individual needs. Moreover, Wang (2024) highlighted AI's role in refining English as a Foreign Language (EFL) writing evaluations, showcasing its potential to provide unbiased and consistent feedback. Daweli and Mahyoub (2024) reported positive feedback from EFL learners on the use of AI tools in reading instruction, emphasizing the importance of strategic AI integration in educational settings. Al Mahmud (2023) observed significant improvements in EFL writing skills among Saudi students using the AI-powered tool, Wordtune. Furthermore, Liu and Reynolds (2024) underscored that AI-enhanced learning environments markedly improved reading skills and vocabulary retention, though they cautioned about potential limitations in developing independent problem-solving skills. Li et al. (2024) revealed that huge language models like ChatGPT enhance academic writing in non-native English-speaking medical students. Raheem et al. (2023) reviewed the transformative impact of AI applications like

Quillbot, Grammarly, and ChatGPT on academic writing, pointing out the necessity for ethical considerations in their deployment. Moreover, Kaharuddin et al. (2024) explored how AI-enhanced reading practices and feedback impacted Indonesian students' writing skills, finding that students' attitudes toward AI use were crucial in mediating these effects. Marzuki et al. (2023) and El Shazly (2021) explored the implications of AI in EFL situations, with the former analyzing its impact on the content and structure of students' writings and the latter evaluating its impacts on speaking anxiety and performance. Additionally, Shu and Xu (2022) evaluated AI-based English self-learning systems, highlighting their role in enhancing autonomous learning capabilities. Samala et al. (2024) emphasized the importance of balanced technology integration in educational settings and ChatGPT's guarantee and restrictions. Imran et al. (2024) pointed to AI's transformative potential in higher education, advocating for addressing integration challenges to ensure equitable and effective use. Likely, Kostikova et al. (2024) detailed how ChatGPT supported the development of professional English courses, illustrating AI's capability to systematize complex information while emphasizing the necessity for human oversight. El Azhari et al. (2023) analyzed the integration of SMART chatbots in e-learning, suggesting improvements to their Knowledge Bases to enhance their effectiveness. Moreover, Yu and Yang (2024) investigated how mobile technology influenced student outcomes in STEM education, emphasizing mobile learning's potential to transform educational landscapes. Ezzaim et al. (2024) demonstrated the benefits of AI-based adaptive learning systems in improving Moroccan high school students' engagement and performance. Finally, Jamshed et al. (2024) showed how AI-driven mobile app feedback boosted English writing skills in Indian secondary school students, demonstrating its immediate practicality.

C. Impact of Social Media Apps on ESL Learners

Muftah (2024) demonstrated that social media platforms played a pivotal role in enhancing writing, reading, listening, and speaking skills among undergraduate learners during the COVID-19 pandemic, emphasizing their potential as a valuable educational tool. Yu et al. (2022) concluded that Rain Classroom encouraged behavioral, social, and cognitive engagement in English learning more than conventional methods or WeChat. Barrot (2021) highlighted the transformative role of platforms such as Facebook, Skype, and WhatsApp in language education, despite challenges like maintaining academic rigor and managing informal interactions. Li (2017) identified YouTube as a frequently used platform for engaging and accessible language learning, fostering peer-to-peer dynamics in collaborative English learning. Alharthi et al. (2020) examined how well social media sites like Facebook and Instagram encourage the development of vocabulary, stressing their inspiring impacts and suggesting their incorporation into official educational settings. Omoera et al. (2018) noted that frequent use of social media among Nigerian undergraduates introduced informal language into academic writing, emphasizing the need for strategies to mitigate such influences. Shahzadi and Kausar (2020) found that Facebook enhanced undergraduate students' English writing skills by facilitating peer interaction and real-time feedback in Pakistan. Dirjal and Ghabanchi (2020) reported significant improvements in the speaking skills of Iraqi university students using Skype, highlighting its potential for interactive learning. Morsidi et al. (2021) demonstrated that WhatsApp positively influenced communication skills among Malaysian university students, fostering collaboration and interaction. Behforouz and Al Ghaithi (2024) showed that an interactive WhatsApp bot significantly improved listening skills among Omani EFL learners, extending learning beyond the classroom. Mallampalli and Goyal (2021) found that Google Docs/Slides outperformed WhatsApp in enhancing collaborative writing among second-language learners, emphasizing the importance of tool selection for specific objectives. Alam et al. (2024) noted that Facebook decreased errors and improved interactive learning in ESL students' writing, although organized assistance was needed. Ilyas et al. (2023) highlighted Canva-based videos as an effective tool for making English learning engaging and visually appealing for Indonesian junior high school students. Usama et al. (2024) emphasized the role of social media and Wiki platforms in fostering collaborative and critical writing skills, while Anwas et al. (2020) found a positive correlation between frequent access to English-language content on social media and improved proficiency across all skills among Indonesian high school students. Rusli et al. (2019) found that social media improved ESL pre-service teachers' collaborative learning and self-directed writing, while informal language use continued.

III. METHODOLOGY

A. Research Questions

1. Is there a statistically significant difference in the outcomes across the experimental and control groups?
2. To what extent does the treatment influence reading skills development from the pre-intervention phase to the post-intervention phase?
3. What is the magnitude of gain in reading skills from pretest to posttest across the experimental and control groups?

B. Participants and Sampling

The study included a total of 93 participants (N=93), comprising 33 females and 60 males, all of whom were first-year undergraduate students with non-English major backgrounds. The participants were native Arabic speakers and had limited exposure to English language instruction, with none having studied abroad. Two intact classes were randomly selected for the study: the experimental group (N=43) and the control group (N=49). The experimental group

utilized WhatsApp and mobile devices for learning, while the control group followed conventional teaching methods. Every participant submitted informed consent preceding the study, confirming their voluntary participation. Additionally, institutional approval was secured, authorizing the use of mobile devices and the WhatsApp platform for classroom learning purposes. This ethical compliance ensured that the study adhered to the guidelines for integrating technology into educational settings.

C. Content for Reading Development

Meta-AI integrated with WhatsApp was used to create content aimed at improving English reading comprehension. A total of 24 reading comprehension passages were prepared, each featuring multiple-choice questions (MCQs). In each passage, difficult words were bolded, and their meanings along with their parts of speech were provided. This approach ensures that learners understand challenging words in context, promoting better vocabulary retention and comprehension, as research shows that contextual learning of vocabulary enhances language learning (Nation, 2001). Furthermore, providing meanings and grammatical categories supports learners in making connections between form and function, which is essential for developing language proficiency (Schmitt, 2008). MCQs were included after each passage to assess understanding and foster critical thinking, as such questions encourage learners to analyze, evaluate, and synthesize information. Three professionals checked the content for correctness and relevancy, following the educational standards. This review process ensures content validity, which is crucial for reliable assessment in educational contexts. To validate the content, 30 students with a similar educational background from another university participated in a pilot test. Pilot testing helps identify faults and adapt educational content to better meet learners' requirements (Creswell & Creswell, 2018). Pilot test feedback improved passages and questions, providing accurate, effective, and well-structured materials. This comprehensive development process highlights the value of evidence-based practices in enhancing English reading and vocabulary skills through technology-integrated learning platforms.

D. Instruments for Pre-Test and Posttest

In our study, we used Kahoot to effectively assess students' reading comprehension skills before and after interventions. The pretest assessed students' initial reading abilities with questions on main ideas, key details, and interpretation, using diverse and appropriate reading passages. After the intervention, a posttest was administered using Kahoot with new passages of similar difficulty to evaluate improvements in the same reading skills. Kahoot's engaging format and instant feedback features made it a valuable tool for this assessment, enhancing student participation and allowing for real-time monitoring of progress. Previous studies have also recognized Kahoot's efficacy in assessing reading skills, noting its ability to maintain student engagement and provide quick, actionable insights into learning outcomes (Iwamoto et al., 2017).

E. Procedures

The study was conducted over 8 weeks, with sessions held three days a week, each lasting 1 hour and 30 minutes. The study's author, who also taught the experimental and control groups, maintained consistency in teaching and student engagement. For the experimental group, the instructor utilized Meta-AI integrated with WhatsApp to enhance the reading comprehension experience. Each day, students received a reading comprehension passage accompanied by multiple-choice questions (MCQs) prepared through this integration. This method leveraged the advanced capabilities of Meta-AI to generate engaging and appropriate reading materials tailored to the student's current educational needs. After students responded to the MCQs, the instructor reviewed their answers and subsequently shared the correct responses. This real-time feedback method helps students understand and benefit from their mistakes, increasing understanding and retention.

In the control group, a traditional approach to reading comprehension was employed, using content specifically prepared by teachers. This group received printed reading passages and multiple-choice questions (MCQs) developed manually without the integration of AI technologies. During the class sessions, teachers distributed these materials, and students completed the MCQs after reading. The instructor subsequently discussed the right responses with learners. His method, which relied solely on teacher-prepared materials, provided a clear insight into the effectiveness of conventional teaching techniques in enhancing reading comprehension.

F. Data Analysis

The pretest and post-test scores from both the experimental and control groups were analyzed using an Analysis of Variance (ANOVA) test, chosen for its ability to compare means across multiple groups simultaneously. Educational research benefits from this strategy since it could determine whether outcome differences are statistically significant. By using ANOVA, the study could assess the impact of the intervention on reading skills while controlling for variability and identifying any significant interactions, ensuring a robust evaluation of the educational strategies employed.

IV. Results and Findings

TABLE 1
ANALYSIS OF VARIANCE OF THE GROUPS

Measures	Experimental Group		Control Group		F	*p*
	Mean	SD	Mean	SD		
Reading Score	41.94	3.963	35.19	2.782	4.028	*0.001**

The analysis of variance was conducted to evaluate the impact of the experimental intervention using Meta-AI integrated with WhatsApp compared to conventional teaching methods in the control group specifically addressed reading skills. When we examine the reading scores, the experimental cohort achieved a remarkable 41.94 (SD = 3.963), in stark contrast to the control cohort's 35.19 (SD = 2.782). The F-statistic recorded was 4.028, accompanied by a highly significant p-value of 0.001, signifying a meaningful enhancement in reading scores attributable to the intervention. This marked difference underscores the effectiveness of the Meta-AI approach in enhancing reading proficiency compared to traditional methods. The significant statistical results affirm the value of incorporating advanced technological tools in educational strategies to boost specific language skills.

Addressing the second research question regarding how Meta-AI integrated with WhatsApp (Experimental group) and conventional teaching methods (Control group) differentially affect outcomes across pre-tests and post-tests, the analysis focused specifically on reading skills (see Table 2). The tested (experimental) group revealed considerable growth in reading ability, escalating from a baseline average of 9.00 (SD = 1.038) to a final average of 32.94 (SD = 1.520), supported by a significant t-value of 19.911 and a p-value less than .001. In a comparable context, the control group, which implemented classic educational techniques, also noted advancements, though not as significant, shifting from a pretest mean of 11.34 (SD = 1.109) to a posttest mean of 23.85 (SD = 1.673), with a t-value of 11.713 and maintaining the same significance level.

This data suggests that while both teaching methods resulted in improved reading scores, the use of Meta-AI integrated with WhatsApp led to more substantial enhancements. These findings support the effectiveness of incorporating advanced technology tools in educational strategies, particularly in enhancing reading skills, more so than traditional teaching methods. The experimental setup, leveraging Meta-AI, provided a more interactive and engaging learning environment, which likely contributed to the greater gains observed compared to the conventional approach.

TABLE 2
DESCRIPTIVE STATISTICS AND T-TEST RESULTS, PRETEST, AND POSTTEST

Groups	Measures	pre-test Mean	SD	post-test Mean	SD	*t*	*p*
Control Group	Reading	11.34	1.109	23.85	1.673	11.713	*<.001**
Experimental Group	Reading	9.00	1.038	32.94	1.520	19.911	*<.001**

TABLE 3
GAINS IN READING FOR CONTROL AND EXPERIMENTAL GROUPS ACROSS TESTS

Groups	Measures	pre-test Mean	post-test Mean	Gain
Control Group	Reading	11.34	23.85	12.51
Experimental Group	Reading	9.00	32.94	23.94

The analysis addressing the third research question regarding language reading gains demonstrated (see Table 3) that the Meta-AI integrated with WhatsApp significantly outperformed the conventional teaching approach in post-test results, particularly in reading skills. In the experimental cohort, the enhancement in reading comprehension was significant, escalating from a pre-assessment average of 9.00 to a post-assessment average of 32.94, culminating in an increase of 23.94. Conversely, the control cohort, which utilized conventional pedagogical approaches, exhibited less remarkable advancements, with a pre-assessment average of 11.34, a post-assessment average of 23.85, and an increase of 12.51 in reading comprehension. This marked difference is especially evident in the reading gains where the experimental group's improvement nearly doubled that of the control group.

V. DISCUSSION AND ANALYSIS

The analysis of reading skill improvements in an educational setting employing Meta-AI integrated with WhatsApp versus conventional teaching methods revealed significant differences in the efficacy of these approaches. The experimental group, which utilized Meta-AI technology, experienced more pronounced improvements in reading skills compared to the control group that used traditional teaching methods. This suggests that the incorporation of advanced technological tools in educational strategies, such as Meta-AI, enhances student engagement and effectively boosts language skills. The substantial enhancements in the experimental group, particularly in reading proficiency, highlight the advantage of an interactive and technologically enriched learning environment. These findings reinforce the potential of integrating innovative educational technologies to significantly improve learning outcomes over more traditional methods. The findings of this study, where the experimental group employing Meta-AI integrated with WhatsApp exhibited superior enhancements in reading skills compared to the control group using traditional teaching

methods, can be cogently interpreted through the framework of Stephen Krashen's Input Hypothesis. Krashen's (1982) seminal work on the Input Hypothesis underscores the essential role of comprehensible input in second language acquisition. He suggests that optimal language learning occurs when learners are exposed to input slightly above their current competence level—the "i+1" level—but which remains comprehensible, facilitating meaningful progression in language skills (Krashen, 1985). In this study, Meta-AI technology presumably provided such input, which was not only comprehensible but also suitably challenging, closely aligning with Krashen's i+1 concept. The dynamic and interactive capabilities of this AI technology likely enabled the delivery of customized educational experiences, precisely adjusting the language input to match the continually evolving proficiency levels of learners. This adaptation maximizes comprehension and bolsters learning potential, effectively illustrating Krashen's theoretical assertions (Gass, 2013; Long, 1996). Furthermore, research by Ellis (2005) and VanPatten (2004) supports the idea that such interactive environments significantly contribute to language acquisition by offering immediate and personalized feedback, thus reinforcing the practical application of the Input Hypothesis in advanced technological learning settings. This study's integration of cutting-edge AI with proven linguistic theory not only validates Krashen's views but also highlights the transformative potential of modern educational technologies in enhancing language learning outcomes.

The study's findings, showcasing significant improvements in reading skills facilitated by Meta-AI integrated with WhatsApp, resonate with several key theories in language learning and educational technology. The use of this innovative technology aligns with the tenets of Long's (1996) Interaction Hypothesis, which emphasizes the significance of interactive environments for successful language acquisition. Long's (1996) research suggests that meaningful interaction in the target language is crucial for language development, a concept that Meta-AI technology adeptly facilitates by providing dynamic, real-time linguistic exchanges. These findings also coincide with Vygotsky's Sociocultural Theory, especially the Zone of Proximal Development. Vygotsky (1978) posited that learners achieve more in collaborative environments with scaffolding that supports their learning just beyond their current abilities. Meta-AI technology effectively operationalizes this by customizing the learning experience to fit the individual learner's ZPD, thus optimizing the acquisition process through tailored challenges and supports (Lantolf, 2000). Additionally, the Cognitive Load Theory (Sweller, 2020) provides a framework for understanding why Meta-AI could enhance reading skills more effectively than less interactive methods. This theory explains learning processes and the importance of reducing cognitive load for enhanced learning. The intuitive and learner-focused design of Meta-AI likely helps in managing cognitive load by presenting information in digestible segments that match learners' processing capabilities, thus improving retention and skill development (Paas & Van Merriënboer, 1994).

The findings of this study, where the experimental group using Meta-AI integrated with WhatsApp demonstrated significant improvements in reading skills, align with a broad range of previous studies emphasizing the transformative potential of technology in language learning. Zou et al. (2023) illustrated how interactive platforms like WeChat improve speaking skills, while Muftah (2024) revealed that social media integration during the COVID-19 pandemic improved language proficiency, including reading, through promoting interaction and engagement. In addition, Alharthi et al. (2020) stated that social media platforms optimized vocabulary development by engaging and inspiring students, and Omoera et al. (2018) revealed how social media affected students' writing, highlighting its larger language skills implications. These findings are further supported by Shahzadi and Kausar (2020), who observed significant improvements in English writing skills through Facebook discussions, and Haidari et al. (2020), who noted that platforms like WhatsApp and Wiki enhance critical thinking and collaborative learning. Collectively, these studies reinforce the efficacy of interactive, adaptive, and technology-driven tools like Meta-AI in improving reading skills, as evidenced in this study's outcomes. The findings underscore the potential for using advanced technology to enhance language learning through tailored and theoretically grounded input. This aligns with educational research advocating for the integration of technology to provide dynamic, student-centered learning experiences that conform to theoretical insights into language teaching (Anderson, 1987).

VI. Conclusion

This study demonstrates that integrating Meta-AI with WhatsApp significantly enhances reading skills among language learners compared to conventional teaching methods. The experimental group's substantial gains in reading proficiency highlight the effectiveness of interactive, adaptive, and technologically enriched learning environments. Grounded in Krashen's Input Hypothesis and supported by related theories such as the Interaction Hypothesis and Sociocultural Theory, this study underscores the transformative potential of AI-driven educational tools in advancing language acquisition. The findings affirm the importance of tailored input and real-time feedback provided by advanced technologies in fostering improved learner engagement and skill development. Despite encouraging findings, this study contains limitations. First, the intervention's brief length (8 weeks) may have made it difficult to measure Meta-AI integration's long-term effects on reading and language abilities. Second, the study only included first-year undergraduate non-English majors, which may limit its applicability to other age groups or educational situations. One AI platform (WhatsApp) hinders understanding how other AI-integrated applications could function in comparable scenarios. Lastly, external factors such as student's prior exposure to English and technological proficiency were not deeply examined, which could influence outcomes. These findings might inform various future study directions. Longitudinal investigations may reveal how AI integration affects linguistic abilities over time. Enrolling students of

varied ages, competence levels, and academic subjects would improve generalizability. Comparative studies investigating the effectiveness of various AI tools beyond WhatsApp would offer a broader understanding of technology's role in language education. Qualitative methods like interviews and focus groups can assist in investigating learner attitudes and AI tool challenges. Research into the integration of AI for other language domains, such as speaking or writing, could also offer valuable insights into holistic language learning strategies.

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