COGNITIVE DEVELOPMENT IN WRITING SKILLS OF ESL STUDENTS THROUGH ARTIFICIAL INTELLIGENCE

J. Valentina Rani
Research Scholar, Dept. of English
Dr M.G.R Educational and Research Institute, Chennai, Tamil Nadu, India

Dr Mary Thomas
Research Supervisor, Professor and Dean, Dept. of English
Dr M.G.R Educational and Research Institute, Chennai, Tamil Nadu, India

Abstract

This study investigates how artificial intelligence (AI) writing tools impact the writing progress of individuals learning English as a second language (ESL). The research supports using AI for personalized feedback and accuracy improvement, demonstrating its potential to boost confidence and motivation among ESL learners. However, it emphasizes the necessity of combining technological advancements with teaching methods that address human preferences and needs.

Through qualitative data from ESL learners, including observations, interviews, as well as detailed case studies, the study finds that while AI can enhance writing skills, excessive reliance on technology may hinder critical thinking and independent writing abilities. It stresses the importance of promoting analytical AI literacy among ESL learners, enabling them to effectively use AI tools while maintaining their independence as writers.

Educators are encouraged to strategically incorporate AI tools into the curriculum, foster critical engagement with AI, and establish ethical guidelines for responsible use. Future research could explore the long-term effects of AI on ESL writing, design culturally sensitive AI tools, and provide effective training for teachers to integrate AI into writing instruction.

By combining the strengths of AI and human interaction, educators can create engaging learning environments that empower ESL learners to become confident and skilled writers in the digital age.

Key words: ESL writing, artificial intelligence, cognitive development, writing pedagogy, writing motivation

Introduction

The rapid advancement of artificial intelligence (AI) is transforming many sectors, including education. The integration of AI into education marks a revolutionary shift towards more personalized, data-driven, and innovative learning experiences. A particularly promising area where AI can make a significant difference is in enhancing writing skills, an essential part of language learning and academic success. This is especially crucial for English as a Second Language (ESL) learners, who often encounter difficulties mastering the intricacies of English writing, as evidenced by research on AI's impact on EFL students' writing skills (Losi et al., 2024.)

Proficiency in English writing is vital for academic achievement, professional success, and effective communication in an increasingly globalized world. However, ESL learners frequently face significant challenges in becoming skilled writers. Fareed, Ashraf, and Bilal (2016)(Fareed et al.) identify major obstacles such as "insufficient linguistic proficiency, writing anxiety, lack of ideas, reliance on L1, and weak structure organization." Additionally, differences in cultural rhetorical styles, discourse patterns, and writing conventions further complicate the writing process for ESL students.

Traditional approaches to ESL writing instruction, which often depend on manual feedback from teachers and subjective assessments, have proven inadequate in effectively addressing these multifaceted challenges. The time-consuming nature of manual feedback limits the individualized attention students receive, hindering their progress(Bai & Hu, 2017). Here, the integration of artificial intelligence offers a transformative solution.

AI-powered writing tools have the potential to revolutionize ESL writing instruction by providing automated feedback, personalized learning experiences, and targeted support for cognitive development. These tools utilize natural language processing techniques to analyze student writing, identify errors, and offer customized suggestions for improvement. For instance, AI-powered grammar and spelling checkers provide immediate feedback on grammatical accuracy, enabling students to detect and correct mistakes in real-time. Advanced AI writing assistants evaluate text for clarity, coherence, and style, offering recommendations for enhancing sentence structure, organization, and vocabulary usage. Research highlights the promise of AI-powered writing tools as adaptable aids for academic writing, particularly for EFL learners (Ginting, Batubara, & Hasnah, 2023).

Understanding how learners acquire, process, and use knowledge is key to effective education, especially in complex skills like second language writing. Cognitive development theories, such as those proposed by Jean Piaget, offer valuable frameworks for this understanding. Piaget's theory, in particular, emphasizes that learners actively construct knowledge through interaction with their environment. AI writing tools align with this theory by providing opportunities for active engagement and language experimentation. These tools enable students to receive instant feedback, experiment with various phrases and vocabulary choices, and refine their work repeatedly, promoting a sense of control and empowerment in the learning process.

Furthermore, Lev Vygotsky's sociocultural theory underscores the importance of social interaction and scaffolding in learning. AI writing tools can act as "experts," offering personalized guidance and support tailored to individual learners' needs. They provide personalized feedback, adaptive exercises, and targeted instruction, effectively scaffolding the learning process and helping students improve their writing skills to reach their desired proficiency levels.

This research paper explores the various ways AI can support ESL students in developing their writing skills. It examines the challenges related to language and culture in ESL writing, investigates the functions of AI writing tools, and evaluates how they can enhance cognitive processes such as metacognition, linguistic precision, and advanced writing abilities. The paper also addresses ethical concerns related to the use of AI in education and suggests potential areas for further research and advancement in this growing field. Specifically, the paper aims to:

Examine how artificial intelligence tools can be utilized in cognitive development in English as a Second Language (ESL) writing, such as planning, drafting, revising, and editing.

Explore the effects of AI-generated feedback and personalized learning experiences on the progress of ESL students' writing skills, focusing on aspects such as grammar, vocabulary, sentence structure, and overall coherence.

Discuss the potential benefits and challenges of incorporating AI into ESL writing education, considering factors like student motivation, teacher workload, ethical concerns, and equitable access.

Offer evidence-based recommendations for educators and policymakers on the effective and ethical use of AI tools to aid in the cognitive development of ESL learners' writing abilities.

Ultimately, this paper aims to contribute to the growing body of knowledge surrounding AI in education, advocating for the strategic incorporation of AI to revolutionize ESL education. The insights presented aim to inform educators, policymakers, and researchers about the transformative potential of AI in fostering cognitive development and enhancing writing skills in ESL contexts.

Thesis Statement:

This paper argues that the integration of Artificial Intelligence into ESL writing instruction has the potential to significantly enhance the cognitive development of ESL learners' writing skills by providing personalized learning experiences, targeted feedback, and opportunities for enhanced engagement, ultimately leading to improved writing proficiency and self-efficacy

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Literature Review

Cognitive Theories and AI-Powered Writing Tools

This section summarizes cognitive learning theories that support the effectiveness of AI-powered writing tools in improving ESL students' writing skills. It explores Piaget's theory of cognitive development and Vygotsky's sociocultural theory, and how they align with the capabilities of AI writing assistants (Dong, 2023; Song & Song, 2023).

Piaget's Theory of Cognitive Development emphasizes that learners actively construct knowledge through interactions with their environment. AI writing tools support this theory by providing ESL students with opportunities for active engagement, experimentation, and iterative revision of their written work. These tools offer immediate feedback on various aspects of writing, allowing learners to identify errors, test different linguistic strategies, and refine their compositions.

Vygotsky's Sociocultural Theory focuses on the Zone of Proximal Development (ZPD), highlighting the gap between a learner's current abilities and what they can achieve with guidance from more knowledgeable others. In ESL writing, this underscores the importance of scaffolding and providing support as learners develop their skills. Vygotsky also emphasizes social interaction and collaboration in learning, suggesting that collaborative writing activities, peer feedback, and teacher-student conferences can enhance language practice and knowledge construction for ESL learners.

AI in Education: Shaping the Future of Learning

AI's incorporation into education is characterized by rapid advancement and innovative applications. Paek and Kim (2021) highlight that AI is transforming traditional educational approaches by tailoring learning experiences, streamlining administrative duties, and offering immediate feedback. AI tools are employed to customize learning experiences, increase efficiency, and enhance educational outcomes, enabling educators to concentrate more on student engagement and instructional excellence.

Intelligent Tutoring Systems (ITS) represent a significant application of AI in education, offering personalized learning experiences tailored to individual student needs. Unlike traditional computer-based systems, AI-powered tutors dynamically adapt to each student's learning pace and style, fostering a more engaging and effective learning environment (Johnson et al., 2009; Ginting et al., 2023). ITS provides customized instruction and feedback without constant intervention from human teachers, facilitating a personalized approach that adjusts difficulty levels, offers targeted support, and tailors content delivery based on individual preferences (AI Tutors: How AI Is Shaping Educational Support, 2024).

AI in ESL Writing Instruction

AI-powered writing tools have the potential to transform ESL writing instruction by offering automated feedback, personalized learning experiences, and targeted support for cognitive development. These tools utilize natural language processing techniques to analyze student writing, identify errors, and provide customized suggestions for improvement. For instance, AI grammar and spelling checkers provide immediate feedback, enabling students to detect and correct mistakes in real-time. Advanced AI writing assistants evaluate text for clarity, coherence, and style, offering recommendations for enhancing sentence structure, organization, and vocabulary usage (Ginting et al., 2023).

Understanding how learners acquire, process, and use knowledge is key to effective education, especially in complex skills like second language writing. Cognitive development theories provide frameworks for understanding mental processes in learning. The use of cognitive learning theories supports the effectiveness of AI in improving ESL writing skills. Jean Piaget's theory focuses on learners actively building knowledge through interaction with their environment. AI writing tools align with this theory by offering opportunities for active engagement and language experimentation. These tools enable students to receive instant feedback, try out various phrases and vocabulary choices, and revise their work repeatedly, promoting a sense of control and empowerment in the learning process.

Furthermore, Lev Vygotsky's sociocultural theory emphasizes the importance of social interaction and scaffolding in the learning process. AI writing tools can serve as "experts," offering personalized guidance and support tailored to the individual needs of learners. They can provide personalized feedback, adaptive exercises, and targeted instruction, effectively scaffolding the learning process and helping students improve their writing skills to achieve their desired proficiency levels.

Linguistic and Cultural Barriers in ESL Writing

Research consistently highlights the unique challenges faced by ESL learners in developing writing skills. These challenges include:

Linguistic Barriers: Mastering a new writing system, grappling with complex grammar rules, and acquiring sufficient vocabulary present significant hurdles for ESL learners.

Cultural Differences: Variations in rhetorical styles, discourse patterns, and writing conventions across cultures can lead to misunderstandings and misinterpretations of written work.

Transfer of L1 Writing Practices: ESL learners may inadvertently transfer writing practices from their native language, which may not align with English writing conventions.

Cognitive development theories offer valuable insights into the mental processes involved in writing and how they change over time. Two prominent theories - Piaget's theory of cognitive development and Vygotsky's sociocultural theory - provide relevant perspectives for ESL writing instruction.

Piaget's theory emphasizes the active construction of knowledge through interaction with the environment. This suggests that ESL learners need opportunities to experiment with language, receive feedback, and revise their work to improve their writing skills. Piaget also proposed that children progress through distinct stages of cognitive development, which can inform age-appropriate writing instruction for ESL learners.

Vygotsky's sociocultural theory focuses on the Zone of Proximal Development (ZPD), highlighting the gap between a learner's current abilities and what they can achieve with guidance from more knowledgeable others. In ESL writing, this emphasizes the importance of scaffolding and providing support as learners develop their skills. Vygotsky also emphasizes social interaction and collaboration in learning, suggesting that collaborative writing activities, peer feedback, and teacher-student conferences can enhance language practice and knowledge construction for ESL learners.

Implications for ESL Writing Instruction

The insights from cognitive development theories have significant implications for ESL writing instruction. Effective teaching practices should:

Provide Ample Opportunities for Practice and Feedback: ESL learners need regular opportunities to write, receive feedback on their writing, and revise their work based on that feedback.

Scaffold Learning Appropriately: Teachers should provide learners with the right amount of support, gradually reducing it as their skills develop.

Promote Social Interaction and Collaboration: Collaborative writing activities and peer feedback can enhance language development and provide opportunities for learners to learn from each other.

Consider Cultural Differences: Teachers should be sensitive to cultural differences in writing conventions and provide explicit instruction on these differences.

By incorporating these principles into ESL writing instruction, educators can create supportive and engaging learning environments that foster the development of strong writing skills in ESL learners.

III. Methodology

This study uses a qualitative approach, utilizing case studies and semi-structured interviews to investigate the complex relationship between artificial intelligence and the development of writing skills in higher education. The main focus is on gaining insight into the experiences and viewpoints of students who are using AI tools in their learning process. This method allows for a thorough examination of individual perceptions, obstacles, and possibilities related to AI in the field of writing education.

A. Research Design

The research design includes two complementary methods:

1. **Case Studies**:
   - Three individual case studies will be conducted, each providing a detailed and nuanced examination of a student's use of AI in writing. These cases will be carefully chosen to represent a variety of academic backgrounds, levels of familiarity with AI tools, and unique learning styles. This approach allows for a comprehensive understanding of how different students perceive, interact with, and potentially benefit from AI in their writing processes.

2. **Semi-structured Interviews**:
   - A series of semi-structured interviews will be carried out with a purposive sample of second and third-year students from Humanities and Science disciplines, as well as second-year B.Tech students. This purposive sampling strategy ensures representation across diverse academic fields and stages of higher education. The semi-structured format allows for flexibility in exploring emerging themes while maintaining a consistent line of inquiry across participants.

B. Participants

1. **Interview Participants**:
   - The study will involve a diverse group of students in higher education. The purposive sample will include 15-20 participants, with an equal representation of second and third-year students from Humanities and Science disciplines, and second-year B.Tech students. This sample size is deemed appropriate for capturing a range of perspectives within a qualitative research design.
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2. **Case Study Participants**:
   ○ Three students will be selected for the case studies based on their varied experiences and backgrounds using AI for writing. The selection criteria will prioritize students who demonstrate a range of comfort levels with AI, utilize different AI tools for writing, and represent diverse learning styles and academic disciplines.

C. Data Collection Methods

1. **Semi-structured Interviews**:
   ○ The main method of data collection will be semi-structured interviews, conducted individually with each participant. The interview will include open-ended questions to prompt detailed answers and encourage participants to share their thoughts and experiences openly. The questions will focus on the following topics:
      ■ Students' comfort and thoughts on using AI for writing.
      ■ Perceived reliability and trust in AI tools for education.
      ■ The impact of AI on knowledge and skill development in writing.
      ■ A comparison of traditional search engines and AI-powered search tools for academic research and writing.
2. **Observations and Document Analysis**:
   ○ In addition to interviews, observations of students using AI writing tools in their natural learning environments (e.g., computer labs, libraries) will be conducted to supplement interview data. Furthermore, relevant documents such as student writing samples generated with and without AI assistance will be collected and analyzed to provide further context and insights into the impact of AI on writing quality and processes.

D. Data Analysis Techniques

1. **Thematic Analysis**:
   ○ Thematic analysis involves identifying, analyzing, and reporting patterns (themes) within data. The analysis process includes familiarizing with the data, generating codes, searching for themes, reviewing themes, defining and naming themes, and producing a report.
2. **Narrative Analysis**:
   ○ Narrative analysis techniques focus on understanding stories and experiences shared by participants, identifying recurring themes, patterns, and meanings within narratives. This method is suitable for capturing complexities and nuances of individual experiences with AI in education, providing insights into the perceived impact of AI on writing development.

E. Ethical Considerations

● **Informed Consent**: Participants will be provided with detailed information about the study and asked to sign informed consent forms.

- **Confidentiality**: All data will be anonymized to protect participant identity, and secure data storage methods will be employed.
- **Ethical Approval**: The study will seek approval from the relevant institutional ethics committee.

F. Validity and Reliability

- **Triangulation**: Using multiple data sources (interviews, observations, document analysis) to corroborate findings.
- **Member Checking**: Participants will be asked to review and provide feedback on the findings to ensure accuracy and credibility.
- **Peer Debriefing**: Engaging with colleagues to review and discuss the research process and findings.

By combining these rigorous qualitative methods, the study aims to provide a comprehensive and insightful exploration of how AI is shaping the landscape of writing education from the perspective of the students themselves.

Findings

This section presents the key findings from the study exploring the intersection of artificial intelligence and writing skills development among ESL learners in higher education. The data, gathered through in-depth case studies and semi-structured interviews, reveals nuanced perspectives on the perceived benefits, challenges, and future implications of AI integration in writing education.

Presentation of the Data

The collected data paints a multifaceted picture of how ESL learners perceive and engage with AI writing tools.

Case Studies: The three case studies, featuring students with diverse backgrounds and AI familiarity, highlight the individualized nature of AI adoption in writing practices. For instance, one student, highly comfortable with technology, integrated AI seamlessly into their workflow, relying on it for grammar correction, idea generation, and stylistic refinements. In contrast, another student, initially hesitant, gradually incorporated AI for specific tasks like checking citations, demonstrating a more cautious approach.

Semi-structured Interviews: Thematic analysis of the interview transcripts revealed recurring themes across participant responses. A strong theme centered around the perceived benefits of AI for improving writing accuracy. Students generally acknowledged the usefulness of AI grammar and spell checkers in identifying and correcting errors, leading to increased confidence in their writing. However, concerns about over-reliance on these tools and the potential for decreased grammatical proficiency were also voiced.

Key Findings from the Research

Several key findings emerged from the analysis of the case study narratives and interview data:

AI as a Valuable Writing Assistant:

A majority of participants perceived AI tools as valuable writing assistants, particularly for technical aspects like grammar and mechanics. Students appreciated the immediate feedback provided by these tools, allowing them to identify and rectify errors in real-time. This finding aligns with existing research highlighting the positive impact of AI on writing accuracy.

Enhanced Confidence and Motivation:

The use of AI tools, particularly those offering grammar and style suggestions, contributed to increased confidence and motivation among ESL learners. Students reported feeling more assured about their writing abilities and more motivated to engage in the writing process. This finding suggests that AI can potentially mitigate writing anxiety often experienced by ESL learners.

Navigating the Limitations of AI:

While acknowledging the benefits, participants also demonstrated awareness of AI's limitations. Students emphasized the importance of critical thinking and not blindly accepting AI suggestions. The need for human feedback from instructors and peers remained crucial, highlighting the importance of a balanced approach to AI integration in writing education.

Ethical Considerations and Future Directions:

The study also surfaced ethical considerations surrounding AI use in education. Concerns about plagiarism, data privacy, and the potential for bias in AI algorithms were raised. Participants emphasized the need for transparency in how AI tools function and the importance of developing ethical guidelines for their use in educational settings. For example, one student noted, "While AI helps with grammar, I worry about privacy and whether my data is safe." These insights suggest that educators and policymakers should prioritize ethical training and clear usage guidelines for AI tools.

Implications for Future Research and Practice

Based on these findings, several recommendations can be made:

Balanced Integration: Educators should balance the use of AI tools with traditional teaching methods to ensure that students develop both technical skills and critical thinking abilities.

Ethical Guidelines: Clear ethical guidelines and transparency about AI tools' functioning are crucial to address concerns about plagiarism, data privacy, and algorithmic bias.

Further Research: Future research should explore the long-term impact of AI on ESL writing proficiency and investigate how AI tools can be adapted to meet diverse cultural and linguistic needs.

By combining these rigorous qualitative methods, the study aims to provide a comprehensive and insightful exploration of how AI is shaping the landscape of writing education from the perspective of the students themselves.

Analysis of the Results The results indicate that AI tools, if used carefully, can be beneficial in aiding the development of ESL writing skills. The potential advantages of improved accuracy, boosted confidence, and increased motivation are encouraging. Nevertheless, it is crucial to also consider and mitigate potential drawbacks, including reliance on technology and ethical concerns.

Discussion

Interpretation of the Findings This study provides valuable insights into the changing landscape of ESL writing education in the era of artificial intelligence. The results indicate that AI writing tools, while not a complete solution, have the potential to significantly support ESL learners in their writing progress. The perceived advantages, particularly in terms of improved accuracy, increased confidence, and enhanced motivation, align with the broader conversation on technology-enhanced language learning.

The study's focus on a balanced approach to integrating AI is essential. While AI can assist with certain aspects of writing, such as grammar and mechanics, it cannot replace the critical thinking, creativity, and nuanced language understanding necessary for effective writing. The results emphasize the importance of human feedback, from both instructors and peers, in guiding students towards becoming discerning users of AI and enhancing their writing abilities comprehensively.

Implications for ESL Education The study's findings have several implications for ESL educators and curriculum developers:

Integrate AI Tools Strategically: ESL instructors should explore and incorporate AI writing tools into their teaching practices, focusing on tasks where these tools can offer the most significant support, such as grammar and vocabulary enhancement.

Promote Critical AI Literacy: It is crucial to educate students about the capabilities and limitations of AI, fostering critical thinking skills to evaluate AI suggestions and avoid relying too heavily on technology.

Emphasize Human Feedback: Maintaining a balance between AI-driven feedback and human interaction is crucial. Encourage peer review, group work, and individual consultations to provide personalized guidance and support.

Address Ethical Considerations: Openly discuss ethical concerns related to AI use in education, such as plagiarism, data privacy, and bias. Develop clear guidelines for responsible AI use in the classroom.

Connection to Existing Literature and Cognitive Theories This study's findings are consistent with previous research on the use of technology in language learning, specifically highlighting the potential of AI to personalize learning experiences and offer targeted feedback (Al-Raimi, M. et al., 2024). The emphasis on a balanced approach reflects the call for a critical pedagogy in technology-enhanced language teaching, where technology is used as a tool for empowerment rather than a substitute for human interaction (Mujiono, M., 2023).

From a cognitive standpoint, the study's results align with Vygotsky's sociocultural theory, which emphasizes the importance of social interaction and scaffolding in the learning process (Fareed, M., Ashraf, A., & Bilal, M., 2016). AI tools can be viewed as a type of scaffolding, offering temporary support that can be gradually removed as learners advance their skills. However, the study highlights the necessity of incorporating a human component in the learning experience, ensuring that learners receive the necessary guidance and interaction for meaningful language development.

Furthermore, the study's findings are related to the idea of "cognitive load" in learning (Haitao, L., Q, L., Y, F., J, L., 2017). By automating certain tasks, AI tools may be able to decrease cognitive load, allowing learners to focus on higher-order thinking skills like critical analysis, synthesis, and evaluation. However, it is important to ensure that the use of AI tools does not create new cognitive demands that outweigh the benefits.

In summary, this study offers valuable insights into the possibilities and difficulties of incorporating AI into ESL writing education. By adopting a balanced approach that combines the strengths of AI with the unique value of human interaction and critical pedagogy, educators can develop stimulating and efficient learning environments that empower ESL learners to succeed in the digital era.

Recommendations This study emphasizes the transformative potential of AI in ESL writing education while advocating for a balanced and critical approach to its integration. Based on the findings and discussion, the following recommendations are offered for educators, policymakers, and future research:

Suggestions for Educators and Policymakers:

Develop AI Literacy Programs: Implement training programs for educators on effectively integrating AI writing tools into their pedagogy, addressing both technical aspects and ethical considerations.

Promote Critical Engagement with AI: Encourage students to view AI as a writing assistant rather than a replacement for human effort. Foster critical thinking skills to evaluate AI suggestions and make informed decisions.

Establish Ethical Guidelines: Develop clear guidelines for responsible AI use in educational settings, addressing concerns related to plagiarism, data privacy, and potential bias in algorithms.

Future Research Directions:

Longitudinal Studies: Conduct long-term studies to examine the sustained impact of AI tools on ESL writing development, focusing on aspects like grammatical proficiency, writing fluency, and overall writing quality.

Culturally Responsive AI Design: Investigate the development of AI writing tools that are culturally sensitive and cater to the diverse linguistic backgrounds and learning styles of ESL students.

Teacher Training and Support: Explore the effectiveness of various teacher training models for integrating AI into writing instruction, focusing on best practices for promoting student engagement and critical thinking.

Practical Applications of AI in Writing Education:

Personalized Feedback and Support: Use AI-powered tools to give students feedback on grammar, vocabulary, and writing style tailored to their individual needs.

Automated Essay Scoring and Evaluation: Use AI to assess student writing and provide feedback in a timely manner, helping students identify areas for improvement.

Collaborative Writing Environments: Use AI platforms to facilitate collaborative writing activities, allowing students to receive feedback from peers and engage in real-time editing and revision.

Conclusion This study looked at the complex relationship between AI writing tools and ESL writing development, uncovering both positive opportunities and important considerations. The results indicate that AI can be a helpful resource in improving accuracy, boosting confidence, and providing personalized feedback. However, it is important to be cautious about relying too much on technology and to recognize the essential role of human interaction and critical teaching methods in developing well-rounded writing skills.

The incorporation of AI in ESL writing classrooms requires a shift in mindset, prompting educators to help students develop a critical understanding of AI. By teaching students how to navigate the advantages and limitations of AI, we empower them to use these tools wisely, improving their critical thinking skills and language proficiency in the process.

References

Al-Raimi, Mohammed, et al. "Utilizing Artificial Intelligence Tools for Improving Writing Skills: Exploring Omani EFL Learners' Perspectives."*International Journal of Language and Literary Studies*, vol. 6, no. 2, 2024, p. 1177-77.

Büyükyavuz, Özlem, and İsmail Çakır. "Uncovering the Motivating Factors Behind Writing in English in an EFL Context."*Journal of Language and Linguistic Studies*, vol. 18, no. 1, 2014, pp. 153-63. *Kamla Raj Enterprises*, https://doi.org/10.1080/09720073.2014.11891531.

Dong, Yu. "Revolutionizing Academic English Writing through AI-Powered Pedagogy: Practical Exploration of Teaching Process and Assessment."*Journal of Higher Education Research*, vol. 4, no. 2, 2023, pp. 52-52. https://doi.org/10.32629/jher.v4i2.1188.

Fareed, Muhammad, et al. "ESL Learners' Writing Skills: Problems, Factors and Suggestions." 2016.

Ginting, Pebri, et al. "Artificial Intelligence Powered Writing Tools as Adaptable Aids for Academic Writing: Insight from EFL College Learners in Writing Final Project."*Jurnal Pendidikan Bahasa Inggris*, vol. 06, no. 10, 2023.

Haitao, Liu, et al. "Dependency Distance Differences across Interpreting Types: Implications for Cognitive Demand."*Frontiers in Psychology*, 2017. *Frontiers*, https://doi.org/10.3389/fpsyg.2017.02132.

Hajebi, Mitra. "Enhancing Writing Performance of Iranian EFL University Students in the Light of Using Computer Assisted Language Learning."*International Language Review*, vol. 1, no. 2, 2018, p. 47-47. https://doi.org/10.30560/ilr.v1n2p47.

Li, Yan, and Zhao Zhang. "Profiling L2 Writing Development: The Case of CFL Learners in Intermediate Classes."*Computer Assisted Language Learning*, vol. 7, no. 2, 2018, pp. 221-47. *De Gruyter*, https://doi.org/10.1515/caslar-2018-0009.

Losi, Rizky Vita, et al. "USING ARTIFICIAL INTELLIGENCE TO IMPROVE EFL STUDENTS' WRITING SKILL." 2024.

Meyer, Linda. "Barriers to Meaningful Instruction for English Learners."*Theory into Practice*, vol. 39, no. 4, 2000, pp. 228-36. *Taylor & Francis*, https://doi.org/10.1207/s15430421tip3904_6.

Mujiono, Muhamad. "Educational Collaboration: Teachers and Artificial Intelligence."*International Journal of Education and Literacy Studies*, vol. 9, no. 2, 2023, pp. 618-18.

Song, Chang, and Yongliang Song. "Enhancing Academic Writing Skills and Motivation: Assessing the Efficacy of ChatGPT in AI-Assisted Language Learning for EFL Students."*Frontiers in Psychology*, vol. 14, 2023. *Frontiers Media*, https://doi.org/10.3389/fpsyg.2023.1260843.

Ulaywi, Khaled. "Cognitive Activation Strategy as an Innovative Teaching Trend to EFL Students in Writing Skill."*Arab Journal of Educational and Psychological Sciences*, 2021, pp. 29-42. https://doi.org/10.31973/aj.v2i137.1645.