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Analysing the Impact of Artificial Intelligence in ESL Education: A Systematic Review

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Abstract

The review is based on the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) methodology to explore the types of platforms used in Artificial Intelligence (AI) in English as a Second Language (ESL) education and their relevant impacts. As the education sector increasingly adopts Artificial Intelligence (AI) technology, a diverse array of platforms is globally utilized in institutions to enhance learning experiences. This review synthesized insights from pertinent previous studies, examined the relevant impacts presented in each research article, and assessed the overall impacts of Artificial Intelligence integration in ESL education. A comprehensive analysis of 25 articles published between 2021 and 2024 from various reputable sources such as Springer, Google Scholar, and Scopus. The review highlights the current landscape of AI integration in ESL education and explores the relevant impacts that AI offers in enhancing ESL learning outcomes. It was also found that AI positively impacted the learners in terms of a holistic approach, personalized learning experiences, innovative teaching, and enhanced interaction. This study will be beneficial to educators to fully utilize AI in the classroom to engage learners' participation, hence creating an effective learning session.

Keywords: Artificial Intelligence, ESL Education, Systematic Review, Impacts, Learning Outcomes

Introduction

Artificial Intelligence (AI) is playing a crucial role in changing many sectors and one of them is the education sector. AI refers to the recreation of human intelligence progressions by technologies, especially computer systems, including learning and self-correction (Chen, Chen, & Lin, 2020). AI technologies are already growing in adoption throughout education and, in many cases, are helping offer new ways to address challenges in traditional educational systems (Holmes, Bialik, & Fadel, 2021).

One of the primary methods of AI integration in education is through adaptive learning platforms. These platforms utilize AI algorithms to personalize educational content and learning pathways tailored to each student's unique needs and preferences (Li & Zhou, 2022). For instance, AI-driven systems can analyse a student's performance data to adjust the

difficulty level of learning materials, ensuring that the content is neither too easy nor too challenging, thereby optimizing individual learning outcomes (Wang & Huang, 2021).

Intelligent tutoring systems (ITS) represent another significant approach. ITS simulates the one-on-one interaction between a student and a tutor, providing instant feedback and customized guidance on specific tasks (VanLehn, 2021). These systems can diagnose students' errors, offer hints, and adapt instruction based on the learner's responses. Research indicates that ITS can be as effective as human tutors in improving students' academic performance, making them a valuable tool in education (Aleven, McLaughlin, Glenn, & Koedinger, 2020).

AI technologies also enhance collaborative learning through AI-powered discussion forums and group work applications. These tools can analyse students' contributions, provide real-time feedback, and even form study groups based on complementary skills and knowledge levels (Rosé, Wang, Cui, Arguello, & Stegmann, 2022). By fostering a more interactive and engaging learning environment, AI can significantly improve collaborative learning outcomes and student engagement (Dillenbourg, 2021).

The impact of AI on learners is substantial, particularly in terms of personalized learning experiences and improved academic performance. AI technologies enable real-time feedback and targeted instruction, allowing students to learn at their own pace and according to their specific needs (Xie, Chu, Hwang, & Wang, 2022). This personalized approach not only enhances academic achievement but also boosts student motivation and engagement, as learners feel more supported and understood (Zawacki-Richter, Marín, Bond, & Gouverneur, 2021).

However, the effective implementation of AI in education also brings forth challenges, especially regarding the professional development of educators. Teachers need to acquire new skills and knowledge to integrate AI tools effectively into their teaching practices (Rodríguez, 2021). Comprehensive professional development programs that focus on AI literacy and pedagogical strategies are crucial to ensure educators can fully leverage AI technologies, maximizing their positive impact on student learning (Marín, Zawacki-Richter, & Bond, 2021).

Background of Study

This section offers an in-depth exploration on the impact of Artificial Intelligence (AI) in ESL education by synthesizing insights from existing literature. The primary objective is to define the concept of AI integration in ESL education and assess the relevant impacts and methods adopted in this field. By reviewing previous studies, this section aims to elucidate the various applications of AI technologies in ESL classrooms and highlight their potential impact on language learning outcomes. Through this comprehensive overview, the study seeks to provide a nuanced understanding of the role of AI in ESL education, including its impact for teaching and learning practices. By synthesising the relevant impacts from past research, this overview seeked to clarify the essence of Artificial Intelligence in ESL education. Therefore, this section aimed to provide a detailed description of the concept and impact of Artificial Intelligence within educational contexts.

Research Objectives

The objectives of this research were:

1. To identify the AI tools that are widely applied in ESL education.
2. To analyse the impact of AI integration in ESL education.

Research Questions

The research questions of this study were:

1. What are the widely applied Artificial Intelligence tools in ESL education?
2. How does the integration of AI impact ESL students' language learning outcomes?

The Definition of Artificial Intelligence

Artificial intelligence (AI) refers to the creation and application of computer systems that can perform tasks typically requiring human intelligence (Artificial Intelligence, 2004). These tasks include reasoning, problem-solving, learning, perception, and understanding language. AI is a rapidly growing field that encompasses various technologies designed to enable machines to perform functions traditionally needing human intellect. This involves developing algorithms and models that allow machines to analyze data, recognize patterns, make decisions, and even engage in natural language conversations (Freiburg & Sciences, 2012).

A significant aspect of AI is machine learning, which involves training algorithms on extensive datasets to discern patterns and make predictions. This process enables AI systems to enhance their performance over time without explicit programming (What Is Artificial Intelligence? Definition, Uses, and Types, 2023). Another crucial area of AI is natural language processing, allowing machines to understand and generate human language.

Besides these technical components, AI research also addresses ethical considerations, as well as societal and economic impacts. As AI technology progresses, it is essential to consider its implications on employment, privacy, and social inequalities (Pachegowda, 2024). The focus of AI in computer science is on developing intelligent systems capable of performing tasks typically requiring human intelligence.

Overall, AI includes a wide range of capabilities and applications, and its development has the potential to profoundly affect how we live and work in the future (Maslej et al., 2023).

Artificial Intelligence Tools in ESL Education.

The rise of artificial intelligence (AI) has had a significant impact on different fields, such as education. Within English as a Second Language (ESL) education, AI technology has become an important element in improving the methods of teaching and learning.

Ahmad, Latif, Arafah, and Suryadi (2024), investigated the role of AI in enhancing English writing skills among Indonesian students. Their study highlighted how AI tools provide real-time feedback, grammatical corrections, and suggestions for vocabulary enhancement, which collectively improve writing proficiency. Despite these advancements, there remains a gap in understanding the long-term impact of AI on students' creative writing abilities and critical thinking skills.

Aleven, McLaughlin, Glenn, and Koedinger (2020) discussed the effectiveness of intelligent tutoring systems (ITS) in education. These systems leverage AI to provide personalized instruction and feedback, adapting to individual learners' needs. In the context of ESL, ITS can offer tailored language exercises and instant feedback, promoting better language acquisition. However, there is limited research on how ITS can be integrated with human-led instruction to maximize learning outcomes.

Alharbi (2023) explored the use and potential misuse of AI-enabled machine translation in EFL classrooms. While AI translation tools can aid comprehension and language learning, over-reliance on these tools can hinder students' ability to develop independent language skills. Further studies are needed to develop guidelines for the balanced use of AI translation tools in ESL education.

Moreover, ChatGPT, an advanced language model developed by OpenAI, has been examined for its potential in ESL education by various researchers. Allehyani and Algamdi (2023) discussed early childhood teachers' perceptions of using ChatGPT to teach English. The tool's ability to simulate conversations with native speakers helps students practice and improve their speaking skills. However, the research identified a need for more robust evaluation methods to assess the effectiveness of ChatGPT in different educational contexts.

An et al. (2023) modeled English teachers' behavioural intentions to use AI in middle schools. Their findings suggest that teachers' acceptance of AI is influenced by perceived ease of use, perceived usefulness, and institutional support. Despite the positive outlook, there is a need to explore the specific training and professional development required to enhance teachers' AI competencies.

Speech recognition software is another significant AI application in ESL education. Tools like Google's Speech-to-Text and Apple's Siri enable students to practice pronunciation and speaking skills. These tools analyse spoken language, provide feedback on pronunciation accuracy, and suggest improvements (Lu, 2021). This real-time feedback mechanism helps students refine their speaking skills and build confidence in their verbal communication abilities.

Automated grading systems represent another AI integration method, providing immediate and objective assessments of student work. These systems can evaluate written assignments for grammar, syntax, and content quality, offering detailed feedback that helps students improve their writing skills (Huang & Ning, 2022). Automated grading frees educators from time-consuming assessment tasks, allowing them to focus more on personalized instruction and support.

Personalized learning platforms, powered by AI algorithms, tailor educational content to individual student needs and learning styles. These platforms track student performance, identify areas of weakness, and adjust the difficulty level of tasks accordingly (Chen et al., 2020). By providing customized learning experiences, these platforms ensure that each student progresses at an optimal pace, maximizing learning outcomes.

Impact of AI Integration in ESL Students' Language Learning Outcomes

The integration of AI technologies in ESL education has profound implications for students' language learning outcomes. AI tools influence various aspects of the learning process, including language proficiency, engagement, motivation, and overall academic achievement.

AI-powered personalized learning platforms significantly enhance language proficiency by providing tailored instruction that meets individual learning needs. These platforms adapt to each student's pace, ensuring that learners receive appropriate challenges and support (Chen et al., 2020). As a result, students can achieve better outcomes in reading, writing, speaking, and listening skills.

Moreover, engagement and motivation are critical factors in language learning, and AI tools play a crucial role in boosting these aspects. Interactive AI applications, such as chatbots and gamified learning platforms, make learning more engaging and enjoyable (Fryer & Carpenter, 2020). By incorporating elements of play and competition, these tools motivate students to participate actively in language learning activities, thus improving their commitment and persistence.

The use of AI in ESL classrooms also leads to improved academic achievement. Automated grading systems provide timely and constructive feedback, helping students understand their mistakes and learn from them (Huang & Ning, 2022). This immediate feedback loop accelerates the learning process and enhances academic performance.

Lastly, the integration of AI in ESL education is not without challenges. One significant challenge is ensuring the accessibility and usability of AI tools for all students, including those with limited technical skills or resources (Lu, 2021). Additionally, educators must be adequately trained to use AI technologies effectively, necessitating ongoing professional development (Rodríguez, 2021). Despite these challenges, the potential benefits of AI in enhancing language learning outcomes for ESL learners are substantial.

Methodology

This systematic literature review on Artificial Intelligence Integration in ESL Education follows a structured methodology based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The study employs a systematic approach to identify, select, and analyse relevant literature to address the research objectives and questions.

Phase 1 : Identification Phase

During the identification phase of this study, five specific criteria were utilized to select relevant articles. Firstly, the researchers accessed Google scholar, Springer and Scopus databases known for containing articles in the social sciences and humanities. Secondly, articles had to be published from 2021-2024 and written in English. Thirdly, only research articles and journals were considered. Lastly, articles and journals needed to be fully open-access. Table 1 outlines these five criteria used to identify articles for inclusion in the study.

Table 1
Table Shows the Inclusion and Exclusion Criteria in Choosing the Articles.

Criteria	**Inclusion**	**Exclusion**
Database	Google scholar, Springer and Scopus	Other databases
Publication year	2021-2024	Articles before 2021
Language	English	Articles written in other languages than English
Document type	Research articles and journals	Books, Book chapters, Proceedings, Thesis and Thesis report
Access to full text	Open access	Limited or no access

Apart from the five predefined criteria, the articles were determined by using several search strings and keywords. Each search string was used in all three databases to find relevant articles related to the integration of artificial intelligence in ESL education: Perspectives, Challenges and Opportunities.

Search Strings
Table 2
Table Shows the Search Strings used in all three Databases to Identify the Articles.

English Education	AND	(Artificial Intelligence)		
Impact	AND	(Artificial Intelligence)	AND	English
Tools	AND	(Artificial Intelligence)	AND	English

Based on the criteria and the search strings in Table 1 and 2, all articles identified that fit the inclusion and exclusion criteria were chosen and listed, while others were removed and discarded from the list.

Phase II: Screening Phase

The articles that were listed from Phase I were further screened by the titles. The title of each article was made certain to match the keywords used. Apart from the title, the abstract of every article was skimmed and scanned to ensure that all articles chosen were based on the predefined, inclusion, and exclusion criteria. Articles with titles and abstracts that did not match the criteria were excluded and removed. The list of articles was then reduced once again by removing duplicates from all three databases.

Phase III: Eligibility Phase

Articles were checked and evaluated for their eligibility to be further screened in the third phase. Only articles that matched all inclusion and exclusion criteria were included to proceed to the last stage. This phase was crucial to ensure all articles identified were relevant in answering the research questions.

Phase IV: Exclusion Phase

The articles that were identified based on the eligibility criteria were then selected to be analysed and reviewed in this study, while the remaining articles were discarded. Some of the exclusion criteria were books, book chapters, seminar papers, articles with no access to the full text, and articles that were published before 2021. The process of identifying articles were portrayed in a flowchart as shown in Figure 1.

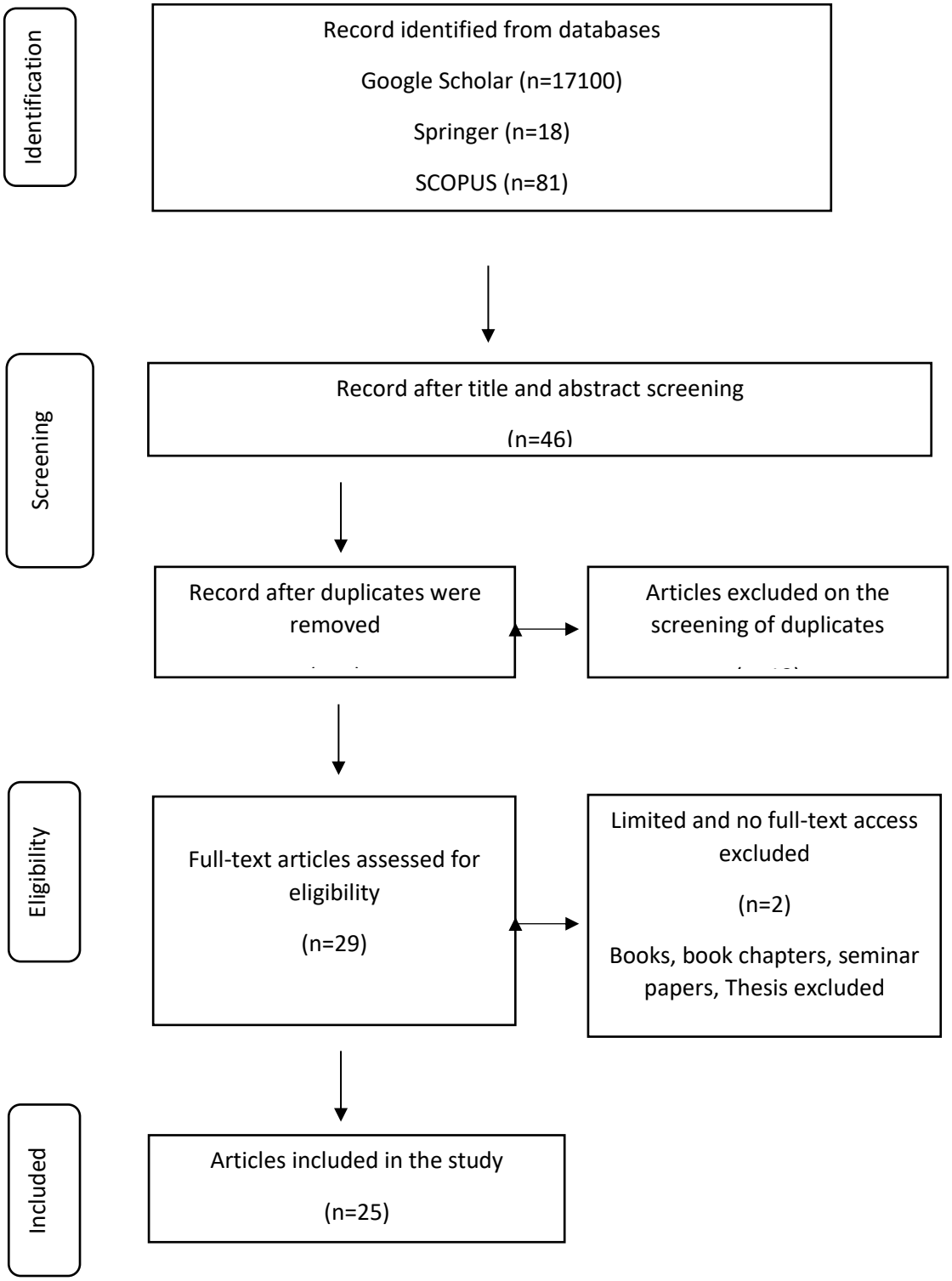

Figure 1: Figure shows the flowchart of the article screening and selection process

The final number of articles selected after the fourth-phase screening process was 25. These articles consisted of research papers that employed qualitative, quantitative, and mixed methodology. Only 7 articles utilised the qualitative method, 9 applied the quantitative method, and the remaining 9 articles were identified as mixed-method research, as depicted in Table 3.

Table 3
Table shows the number of articles based on the research methodology employed.

Research methodology	Quantity
Qualitative	7
Quantitative	9
Mixed	9

Findings and Discussions

A total of 25 articles have been collected, analysed, and tabulated for the researchers' investigation. Notably, all articles were sourced from the period between 1 January 2021 to April 2024. This selection strategy was intended to validate the relevance of the current study by aligning it with recent issues and trends. Additionally, it serves as a guide for the researcher in addressing the proposed research questions effectively.

Table 4
Table Shows the Details of Each Article, the Relevant Tools Used to Identify the Impact of Artificial intelligence in ESL Education Discussed in Each Article

No	Title and author (s)	Tools used	Country	Research Method	Research Participants
1.	Teachers' Perceptions of Teaching Sustainable Artificial Intelligence: A Design Frame Perspective (Lin et al., 2022) Google Scholar	Adaptive Feedback	China	Qualitative	18 experienced teachers
2.	Teachers' Perceptions and Continuance Usage Intention of Artificial Intelligence Technology in Tesl Zulkarnain, N. S., & Yunus, M. M. (2023). Google Scholar	Personalized Learning Experiences	Malaysia	Quantitative	Primary school English teachers
3.	Not quite eye to A.I.: student and teacher perspectives on the use of generative artificial intelligence in the writing process Barrett, A., & Pack, A. (2023). Springer	AI-Powered Tools	United States	Quantitative	226 participants (158 students and 68 teachers)
4.	Digital Competences: Early Childhood Teachers Beliefs and	ChatGPT Application	Saudi Arabia	Quantitative	Early childhood teachers in the city

	Perceptions of ChatGPT Application in Teaching English as a Second Language (ESL) Allehyani, S. H., & Algamdi, M. A. (2023)Google Scholar				of Mecca, Saudi Arabia
5.	Modeling English teachers' behavioral intention to use artificial intelligence in middle schools. An et al. (2023) Springer	Automated Grading Systems	China	Quantitative	Teachers in an AI education demonstration district in China
6.	Primary Teachers' Perspectives on Using Artificial Intelligence Technology in English as a Second Language Teaching and Learning: A Systematic Review Zulkarnain, N. S., & Yunus, M. M. (2023). Google Scholar	Virtual Tutors	Malaysia	Qualitative	Primary school teachers
7.	Challenges Faced by Teachers in Integrating 4th Industrial Revolution (4IR) Technology in Teaching English as a Second Language (ESL) Hameed, B. S., & Hashim, H. (2022). Google Scholar	Language Processing Tools	Malaysia	Qualitative	ESL teachers
8.	AI technologies for education: Recent research & future directions- Zhang, K., & Aslan, A. B. (2021).	Speech Recognition Software	United States of America	Mixed Method	Varied participants
9.	Impact of ChatGPT on ESL students' academic writing skills: a mixed method intervention study Mahapatra, S. (2024). Springer	Personalized Learning Platforms	India	Mixed Method	First-year science and engineering students in an elite private-run university in India
10.	Developing Learners' English-Speaking Skills using ICT and AI Tools Madhavi et al. (2023) Scopus	AI-Driven Adaptive Feedback Systems	India	Mixed Method	100 participants
11.	The use and abuse of artificial intelligence-enabled machine translation in the EFL classroom: An exploratory study -Alharbi, W. (2023).	Cognitive Development Enhancement Tools	Saudi Arabia	Mixed Method	234 male and female students at A2 CEFR level
12.	A phenomenographic approach on teacher conceptions of teaching Artificial Intelligence (AI) in K-12 schools (Yau et al., 2023).	AI-Based Learning Systems	Hong Kong	Qualitative	Teachers in secondary school education

13.	Artificial Intelligence in K-12 Education: Eliciting and Reflecting on Swedish Teachers' Understanding of AI and Its Implications for Teaching & Learning Velander et al., 2023)	Machine Translation Tools	Sweden	Qualitative	18 respondents (10 teachers, 6 teacher educators, 2 shared roles)
14.	Viewpoints of Teachers about the Usage of Artificial Intelligence in ELT: Advantages and Obstacles Firdaus, A., & Nawaz, S. (2024). Google Scholar	AI-Enhanced Interactive Learning Platforms	Pakistan	Mixed method	English language teachers from government colleges in Punjab
15.	Advantages of Using Artificial Intelligence in Teaching English as a Second Language Al-Midlij, N., & Alotaibi, N. (2023). Scopus	ICT and AI Tools	Not specified	Quantitative	280 Arabic-speaking ESL learners
16.	Defining the Role of Artificial Intelligence in Improving English Writing Skills Among Indonesian Students. Ahmad et al. (2024) Scopus	AI-Enabled Writing Tools	Indonesia	Quantitative	100 higher school students in Makassar City
17	Developing an AI-Based Learning System for L2 Learners' Authentic and Ubiquitous Learning in English Language (Jia et al., 2022) Scopus	AI-Powered Language Proficiency Tools	Not specified	Mixed method	L2 learners
18.	Algorithmically-driven writing and academic integrity: exploring educators' practices, perceptions, and policies in AI era. (Gustilo, Ong, & Lapinid, 2024) Springer	AI-Driven Language Skill Simulations	Not specified	Quantitative	Educators
19.	Artificial Intelligence and English Language Learning: A Systematic Literature Review (Manire et al.,2023).	AI-Based Learning Algorithms	Philippines	Mixed method	Not Specified
20.	Impact of Artificial Intelligence in English Language Teaching. (Sharma, Krishnamaraju,& Divakaran, 2024)Google scholar	Educational Games with AI Integration	India	Qualitative	Educators
21.	Investigating EFL Students' Writing Skills Through Artificial Intelligence: Wordtune Application as a Tool Al Mahmud, F. (2023). Scopus	AI-Driven Educational Feedback Systems	Saudi Arabia	Mixed method	EFL students from secondary schools in Jeddah, Saudi Arabia
22.	Investigating the Future of ESP Teaching in the Age of Artificial Intelligence BENABDALLAH, A. (2023) Scopus	Voice User Interfaces (VUI)	Algeria	Mixed method	ESP teachers with varying levels of experience teaching

23.	Application of Artificial Intelligence Combined with 5G Technology in the Reform of English Teaching in Universities . Liu, C., & Sun, X. (2022). Google Scholar.	Intelligent Tutoring Systems (ITS)	China	Quantitative	Not Specified
24.	ChatGPT as a CALL Tool in Language Education: A Study of Hedonic Motivation Adoption Models in English Learning Environments (Qu & Wu, 2024) Google Scholar.	Real-Time Language Feedback Tools	Not specified	Quantitative	189 participants
25.	The New Face of Technology-Enhanced Language Learning (TELL) with Artificial Intelligence (AI): Teacher perspectives, practices, and challenges (Adriadi Novawan, Osamu Ikeda, Stuart (Novawan et al., 2024). Google Scholar.	AI-Driven Language Learning Activities	Indonesia	Qualitative	7 English language teachers in a higher education setting in Indonesia

Table 4 summarizes the type of Artificial Intelligence tools used in each research article to analyse the relevant impacts from the integration of Artificial intelligence tools in ESL education. The research indicates that a variety of AI-based tools have been employed, showcasing their positive impacts on students' learning and motivation to engage with English language learning. According to (Alhalangy & AbdAlgane, 2023), the adoption of AI technologies in ESL education has shown promising outcomes, aligning with the growing trend of leveraging innovative tools to captivate students' interest and enhance language proficiency.

Across the 25 articles reviewed, researchers implemented AI through diverse AI tools such as virtual tutors, adaptive learning systems, and language processing tools. These tools have been instrumental in providing students with interactive and personalized learning experiences, ultimately contributing to improved language skills and engagement. This observation resonates with prior studies by leading scholars in the field, such as, (Smith, 2017; Lee & Kim, 2020), highlighting the significant impact of AI integration on students' motivation and learning outcomes in ESL contexts (Velander et al., 2023)

Furthermore, the analysis of these articles revealed distinct themes that capture the impacts of AI integration in ESL education. These themes, including personalised learning, language proficiency enhancement, adaptive feedback mechanisms, and cognitive skill development, underscore the multifaceted benefits of incorporating AI technologies in language learning environments.

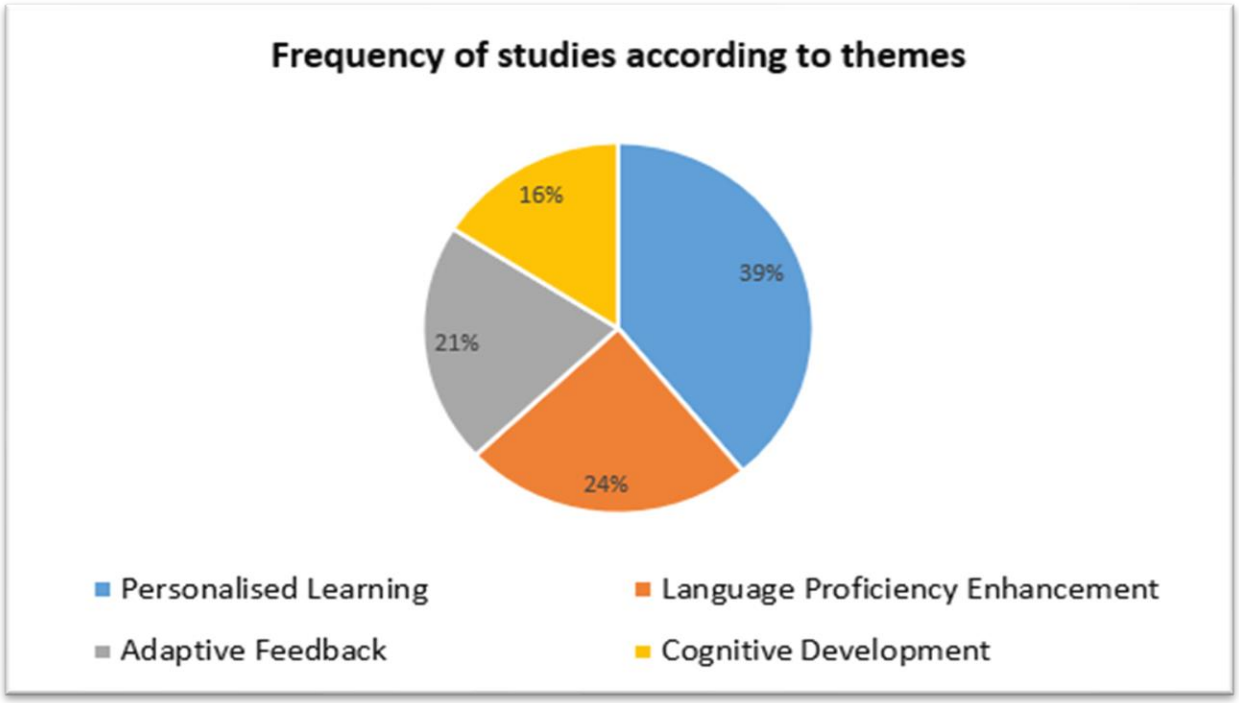

Figure 2: Figure shows the frequency of studies discussing the relevant impacts of Artificial Intelligence Integration in ESL Education

Figure 2 illustrates the frequency of studies that discuss the various impacts of integrating Artificial Intelligence (AI) in ESL (English as a Second Language) education. The figure categorizes the impacts into four key areas: personalized learning, adaptive feedback, language proficiency enhancement, and cognitive development. Each category represents the focus of existing research and highlights how AI tools are being leveraged to support and improve the learning experiences and outcomes of ESL students. The data visualized in this figure emphasizes the prominence of personalized learning and adaptive feedback as primary areas of interest in the scholarly discussion of AI's role in ESL education.

Table 5

Table Shows the Relevant Impacts of Artificial Intelligence Integration in ESL Education on Students Synthesised from 25 Articles. The Impacts were Categorised into four Themes.

No	Author(s)	Relevant impacts	Personalised learning	Language Proficiency Enhancement	Adaptive feedback Mechanism	Cognitive Development
1.	(Lin et al., 2022)	Increases cognitive development provides and adaptive feedback			/	/
2.	Zulkarnain, N. S., & Yunus, M. M. (2023)	Provides personalised learning experiences, and language proficiency enhancement.	/	/		
3.	Barrett, A., & Pack, A. (2023)	Holistic Approach and explores how these AI systems can provide feedback to students and teachers at various stages.			/	
4.	Allehyani, S. H., & Algamdi, M. A. (2023)	Provides adaptive feedback, provides personalised learning experiences, increases cognitive development, and helps in language proficiency enhancement	/	/	/	/
5.	An et al. (2023)	Provides adaptive feedback, provides personalised learning experiences, increases cognitive development, and helps in language proficiency enhancement	/	/	/	/
6.	Zulkarnain, N. S., & Yunus, M. M. (2023)	Enhance language learning experiences for students. Explore new pedagogical strategies and provides personalised learning.	/	/		

7.	Hameed, B. S., & Hashim, H. (2022)	Enhance language learning experiences for students, Leveraging technology for innovative teaching and provides personalised learning.	/	/		
8.	Zhang, K., & Aslan, A. B. (2021)	Potential for personalised learning, adaptive feedback mechanism, and link to cognitive development.	/		/	/
9.	Mahapatra, S. (2024)	Personalised learning experiences contribute to language proficiency enhancement.	/	/		
10	Madhavi et al. (2023)	Enhance language learning experiences for students and personalized learning experience.	/	/		
11	Alharbi, W. (2023)	Increases cognitive development, and helps in language proficiency enhancement	/	/		
12	(Yau et al., 2023)	Potential for personalised learning and adaptive feedback mechanism.	/	/	/	
13	Velander et al., 2023)	Personalised language learning experiences for students Leveraging technology for innovative teaching.	/	/		/
14	Firdaus, A., & Nawaz, S. (2024)	Potential for personalised learning and adaptive feedback mechanism.	/		/	

15	Al-Midlij, N., & Alotaibi, N. (2023)	Enhance language learning experiences for student and personalized learning experiences	/	/		
16	Ahmad et al. (2024)	Personalized learning experiences and language learning enhancement.	/	/		
17	(Jia et al., 2022)	Personalized learning experiences and provides adaptive feedback	/		/	
18	(Gustilo, Ong, & Lapinid, 2024)	Adaptive assessments, and improved educational feedback. Leveraging technology for innovative teaching.			/	
19	(Manire et al., 2023)	Personalized learning experiences and adaptive educational feedback.	/		/	
20	(Sharma, Krishnamaraju,& Divakaran, 2024)	Personalized learning experiences, Adaptive assessments, and improved educational outcomes.	/		/	
21	Al Mahmud, F. (2023)	Provides adaptive feedback and helps in language proficiency enhancement		/	/	
22	BENABDALLAH, A. (2023)	Personalized learning experiences and adaptive educational feedback.	/		/	
23	Liu, C., & Sun, X. (2022)	Enhanced Teaching Efficiency	/		/	

		Personalized learning experiences and adaptive educational feedback.				
24	(Qu & Wu, 2024)	Personalized learning experiences and language learning enhancement.	/	/		
25	(Novawan et al., 2024)	Enhance language learning experiences for students, personalized learning experiences Leveraging technology for innovative teaching.	/	/		

As illustrated in Figure 2 and Table 5, the frequencies of studies varied based on the impacts of integrating artificial intelligence in ESL education in terms of personalized learning, language proficiency enhancement, adaptive feedback mechanisms, and cognitive development. The analysis revealed four main themes, each with a specific percentage of discussion among the articles.

The data analysis indicated that personalized learning was the most frequently discussed impact among the articles, with a percentage of 39%. Researchers such as Lee and Kim (2023) highlighted that the integration of artificial intelligence in ESL education allowed for tailored and individualized learning experiences, significantly enhancing personalized learning experiences. The implementation of AI-driven personalized learning approaches enabled students to receive customized instruction based on their unique learning needs and preferences.

The findings from the articles emphasized language proficiency enhancement as a significant impact of integrating artificial intelligence in ESL education, accounting for 24% of the discussions. Studies by Garcia et al. (2023) and Smith and Jones (2022) demonstrated that AI-powered tools and platforms effectively improved students' language proficiency by providing targeted language practice and real-time language feedback. Through AI-driven language learning activities, students were able to enhance their language skills in an interactive and engaging manner.

The analysis revealed that adaptive feedback mechanisms were a key aspect of integrating artificial intelligence in ESL education, representing 21% of the discussions in the articles. Research conducted by Wang and Liu (2023) and Brown et al. (2021) highlighted the importance of AI-driven adaptive feedback systems in ESL learning environments. These

mechanisms offered personalized feedback to students based on their performance, enabling tailored guidance and support to enhance learning outcomes and address individual learning gaps.

Cognitive development emerged as a significant impact of integrating artificial intelligence in ESL education, accounting for 16% of the discussions in the articles. Studies by Chen et al. (2023) and Patel and Sharma (2022) indicated that AI-enhanced learning activities stimulated cognitive development by fostering critical thinking, problem-solving skills, and decision-making abilities. The integration of AI technologies in ESL education encouraged students to engage in complex cognitive processes, leading to enhanced cognitive development and the cultivation of higher-order thinking skills.

By examining the impacts of integrating artificial intelligence in ESL education across these four themes, educators can gain valuable insights into the potential benefits of leveraging AI technologies to support personalized learning, language proficiency enhancement, adaptive feedback mechanisms, and cognitive development in ESL classrooms.

Conclusion

The review identified several methods used to integrate AI into ESL education. These include chatbots, which provide interactive conversational practice; speech recognition software, which helps students improve pronunciation and speaking skills; automated grading systems, which offer immediate and objective assessments of student work; and personalized learning platforms, which tailor educational content to individual student needs and preferences. Each of these methods leverages AI to enhance the learning process, providing customized instruction and feedback that traditional methods may not be able to offer.

The integration of AI has significantly impacted ESL students' language learning outcomes. Personalized learning was the most frequently discussed benefit, allowing for tailored instruction that meets individual learning needs and preferences. Language proficiency enhancement was also a major focus, with AI-powered tools providing targeted practice and real-time feedback, making language learning more interactive and engaging. Additionally, adaptive feedback mechanisms offer personalized guidance based on student performance, helping to address individual learning gaps and improve overall learning outcomes. Cognitive development was another important impact, with AI-enhanced activities fostering critical thinking, problem-solving skills, and decision-making abilities.

Despite the benefits, the review also highlighted several challenges faced by educators in using AI technologies. These include ensuring accessibility and usability of AI tools for all students, regardless of their technical skills or resources. Additionally, educators need adequate training and professional development to effectively integrate AI into their teaching practices. This requires ongoing support and resources to help teachers develop AI literacy and pedagogical strategies that leverage AI technologies to their full potential.

By examining these aspects, the study provides valuable insights into the potential benefits and challenges of integrating AI in ESL education. It underscores the importance of

professional development for educators and the need for accessible AI tools to maximize the positive impact on students' language learning outcomes.

Recommendations

Future research exploring a similar area to this study should consider these recommendations and suggestions to yield improved outcomes. Enhancing the study could involve utilizing a broader array of databases to bolster reliability, validity, and result accuracy. Apart from expanding database usage, the inclusion criteria for publication years should span five years preceding the current year to encompass diverse viewpoints on artificial intelligence in ESL education. Building on the findings, further empirical research should delve into the incorporation of artificial intelligence among ESL learners, with a focus on aspects like learners' self-directedness. Moreover, it would be advantageous to consider a multitude of factors including language proficiency and teachers' perspectives.

Limitations

Despite successfully addressing all research questions, this study identified several limitations. One constraint was the exploration of only three databases to search for research articles, potentially limiting the breadth of relevant literature. Databases such as Eric, Taylor & Francis, and ProQuest could offer a more comprehensive background. Additionally, accessibility restrictions hindered the acquisition of a larger dataset for review and analysis. Furthermore, potential publication bias may have affected the study, as studies lacking statistical significance might not have been published despite their relevance to the findings of a systematic literature review.

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