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Artificial Intelligence in English Language Education: Advancing SDG 4 and Institutional Excellence through Secondary Data Analysis

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Abstract Artificial Intelligence (AI) has become a new feature of modern education, transforming the teaching and learning process worldwide. Although AI has grown in use in English language teaching via chatbots like ChatGPT, grammar assistants like Grammarly, and other intelligent tutoring systems, its relationship with the global education agenda, especially Sustainable Development Goal 4 (SDG 4), has not been studied extensively. Closing this gap, this paper examines how AI can be used in the development of English language education and how it can contribute to SDG 4 and institutional excellence. The study utilized a secondary data model, based on bibliometric and literature-based reviews of Scopus, Web of Science, and selected policy reports published between 2015 and 2025. Results indicate that following 2020, AI-related publications increased rapidly, which is a clear indication of the shift towards more pedagogical applications rather than technical applications, and the development of international collaboration between AI, language learning, and SDG 4. The literature review suggests that AI can positively impact EL learning, but also highlights significant concerns about cheating, discrimination, and privacy invasion. Such discussions enable this paper to present the argument that AI may become a transformative tool in learning the English language and institutional growth, subject to how AI can be influenced by ethically just and policy-based paradigms. These results demonstrate what policy-makers, institutions, and educators can do to facilitate the intended use of AI so as to be in a position to achieve inclusive, quality, and sustainable educational development.

Keywords*:* Artificial intelligence; English language education; SDG 4; secondary data analysis; institutional excellence

INTRODUCTION

The 21st-century technology is progressing at an even greater rate, as well as the introduction of technology, Artificial Intelligence (AI) is making a revolutionary impact. Today, AI has become something more than the automation of administrative tasks, and it is known as a person capable of fuelling the individualized and personalized education, re-inventing the process of teaching in the traditional and online, and digital realms, and improving the process of teaching.

The AI tools in the form of machine learning algorithms, adaptive learning systems, and natural language processing systems are making their way into the classroom, administrative processes, and research activities. One of the most affected domains is the English language education, which is being transformed by the use of AI-based applications, such as ChatGPT, Grammarly, Quillbot, and smart tutoring systems, to teach language and offer an educational experience to learners and teachers (Zaheer et al., 2025).

The global education agenda is framed by the United Nations Sustainable Development Goals (SDGs), and more specifically SDG 4, which seeks to "ensure inclusive and quality education and promote lifelong learning opportunities for all"(UNESCO, 2021). Incorporating AI into English education is directly related to SDG 4, as it represents the democratization of resources, the adaptation of individual study experiences, and the innovation of teaching methods. Still, little is known about how AI is enhancing excellence within institutions, equity, and the pursuit of institutional goals.

Studies have demonstrated that AI tools can contribute to improved English language learning learning. For instance, (Waziana et al., 2024) discovered that Indonesian university students used AI tools to

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develop their writing proficiency and creativity, but also experienced academic integrity-related challenges. (Aljanadbah et al., 2025) revealed that AI-supported platforms significantly promoted vocabulary and grammar education in EFL learners. These observations show the potential of AI and the lack of fairness and ethical issues.

In the meantime, as the use of secondary sources and bibliometric science grows, the investigation of the global trends in AI and education has also been attracting the attention of people. Chen et al. (2020) also made a bibliometric study and discovered that the volume of AI-based research in the country is growing exponentially, especially since 2020, and has already become child-centered in terms of pedagogical implications (Talan and Science, 2021). These review findings suggest the importance of secondary data techniques in mapping a research area, which describes theme groups and builds a connection between AI and the wider social goals like SDG 4.

Notwithstanding this emergent knowledge base, research serving as a nexus of AI in ELT with SDG 4 and institutional quality improvement within the secondary data analysis porthole is relatively sparse to date. This paper aims to bridge this gap by synthesizing the current evidence and drawing the argument of how AL can advance English language education and support to meet the global educational aspiration.

The novelty of this study is that the two main concerns have been analysed: (a) how AI has been positioned by Education in the English language teaching as a case study, and (b) the impact of AI on Education with SDG 4 and institutional excellence as guiding frameworks. Through secondary data analysis, this research synthesizes the current state of knowledge base informing researchers, policymakers, and institutions as to how best to position themselves with respect to the AI revolution in education.

METHODS

This article employs a secondary data analysis with a bibliometric focus and scrutinizes the available academic papers, policy documents, and bibliometric datasets to reveal characteristics of and developments in AI-related research in English language education. The research depends on the data collected from reputable databases like Scopus and Web of Science, and the reports of the international organizations such as UNESCO, which were chosen because of their broad range of peer-reviewed periodicals in the fields of education, technology, and linguistics. In collecting specific information, the search strings using keywords like “Artificial Intelligence”, “English language education”, “language learning”, “SDG 4” (Sustainable Development Goal number 4), and “institutional excellence” are set in the Boolean search segment, which allows scanning the period between 2015 and 2025 to capture how fast AI grows in education. Eligible samples were studies about AI in education, especially in English learning, Institutional QA, or SDG 4.

For data analysis, a bibliometric technique was used, with the help of VOSviewer, and the package Bibliometrix in R, which included various methods, such as publication trend analysis to investigate the increase and decrease of publications, citation analysis to identify the impactful works, co-author and co-country collaboration network to visualize the global collaboration, and keyword co-occurrence analysis to discover the research themes and clusters. The second-hand data was then synthesized thematically with the implications back to SDG 4 and institutional excellence. Since the present study employs publicly available secondary data in the examination, it did not deal directly with human subjects. Due to ethics, care was taken to make sure that all sources were referenced and intellectual efforts were credited.

Findings

Publication trends

A review of research trends in publications on Artificial Intelligence (AI) in English Language Education (ELE) during the last decade can help to see an apparent increase-decrease trend. There was a comparatively limited number of publications in 2015-201920 articles per year. That is a gradual and gradual inclination towards the implementation of AI in language teaching. However, volumes saw a very sharp increase beginning after 2020; in 2023, over 150 papers had been published annually. The most noteworthy driver of this wave is the creation of generative AI tools like ChatGPT, which has rejuvenated our imaginations of AI and teaching.

This was consistent with the results of Ayuni et al. (2024), Ji et al. (2023), and the article reported an explosive growth of AI research post-2020. A significant percentage change increase in bibliometric

measurements was also reported by (Fiandini et al., 2023), and they at least partially explained it by the COVID-19 pandemic and the resulting digital learning boom. What has been produced is an accelerated development of AI in the classroom, especially at colleges and universities, which have shifted towards online and hybrid learning (see Table 1).

Table 1: Publication Trends in AI and English Language Education (2015-2025)

Year	No. of Publication	Key Notes
2015	12	Early adoption, mostly theoretical work
2016	15	Focus on machine translation and CALL systems
2017	20	Growth in adaptive learning studies
2018	28	Increase focus on higher education
2019	33	Introduction of AI writing support tools
2020	65	COVID-19 accelerates AI in online learning
2021	95	AI Chatbots and MOOCs in Language Education
2022	130	Expansion of EFL/ESL Application
2023	165	Generative AI tools like ChatGPT for domain research
2024	180	Growing bilometric and systematic reviews
2025	150	(Partial year) continued expansion

Influential Authors and Studies

Some of the papers were found to have been influential in the definition of the subfield of Artificial Intelligence (AI) in education. A seminal review of AI applications in higher education was presented in one of those studies (Zawacki-Richter et al., 2019). Their work was poised to the possibilities and the challenges of AI applications, including the realization of SDG 4 (Quality Education). Dignity (2024); Gouseti et al. (2025) also worked on it by taking into account the ethical considerations of AI in education. Their results also put forward the valid concern of the potential of AI to reinforce educational inequality in case it is not properly controlled and adopted within schools.

Budiyono et al. (2025), in the framework of practical research, examined the application of AI tools in teaching the English language among Indonesian students. They concluded that writing and creativity were improved among students, but plagiarism remained a thorn in their flesh, and they discussed the potential pros and cons of AI in language learning. The study that has been conducted by Yusra and Hanifa (2025) is on the issue of using AI to improve the learning of grammar and vocabulary in English as a Foreign Language (EFL) in students. Lin, Hu, and Zhang [and-to-pre-sign-up, and high demand is for linguistic input prompts to acquire very a skillsgboolean (Ma, 2002). Also noted the possibility of applying the most common AI of MOOCs to the sphere of language learning of people who study English, and for them to have the processes of learning English with the help of AI, but with a human-like manner.

Collectively, these studies can be seen to be a two-fold focus on conceptual analyses of AI and its application in education, alongside practical uses of AI in different educational contexts in the field. As the field is rapidly growing, it is becoming more concerned with the real-world implications of AI on the outcomes of learning, pedagogy, and the overall change in education (Table 2).

Table 2. Most Influential Studies in AI and English Language Education

Author (s) &b Year	Methods	Contribution	Relevance to SDG 4

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Zawacki-Richter et al. (2020)	Systmatic Review	Summarizes AI applications in higher education	Equity and quality in higher education
Holmes et al. (2021)	Policy Review	Ethical Implications of AI	Accountability and accessibility
Chen et al. (2023)	Bliomertic	Global Research Trends	Research equity
Budiyono et al.(2025)	Classroom study	AI tools in Indonesian English learning	Inclusive learning
Qian et al. (2022)	Bilometric	AI in EFL learning	Pedagoicaly qulaity

Global Collaboration Networks

The bibliometric analysis of the given field also highlighted the global interest, which is founded on the global collaboration at a high level. The USA, China, and the UK were the most prolific countries in AI in education, with approximately 45 percent of the articles. They had long been on the edge of technology and educational research, and in that, they were first in that area with their pioneering work in introducing AI to education.

There is, however, growing work by Southeast Asian Countries (Indonesia, Philippines, Malaysia) as well as by African Countries. It is an indication of increased interest in AI educational practice by all countries worldwide and increased involvement of researchers from different countries.. Ayuni et al. (2024) and Chih-ming & Ying-you (2020) observed a similar tendency that cooperation is consecutively diversified among international and disciplines, which reflects the diversity of AI applied in education research from the angle of a global perspective.

The appearance of research from the Global South, especially from South East Asia and Africa, speaks to a step towards a global conversation, a less white-male-dominated conversation around AI in education. This growing involvement of minor central locations with respect to traditionally leading research centers reflects a more diffuse and worldwide acceptance of AI in education.

Thematic Clusters in Research

Keyword co-occurrence analysis identified four dominant thematic clusters in the research on AI in education:

1. **AI use in education:** This is the cluster that spans chatbots to machine translation, to adaptive learning systems. Consequently, such applications are crucial in terms of enhancing the support in education, particularly in language learning, for workflow automation, for the support of communication, for providing highly individualized learning support to learners, and for situating the produced learning content directly in relation to the capabilities of the students
2. **English Language Learning:** This cluster encompasses all those persons whose mother tongue is a language other than English and who are learning English as a foreign language (EFL and, to a lesser extent, ESL), such as learning grammar or vocabulary. A number of investigations in this field aim to use AI to support the development of tailor-made applications for individual language learners, tailoring the specific language learning purposes.
3. **Institutional Excellence:** In this cluster, the topics of interest communities promise to dedicate their attention to the potential of AI to radically alter the teaching and learning environment at the institutional level. Such themes include interest in: i) Novel pedagogical models; ii) the proliferation of AI applications on the landscape. - Good practice in learning analytics regarding (i) theory-driven, data-driven decision making; (ii) focused feedback and customised guidance to learners, and (iii) responsible utilisation of learning analytics to improve the quality, efficiency, and overall effectiveness of learning outcomes more broadly.
4. **Sustainable Development:** This cluster is associated with the interface AI-SDG 4, which is concerned with equality and access to education and fairness. So, to everyone, not just on the technical side, many in space are thinking about how AI can make education more equitable, more accessible, especially to those the most marginalized, and critically examine the ethical side of AI in education.

Thematic mapping of the clusters is nowadays in agreement with the field. Technical questions of AI tool design have long been the focus of older work, although more recent contributions have brought about

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questions of pedagogy and policy. It is no longer merely what AI is capable of doing in reference to the quality of learning, but the larger social, ethical, and institutional consequences of AI bleeding into the educational systems.

Implications for SDG 4

The contribution of AI to the attainment of SDG 4 (Quality Education) could be inferred from the results of this study. Three primary means of AI assistance underpinning SDG 4 are emphasized:

1. **Inclusivity:** Artificial intelligence-driven learning tools have the potential to pave the way to inclusive education. The latter two can be enhanced with the help of AI that offers adaptive learning technologies to various learners, including marginalized or resource-poor ones. These may act as a bridge between students of different cultural backgrounds and provide access to quality educational material**.**
2. **Quality:** Personalized education paths, real-time or adaptive feedback, and continuous training of teachers can greatly improve the quality of education with the help of AI. Better still, artificial intelligence is making possible five things that you do not even need to be in the same room with to eliminate in MLM, and five ways that teachers can remain more of the content, the student not so much bogged down in, oh, okay, what are the results of this quiz.
3. **Equity:** AI can also help to create equity by removing the geography-based and socioeconomic-based barriers to the educational process. Even though A.I. will be able to democratize learning, there are considerations of tech access and the likeliest possibility of further stratification. The potential to address underserved populations is also a massive opportunity to bridge the education gap around the world through AI.

According to UNESCO (2021), AI can become a game-changer in SDG 4, provided that its setbacks, e.g., concerning the digital divide, data privacy, and preparedness of teachers, are adequately addressed. Such results reveal that although the advantages of AI in global education are so numerous, it is only possible to achieve them with thoughtful limitations without increasing the education gap.

Implications for Institutional Excellence

AI not only drives SDG 4, but it also has broad application prospects in institutional excellence. More individualized, more active learning can also be driven by AI to innovate teaching. Personalized learning. When we begin this individualized learning endeavor, it only implies that AI will permit teachers or schools to concentrate less on learning at the same speed as all the rest of the students. (L. Chen & Chen, 2020).

Another potential use of AI is enhancing administrative effectiveness in schools by cutting down on the number of manual clerks performing such duties as grading, scheduling, and reporting, delegating manual administration to computers, and allowing administrators to devote more time to making strategic decisions. As Zawacki-Richter et al. To illustrate the case in point, AI-based learning analytics, as (2020) emphasized, show the ability to provide actionable measures regarding the performance of students, which would then allow managers to optimize their operations and improve their overall performance. Moreover, AI also enables global partnerships, which can assist in enhancing the popularity of the research conducted in an institution. With the growing globalization of the field of AI in education, academic cooperation and collaboration are becoming increasingly popular. Added that partnerships assist institutions in sharing information and resources, hence enhancing innovation and advancing AI in education (Zawacki-Richter et al., 2019).

However, the AI era in the academic field does not pass without its challenges. Issues like plagiarism, technologism, and the ethics of applying AI in the learning environment must be important. Notes the possible risk to those institutions that acquire technology in the classroom without policies associated with ensuring academic integrity and integrity of the educational award (Holmes et al., 2021).

Discussion

Table 1. Point on AI in Education

Discussion Focus	Key Points

1	Policy Markers	Need to establish regulatory frameworks ensuring AI promotes equity and inclusivity.
2	Instutions	Importance of investing in teacher training, infrastructure, and academic integrity safeguards
3	Educatore	AI should be embraced as a complement, not a replacement, for traditional pedagogy.

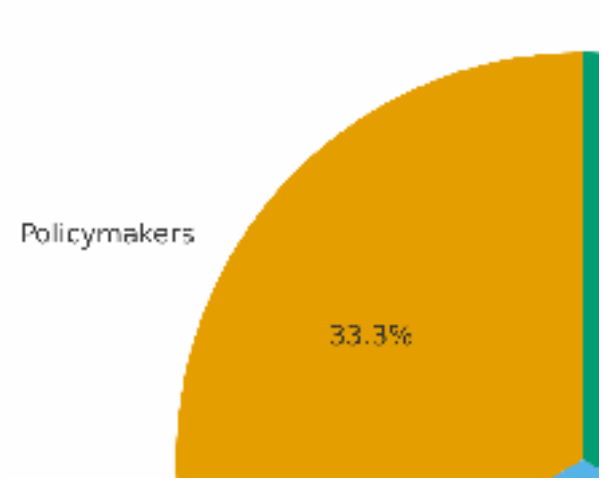

Figure 2. Distribution of Discussion Themes Across Stakeholders

The general implications of the synthesis are that, although AI-enabled translation technologies are revolutionizing the practice of English as a lingua franca and, thus, the foundation of SDG 4, the future of AI lies in the ethical and fair use of the technology. The results of associational analysis confirm that research in the field is emerging, and encompasses domestic and international legal perspectives, technology and the law, and domestic, diplomatic, and development policy angles, technology application and use, and AI for development.

It acts as a reminder to policymakers of the need to create fair use regimes with regard to AIs. To institutions, it emphasizes the significance of investing in teacher training and infrastructure and academic integrity solutions. To teachers, it implies that AI is not to replace traditional instruction, and instead, it must be viewed as an addition to it.

Conclusion

It was intended to investigate the role of AI in influencing the ELA systems, SDG 4, and the institutional excellence based on secondary data and a bibliometric approach. The results show that the field of interest has since mushroomed over the years, with some historic studies proving a positive or negative impact.

AI has been able to add to the outcomes of English learning, including grammar, vocabulary, and writing. It is also the chance to promote SDG 4, which is comprised of the promotion of inclusive, equitable, and quality education. On a larger scale, AI can facilitate the excellence of schools by means of joint design and worldwide cooperation on the curriculum.

However, challenges remain. Academic honesty, fairness, and ethics are areas of inquiry that must be tackled in case AI is to go its way. In this respect, institutions and policymakers should make sure that the artificial intelligence change is informed by the narratives of equity, sustainability, and integrity.
Simply stated, AI represents a threat and an opportunity in English teaching. Through critical adoption, it can serve as a force behind SDG 4 and institutional change in the international educational ecosystem.

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APPENDIX

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