
Artificial Intelligence and the Changing Patterns of English Language Use: An Applied Linguistic Perspective

Original Research Article | Volume 1 | Issue 5 | 2026 | Article Number: 065

Accepted: 30 September 2026 | Published: 10 October 2026 | ISSN: 2979-8582 (Online)



Crossref : <https://doi.org/10.67693/BJCR-3SA4W8X7>



Monica Nnenne Okafor (PhD)¹, Innocent Njoku Nweze (PhD)²

¹School of Languages, Ebonyi State College of Education, Ikwo, Ebonyi State, Nigeria,

²Department of English, Ebonyi State College of Education, Ikwo, Ebonyi State, Nigeria

Correspondence: Monica Nnenne Okafor (PhD), monicaokafor36@yahoo.com

Abstract

Artificial intelligence is redefining the structure, practice, and evolution of English use in the twenty-first century. Generative AI technologies have been rapidly adopted in various fields as the educational tool of choice, language constructor for professional correspondence and creative writing assistance. Although artificial intelligence has gained increasing attention in the academic community, there is a surprising lack of studies focused on practical implications that center around language use, communication and changing discourse practices, especially from applied linguistic perspectives. This article explores the impact of artificial intelligence on modern English usage, including how it has influenced writing and speaking as well as our vocabulary processes and modes of communication in a digital age. It examines, in particular, how AI opens new avenues for language acquisition and communication, the new linguistic and pedagogical issues that arise with such AI-mediated language production, and what it may mean for future English. A qualitative research design based on documentary analysis, discourse analysis and perspectives of recent academic literature was adopted to enrich the study. The analysis is rooted on the Adaptive Linguistic Ecology Framework (ALEF), which proposes an original theoretical model positing that human linguistic creativity, sociocultural context, and algorithmic intelligence constantly co-evolve to give rise to language. It outlines that although artificial intelligence contributes to higher communicative efficiency, improved accessibility and language learning it also promotes linguistic homogenization and less stylistic diversity. The article, therefore, argues that AI should enhance, not replace, linguistic creativity through human agency, and advocates for language education to embrace AI literacy alongside critical language awareness and the preservation of linguistic diversity in digitally mediated communication.

Keywords: Artificial Intelligence, Applied Linguistics, English Language Use, AI Literacy, Adaptive Linguistic Ecology Framework

Introduction

Artificial intelligence (AI) is one of the most disruptive technologies of the last decades and provides novel approaches for how people communicate, learn and create knowledge. As explained by Crystal (2023), while technological progress has always influenced the development of English, recent advances in AI have propelled this process considerably faster than ever before. AI technologies have considerably changed the use of English in real contexts particularly when it comes to applications used in applied linguistics such as machine translation systems, intelligent writing assistants, speech recognition software, and generative language models. Kasneci et al.(2023). These technologies have broadened access to communication and language learning while also giving rise to novel projects in human / intelligent system collaboration. Consequently, English is no longer only formed through face-to-face exchanges but also through forms of digital contexts that algorithmic systems shape: this includes how words are chosen, sentences built and ways of communicating (Zhai, 2024).

As we witness artificial intelligence become increasingly integrated into our daily communication, we are presented with incredible possibilities while also raising significant language and education-related issues. Nowadays, students, workers, researchers and creative writers have been relying on AI applications to help them generate ideas, edit grammar, translate content text and improve writing qualities. Although these innovations support efficiency and accessibility, Godwin-Jones (2023) states that over-dependence on AI produced language could hinder autonomous language accomplishment and mitigate openings for real expression. Holmes and Tuomi (2022) have expressed similar concerns, arguing that the modern educational system must find a middle ground between technology innovation and human creativity balanced against informed critical thinking. In addition, since AI systems learn from existing language corpora, they often reproduce the dominant linguistic patterns which might suppress stylistic diversity over time and makes some varieties of English less represented (Tlili et al., 2023).

The impact of AI is not limited to language learning: it penetrates literature, academic writing, journalism and digital communication spaces as interactions between human authors and intelligent systems persistently change communicative practices. Language is constantly being reconceptualised in terms of changing social and cultural negotiations, which are increasingly mediated by intelligent technologies (Canagarajah, 2022). Existing linguistic theories on language development from cognitive, functional, and sociocultural perspectives leave little room for an active role of algorithmic systems in the evolution of language. This article is inspired by recent discussions around artificial intelligence and society (Dwivedi et al., 2023) through a novel adaptive linguistic ecology framework (ALEF) that posits language is co-evolving in the dynamic interplay between human creativity, sociocultural contexts, and adaptive algorithmic systems. This also fits in with the argument put forward by Floridi (2023), that AI ascended from being passive in shaping human knowledge, communication and social practices to active participants.

This article is especially significant as it adds to the literature exploring the pedagogical impact of artificial intelligence on the English Language from an applied linguistic standpoint. Its objective is to explore how AI technologies are altering styles of English communication while appraising both the opportunities and linguistic challenges they pose. The study examines the role of AI in writing, speaking, vocabulary and digital communication; reflects on its impact on language learning and communicative competence; and offers ideas for the future of English in an AI-powered world. The exploratory research methodology is qualitative with a combination of documentary analysis and discourse analysis based on picking through contemporary academic literature critically. The entire composition of the article explores current and future trends of English use in an AI-rich environment, establishes a typology of opportunities and challenges provided by AI-mediated communication, articulates the Adaptive Linguistic Ecology

Framework as the theoretical grounding for this study alongside implications for language education, research, and policy.

Artificial Intelligence and Contemporary English Language Use

In broad terms, artificial intelligence (AI) is the area of computer science that focuses on creating systems that can undertake tasks typically requiring human-like capabilities such as learning, reasoning, natural language processing and decision-making. Modern AI expanded on those abilities, particularly with generative AI and large language models (LLMs) writing faster and more accurately than humans, generating coherent texts, conversational responses, language translations and writing assistance. According to Russell and Norvig (2021), AI systems emulate elements of human intelligence by analyzing large datasets, searching for patterns in language, and building a foundation for intelligent responses. These technologies have recently been integrated into classroom and work contexts even more so than in everyday communication, shaping how English is learned and used. As pointed out by Floridi (2023), AI is advancing beyond the mere instrumentalisation of computation; it has developed into an autonomous technological force that is determining how knowledge is produced and humans communicate today.

AI's effect on English writing is especially conspicuous because writing functions for drafting, revising, and editing English texts have been displaced from humans to intelligent assistants (such as Grammarly) and generative language models. Students, academics, journalists and professionals are frequently using AI applications to structure concepts, correct grammar errors, enrich vocabulary and improve text coherency. These technologies offer instantaneous linguistic support that allows users to generate written communication that is clearer and more effective (Godwin-Jones, 2023). Scholars are concerned, however, that using AI-writing frequently may limit opportunities for writing independently and thus impair critical writing skills (Kasneci et al., 2023). Therefore, the question is not whether AI should be used in language education but how it can supplement, rather than supplant human writing.

Speech recognition technology, digital agents and smart virtual assistants have similarly revolutionized spoken English communication through instant real-time interaction. This means practicing pronunciation and receiving instant corrective feedback, as well as speaking in simulated conversations, without the burden of geography. According to a recent study (Zhai 2024), AI-supported speaking platforms provide personalized learning experiences through adaptive feedback tailored to the proficiency level of individual learners. However, human communication takes place in an emotional, cultural and pragmatic context and spoken interaction with AI cannot replicate those nuances associated with natural conversation. As Canagarajah (2022) demonstrates, efficient communication depends not only on grammatical accuracy but also on social context, cultural interpretation, and interpersonal negotiation of meaning.

Increased use of AI-based technologies for both language learning and digital communication has also been facilitated by a new development in vocabulary (2023). Today intelligent learning platforms recommend words that are relevant based on context, elucidate the relationships between different meanings of a word and also show some practice examples selected from real corpus language data. In this way, these novel innovations fast-track vocabulary acquisition while also helping the learners choose expressions which are appropriate to particular context in a communicative situation. However, Holmes and Tuomi (2022) express concern that algorithmic recommendations of the sorts are often built around frequent lexical patterns, thus promoting stereotypical use of vocabulary rather than regional or personal originality. This tendency can be viewed as part of a major applied linguistic issue as language diversity represents precious cultural and communicative resources (Crystal, 2023).

Through translation and grammar support, AI is also making its mark in another area: the field of natural language processing has become more and more accurate. AI translation systems enable users to quickly

translate information from one language to another, therefore removing barriers to global communication, education, business and international cooperation. Although these technologies provide an extraordinary tool to help reduce the language barrier, their outputs sometimes address contextual meaning and even cultural nuance, idiomatic expression and pragmatic intent that humans must discern. Substantiating this perspective, Tlili et al. (2023) continued to perceive AI-assisted translation as either usefully collaborative or a flawed substitute for human language competence. Likewise, automatic grammar correction fosters grammaticality but over-reliance on such services may disincentivize learners to learn a more sensible understanding of the mechanics and use of language.

Digital communication, indeed, continues to experience some of the most detectable change in how we interact over emails, social media sites, mobile and messaging applications and tech collaboration platforms wherein AI mediate to offer assistance. Chatbots, automated replies, and tools that generate written content also influence how fast or the style or even format you use to speak English in digital space. According to Dwivedi et al. (2023), generative AI has transformed the world of digital communication by allowing users to generate complex texts with little effort, but it has also triggered fundamental concerns about authenticity, authorship and ethical responsibilities. Such advances demonstrate, from the applied linguistic perspective, that communicative competence has come to include not only a sense of proper language use but also competent and responsible usage of AI, critical response to machine-generated information, and a preservation of originality in communication. Thus the modern use of English is an ambivalent development in human communicative agency and intelligent technologies for which new representative frameworks are required such as the Adaptive Linguistic Ecology Framework (ALEF) to account for how language continues to evolve under increasing AI-mediated conditions.

The Adaptive Linguistic Ecology Framework (ALEF): A New Perspective

This paper proposes an Adaptive Linguistic Ecology Framework (ALEF) as a contemporary theory of the interaction between artificial intelligence and English language change. Language dynamic is based on the idea that language now changes as a result of intelligent computational systems engaged in its production, transmission and modification, which does not depend solely on human cognition and social interaction. While traditional linguistic theories mainly focus on the role of human agency, ALEF regards AI algorithms as having an impact in lexical choices, syntactic patterns, discourse organization and communicative norms across digital ecosystems. Thus, the framework sees language as an ever-shifting ecosystem and a continual interaction between human creativity and sociocultural circumstances in conjunction with adaptable algorithmic systems creating novel communication forms through this dynamic. This is relevant in an age where many of us encounter AI-generated texts regularly in academia, the workplace and daily conversation.

ALEF builds on well-established linguistic and communications theories while expanding their explanatory power to artificial intelligences. Halliday in (1978) believes that language is functional, responding to the communicative needs of its users and results in a view of language evolution that still underlies much understanding. But, contemporary communication now takes place largely in digital contexts where an intelligent non-human agent fields the process of language production, which indicates that the social environment is a participant (intelligent agents) rather than merely a framework for behaviour. Along the same line, Canagarajah (2022) argues that language is not something set but growing through constant interaction across various cultural and communicative spaces. ALEF adds to these frameworks by suggesting that AI can be viewed as yet another ecological force shaping the ways we use, share and adapt English, and how it evolves.

A recent scholarship that describes artificial intelligence as a general-purpose social and cognitive technology also finds its way into the framework. Floridi (2023) contends that AI is not an instrumental computational tool but a transformative force to change human knowledge, communication and social practices. On a similar note, Dwivedi et al. (2023), stresses that generative AI transforms the way information is produced, interpreted and consumed in educational and professional contexts. Such views underpin ALEF's main premise: language evolution in the digital age must be viewed as a product of human communicative intentions interacting with the way their expression is optimized by algorithmic systems. Instead of replacing human linguistic creativity, AI is in constant interaction with it and results in the emergence of new communication patterns that shape our styles, vocabulary choices, discourse conventions or even language learning.

ALEF is consequently relevant to this study because it offers a proposal for an overarching explanation of how the patterns of English use are being transformed in the age of artificial intelligence. On one hand, traditional linguistic theories like Chomsky's generative grammar essentially explain language as an inherent human competence skill and rather focus on the biological nature of it; on the other hand, sociolinguistic theories stress social interaction and sometimes cultural variation in their explanations of how language comes into play. Yet while these theories remain a useful resource, their explanatory potential for AI-mediated communication is limited; they were developed prior to the onset of intelligent algorithms as active agents in producing language. For this reason ALEF does not replace linguistic theories, rather it augments our understanding of language evolution through the lens of technological agency without dismissing human creativity and culture. As a result, the framework lays out the theoretical basis for exploring how AI serves to increase communicative competence, shape language behaviour and further drive English language change through practice.

Opportunities and Challenges of AI in Language Learning and Communication

Artificial intelligence has been developed to be one of the major innovations in modern society that affects learning and communicating language. Intelligent Language Technologies have become more prevalent and accessible than ever before, fundamentally changing the ways in which learners learn English, interact with instructional resources and materials, and develop communicative competence. Features like adaptive instruction, automated feedback, speech recognition and interactive conversational systems that offer immediate responses to language-related tasks are now built into AI-supported platforms around the world to support learners. As Kasneci et al.(2023) rightly averred, these technologies have created new opportunities, making learning accessible and personalized, flexible and customized to individual learner needs. As a result, language acquisition is transitioning from being teacher-focused to a learner-centred activity that technology has the power to support within and outside of the classroom.

AI has a unique educational benefit in that it can provide personalized learning. For example, rather than relying on traditional classroom instruction, AI systems conduct an analysis of learners' strengths and weaknesses as well as the specific pace at which they can learn effectively and recommend corresponding learning activities and instructional content. This personalised learning strategy allows students to tackle specific grammar issues and promotes steady improvement in their language skills. According to Holmes and Tuomi (2022), adaptive learning systems are said to improve educational outcomes as they allow immediate feedback, and also adjust instructional strategies based on the specific performance of learners. It also makes language accessible and removes barriers in between various linguistic communities by doing away with myths. Machine translation applications, multilingual conversational agents and speech-to-text technologies improve the use of multiple languages in an educational, professional or social context. Zhai (2024). For many learners with diverse language proficiency and educational background, these technologies also help to provide a more tailored learning environment. These developments have

opened new avenues for international cooperation, cross-linguistic communication, and access to educational content that would otherwise be locked behind a language barrier. All this leads to AI further enhancing the global importance of English as a lingua franca, as well as enabling multilingual communication.

Writing assistance is another significant contribution of AI to language learning and communication. Smart writing tools help users in spotting grammatical errors, vocabulary enhancement, and sentence structure improvements for better textual coherence. While traditional proofreading methods often improve accuracy, detailed feedback from these technologies offers instantaneous linguistic support that motivates learners to revisit and elaborate on their writing (Godwin-Jones 2023). Not only does AI rectify mechanical errors but also assists users in organizing ideas, creating outlines and enhancing clarity of expression. Such functions are especially useful for academic writing, professional communication and reporting, digital communication that requires clear presentations of facts. Notwithstanding these educational advantages, growing reliance on AI has attracted some critical concerns in the field of applied linguistics and language education. Increased dependence on smart writing programs might prevent students from developing independent writing skills as well as critical language skills. Dwivedi et al. (2023) warn that while generative AI improves efficiency, it can also undermine key cognitive functions related to problem-solving, creativity, and independent thought. These fears imply that AI is more of a learning tool than a replacement for the intellect.

Another significant challenge involves the gradual decline of originality in written and spoken communication. The tasks of AI language models are unique, they derive enumerable responses by finding statistical patterns from a vast range of training data, therefore many outputs will inevitably conform to human linguistic conventions. While such uniformity typically enhances syntax, it at the same time lessens stylistic variety and diminishes personal voice in expression. As Floridi (2023) argues, human originality must still be preserved as creativity embodies experience, emotion, and cultural identity—elements that intelligent systems cannot, or may never match. Even in a rapidly advancing world of AI, preserving genuine human expression remains a key goal in language teaching. A further issue that should be addressed in applied linguistics is the challenge of algorithmic bias. AI systems are trained on existing datasets which often overrepresent certain linguistic patterns, cultural assumptions and social preferences present in the data currently accessible. As a result, some dialects, regional expressions and minority language varieties may be underrepresented in AI-generated outputs. Bender et al. (2021) point out that many language technologies simply replicate the biases within their training data, and are therefore perpetuating existing inequalities rather than creating real linguistic diversity.

Another potentially far-reaching effect of the widespread use of AI is that it is leading to a gradual homogenisation of how we express language. With millions of users using similar such language models to do writing assistance, it easily leans toward common propensities for vocabulary selection, sentence order and stylistic preferences. As Crystal (2023) clarifies, language will always change through variation and creativity but too much uniformity could suffocate the very diversity that helps to sustain linguistic evolution over a long period of time. Maintaining various varieties of English and promoting individualized communicative styles for each person remain a priority when conserving the richness of global English from an applied linguistics perspective. This is precisely why language educators must exhort students to utilize AI as a supplement to their studies and not a substitute for the analysis that they must do independently. Simultaneously, curriculum developers must embed literacy in artificial intelligence into language education so that learners are cognizant of the strengths and weaknesses of intelligent technologies. Encouraging critical thinking, use of ethical AI, creativity awareness, and enhanced cultural competencies would motivate technological development to fortify our connection

rather than weaken the inter-human efficacy in communication. Striking this balance allows the educational community to reap the rewards promised by artificial intelligence while also maintaining authenticity, plurality of language and genuine communicative ability as English usage continues to evolve.

The Future of English Language Use in an AI-Driven Society

The use of the English language will continue to evolve as new technologies interact with human communicative practices. With the ever growing integration of AI into education, business, research and everyday communication — English will surely continue to evolve through human creativity and influence by technology. English has always evolved and adapted to significant social and technological changes, suggesting that AI is the language's major evolutionary catalyst. (Crystal, 2023). Pennycook (2021) further makes the same argument that language changes over time in relation to variable social practices, cultural interactions and technological environments rather than by simply fixed linguistic systems. Thus, we shall see that the future of English will depend on how people and societies negotiate humanity's place with intelligent language technologies while preserving the flexibility and plurality that are the hallmarks of living languages.

AI matters, too, for ideation in literature and translation between languages. Generative AI provides more support to authors to write poems, novels, essays, and digital narratives - thus opening new potential for human-machine collaborative creativity. As Hyland (2019) points out, good writing represents disciplinary knowledge, rhetorical context and the purpose of the writer as a communicator—none of which work merely for grammatical refinement and expression. Similarly, Jenkins (2020) posits that the English language acts as a global lingua franca in so far as it allows for heterogeneous linguistic and cultural identities without enforcing homogenous norms. This view implies that while AI yield can create greater efficiency in literary production and translated communications, humanity must remain dedicated to originality, cultural integrity, and creative expression as core tenets for the sustainable course of English in a digitally interlinked world.

The evolution of AI will also change the way we communicate digitally and professionally across society as it already has. Kohnke et al. (2023) argue that generative AI challenges language education by transforming the way learners engage with texts, build knowledge, and communicate in academic contexts. Apart from education, such intelligent communication systems are increasingly being employed in journalism use cases; customer service support sectors; healthcare and assistive health communication; diplomatic communication processes, where speed and accuracy matters a lot and corporate communicators often desire both. Selwyn (2019) warns against rapid technological innovation without critical assessment because digital tools always provide a certain degree of agency to human behaviour, communication and education methods. Hence, as urged by UNESCO (2023), educational institutions should be urged to establish ethical principles that guarantee transparency through responsible use of AI technology and safeguard the intellectual growth of learners in these AI-enhanced environments.

Effective responses to these developments will involve collaboration between educators, linguists, technologists, and policymakers. Language teaching professionals need to incorporate AI literacy in their English language classes to help learners gain not only communicative competence but also critical and ethical judgement of AI-generated texts. While linguists explore the unforeseeable ramifications of intelligent algorithms on language variation, discourse practices, multilingualism and new forms of communication, policymakers create regulatory environments that foster innovation while taking care not to destroy linguistic diversity or cultural heritage. Based on the goals of this study, Luckin (2018) claimed that the educational benefits of artificial intelligence depend more on human guidance than technological

pro prowess. In conclusion, the intelligent use of AI helps aid humanities development—ultimately moving us toward a future partnership where artificial intelligence takes a strong role in learning, communication and creativity, while human evolution sits in the center with judgement, cultural identification and linguistic originality.

Conclusion and Recommendations

The present study explored from an applied linguistic perspective the evolving patterns of English language usage in an increasingly AI mediated world. It has proved that AI had influence on writing, speaking, translation, language learning, digital discourse and professional communication while enhancing efficiency, accessibility and personalized learning along with challenges regarding originality, algorithmic bias tracking and language uniformity, over-reliance on intelligent systems. The overarching importance of this study lies in its suggestion of Adaptive Linguistic Ecology Framework (ALEF), to show that the future and development of English lies in its continued interaction between human creativity, sociocultural realities and intelligent algorithms with human agency staying at the core for meaningful communicative impact. The study reaffirms that artificial intelligence should be treated as a supplementary element to human language skills rather than serving as any form of replacement for the creativity, critical thought and cultural variation which nourishes the English language.

On the strength of this submission, the study offers the following insightful recommendations:

Firstly, educational institutions should integrate AI literacy into English language curricula to equip learners with the knowledge and critical skills required for the responsible use of intelligent language technologies. Secondly, language teachers and researchers should promote the employment of AI as a supplemental tool for studying while continuously honing independent writing, speaking, critical thinking and creative skills. Thirdly, ethical guidelines and language policy should be developed by governments, policymakers, technology developers and professional bodies in order to enhance transparency in AI-mediated communication practices while ensuring the protection of linguistic diversity and cultural identity. Finally, continued collaboration among educators, linguists, researchers, technology companies, and policymakers will ensure that we leverage artificial intelligence to shape what the future of English language would look like without losing sight of the originality and creativity built into real-world communication as a human experience.

References

- Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the dangers of stochastic parrots: Can language models be too big? *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, 610–623. <https://doi.org/10.1145/3442188.3445922>
- Canagarajah, A. S. (2022). *Translingual practice: Global Englishes and cosmopolitan relations (2nd ed.)*. Routledge.
- Crystal, D. (2023). *English as a global language (3rd ed.)*. Cambridge University Press.
- Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M., Al-Busaidi, K. A., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., ... Wright, R. (2023). So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71(, 102642). <https://doi.org/10.1016/j.ijinfomgt.2023.102642>

- Floridi, L. (2023). *The ethics of artificial intelligence: Principles, challenges, and opportunities*. Oxford University Press.
- Godwin-Jones, R. (2023). Emerging technologies: Generative AI tools in language teaching and learning. *Language Learning & Technology*, 27(3), 5–15.
- Halliday, M. A. K. (1978). *Language as social semiotic: The social interpretation of language and meaning*. Edward Arnold.
- Holmes, W., & Tuomi, I. (2022). State of the art and practice in AI in education. *European Journal of Education*, 57(4), 542–570.
- Hyland, K. (2019). *Second language writing (2nd ed.)*. Cambridge University Press.
- Jenkins, J. (2020). *English as a lingua franca in the international university: The politics of academic English language policy*. Routledge.
- Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeiffer, F., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., ... Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). Exploring generative artificial intelligence preparedness among university language instructors. *Computers and Education: Artificial Intelligence*, 5, 100156. <https://doi.org/10.1016/j.caeai.2023.100156>
- Luckin, R. (2018). *Machine learning and human intelligence: The future of education for the 21st century*. UCL Institute of Education Press.
- Pennycook, A. (2021). *Critical applied linguistics: A critical re-introduction (2nd ed.)*. Routledge.
- Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach (4th ed.)*. Pearson.
- Selwyn, N. (2019). *Should robots replace teachers? AI and the future of education*. Polity Press.
- Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, 10(1), 15. <https://doi.org/10.1186/s40561-023-00237-x>
- UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO.
- Zhai, X. (2024). ChatGPT in education: Opportunities, challenges, and future directions. *Educational Technology & Society*, 27(1), 1–15



© 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>)