



Unveiling the Effectiveness of Utilizing AI as Tools for Language Learning and Teaching

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Submitted: March 2025

Revised: April 2025

Accepted: June 2025

Abstract

Artificial Intelligence (AI) is an effective tools that enhances innovative advancement in education, especially in language learning. It further help bring to the know the promises and challenges associated with AI's impact in language education. This objective of the study unveils the numerous AI tools engaged for language learning, such as speech technology, chatbots, machine translation and AI-generated content. On the one hand, it provide benefits which vary from interactive engagement, progress tracking and personalized guidance. This research engage the combination of survey techniques from sample of 34 respondents and library methodology. This paper conclude that explorering AI technologies enhance innovative learning experience in education especially in language by catering to both institutional and individual needs, enabling flexible and self-paced learning if the recommendation of this study is adopted.

Keywords: Artificial Intelligence, Integration, Language, Learning and Teaching

INTRODUCTION

Artificial Intelligence (AI) technologies have initiated significant advancements in language learning and teaching by replicating the complex cognitive processes of the human mind. This progress has led to the development of AI-powered virtual assistants like Siri, Alexa, and Google Assistant, which support users in tasks such as playing music, setting alarms, and making phone calls. AI encompasses various techniques and methodologies aimed at equipping machines with intelligent thinking capabilities. AI tools offer enhanced accessibility and serve as powerful mechanisms for knowledge development. Their relevance spans a wide range of domains, including education, finance, healthcare, agriculture, entertainment, e-commerce, robotics, and more. This technological advancement has broadened our understanding of how AI simulates human cognition through computers.

In education, for example, AI-powered tutoring platforms personalize learning for early learners, while in healthcare, AI systems are used to detect cancer cells. In finance, they help prevent fraudulent transactions. Specifically in language learning, AI is designed to process and interpret human speech, enhancing both teaching and learning processes (Ali, 2020). These systems offer instant feedback, personalized learning paths, and intelligent tutoring, allowing learners to access diverse language resources and engage in real-time communication (Ji et al., 2023). AI also supports online learning by enabling personalized instruction, automating routine tasks for instructors, and facilitating adaptive assessments. However, the integration of AI in education raises concerns, such as privacy, data security, and teacher preparedness (Woo & Choi, 2021). Without proper protective measures, student data could be vulnerable to breaches. For instance, an unprotected AI-based tutoring system might be hacked, leading to unauthorized access to sensitive information.

The Computer-Assisted Language Learning (CALL) as an important basic concept in encouraging AI learning. These programs expose learners to access various challenging and complex learning scenarios, enabling their comprehension of the subject matter (Ali, 2018). The innovative impact of programs integrating developed technologies is categorized into the purview of intelligent computer-assisted language learning (ICALL) (Heift & Schulze, 2007). ICALL is broad as it covers the various CALL elements, incorporating AI, Natural Language Processing (NLP), computational linguistics and speech processing techniques fused into language learning materials. These resources materials include basic grammar checkers to other sophisticated learning conditions (Ward, 2017). The emergence of ICALL involves the application of Artificial Intelligence methods and techniques in the process of language learning, advancing into new level of innovation and personalized education pattern (Gamper & Knapp, 2002). Importance and role of ICALL systems on language learning can be verse considering the precise needs of modernized foreign language education.

The expanded span of the verse spectrum, enabling diverse activity of various forms, input constraints, command methodologies, interface design and incorporation of the learner's native language, report mechanisms, and language analysis (Amaral & Meurers, 2011). Maximizing these foundational principles provides more details on the potential of AI usefulness in language learning. It provides an effective groundwork for incorporating technology with education, thereby encouraging enhanced and personalized learning techniques. The effectiveness of AI in language learning is still a fundamental concept, including Natural Language Processing (NLP), machine learning (ML) and deep learning. Machine Learning (ML) empowers machines to learn instantly without demanding constant user direction. It works on computational process through statistical analysis, mathematics, computational data mining to analyze data as to perform specific duty.

The term "Machine Learning" came into existence in 1920s and has since been used in a various notable application such as IBM's Deep Blue, emerged a chess professional champions in 1996. ML is important in diverse ways, these ranges from smartphone facial recognition improvement to personalized online media promotion based on user preferences. ML is based on analyzing both development data and available real-world usage data, with frequent advancements driven by new learn theoretical developments, algorithms and the accessibility of online data and affordable computing (Jordan & Mitchell, 2015). Natural Language Processing (NLP) is defined as a specialized branch of AI dedicated to processing human language. NLP help computer by equipping it with the capacity to comprehend and process natural language humans use in daily conversation. It enhances tendency of computer systems to perform meaningful tasks using human-understandable language (Jain et al., 2018). NLP applications include language chunking, chat boards, translation tools, text summarization

coupled with other tools that facilitate computers' comprehension and response to user-inputted language command.

NLP concentrate on different areas of language, including semantics, pragmatic and syntax to enhance adequate language understanding. Moreover, Information Retrieval (IR) entails retrieving of vital documents to users' information needs, commonly implemented in web search engines with the use of search results, language-specific queries, and result presentation, corpus documents. Deep learning is an innovative approach which enable computers to learn analogously to human learning by comprehending complex patterns in data such as sound images and text. It aligns with neural networks with developed operations, advancing above human capacity and autonomously extracting relevant insights from raw data (Janiesch et al., 2021). Deep learning's potential advances into enhancing data performance on websites and applications which are relevant to the diverse domains

RESEARCH METHOD

Research Methodology

This study employed a mixed-methods approach, combining survey techniques with library-based research to establish a robust theoretical and empirical foundation for examining the role of Artificial Intelligence (AI) in language learning and teaching. A quantitative survey was conducted with a sample of 34 respondents, selected using a purposive sampling method to ensure participants had relevant experience or interest in language learning and AI integration. The survey consisted of structured close-ended questions designed to capture the respondents' perceptions, preferences, and concerns regarding the use of AI in language learning contexts. This approach enabled the collection of measurable data reflecting general trends and attitudes. In parallel, the study utilized a library research method, which involved systematically reviewing secondary data sources, including academic journals, books, institutional reports, and statistical databases. The goal was to explore the theoretical underpinnings of AI integration in language education by examining foundational frameworks such as Computer-Assisted Language Learning (CALL), Intelligent CALL (ICALL), Natural Language Processing (NLP), Machine Learning (ML), and Deep Learning (DL). This theoretical exploration provided the background and context necessary to interpret the survey results meaningfully.

According to George (2008), library research transcends disciplinary boundaries, allowing researchers to analyze prior studies, evaluate expert opinions, and synthesize insights across fields. This process serves as a platform for informed, systematic inquiry that fosters the emergence of new perspectives. Similarly, Snyder (2019) outlines key milestones in the research process: formulating the research question, conducting the review, analyzing the data, presenting the results, and writing up the findings. These steps were carefully followed to ensure academic rigor.

Methodological Approach and Strategy

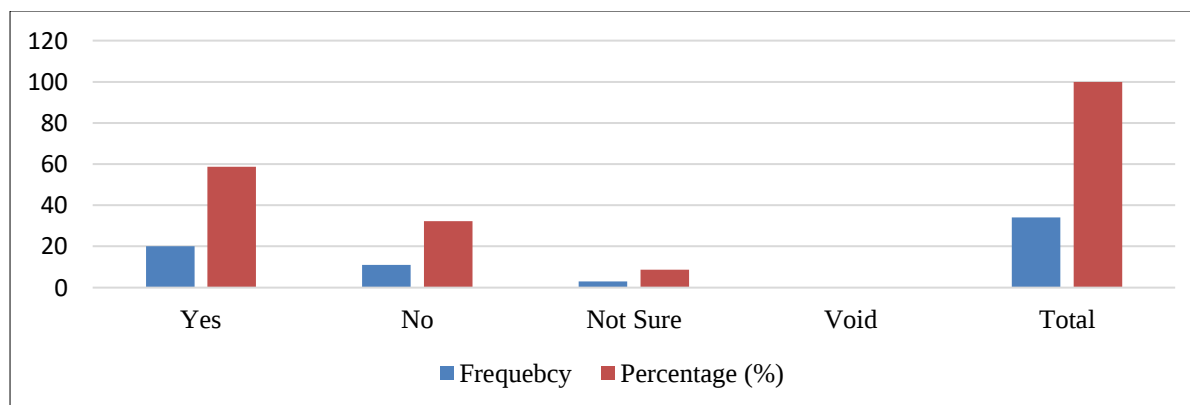
The research adopted a directional and theory-driven strategy, grounded in the purpose of exploring how AI tools influence language learning within cultural and social contexts. Key considerations included defining the review objectives, identifying target audiences, and aligning publication goals with methodological rigor. This approach allowed for the integration of both empirical observations and theoretical discourse.

RESULTS AND DISCUSSION

The quantitative data obtained were carefully collated, arranged and analyzed using tables and percentages. This was well done in such manner that reviewers and readers will easily comprehend the analysis of the data. The researchers therefore made use of the 34 responses generated data for analysis.

Table 1. As A Student Do You Prefer AI Translation To Human Translation If You Are To Translate From A Language To The Other?

Variable	Frequency	Percentage %
Yes	20	58.83
No	11	32.35
Not sure	3	8.82
Void	0	0.00
Total	34	100



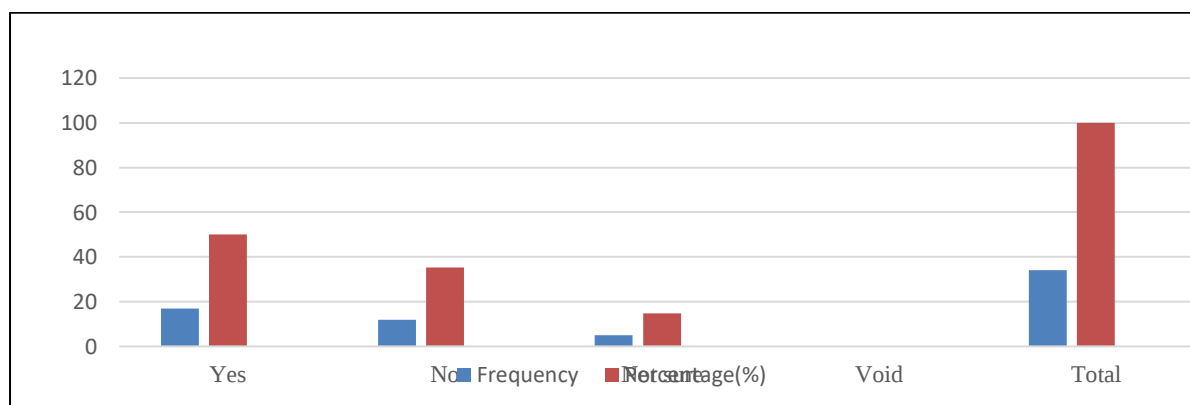
Picture 1. As A Student Do You Prefer AI Translation To Human Translation If You Are To Translate From A Language To The Other?

The analysis of student preferences reveals that a majority (58.83%) favor AI translation tools over human translation, with 20 out of 34 students indicating a preference for technologies such as Google Translate and DeepL. This suggests a growing confidence in AI-based tools, likely due to their speed, accessibility, and ease of use for routine or straightforward translation tasks. However, a substantial minority (32.35%) still prefer human translation, emphasizing trust in the accuracy, contextual nuance, and cultural depth that human translators offer—particularly when working with complex texts, idiomatic language, or academic writing. A small portion (8.82%) of respondents remained undecided, which may reflect limited exposure to both translation methods or an awareness of the strengths and weaknesses inherent in each approach. Notably, all responses were valid (0.00% invalid), indicating clear understanding of the survey question and effective administration.

These findings suggest a broader shift toward AI adoption in language-related tasks while also reaffirming the enduring value of human expertise. For educators, this trend underscores the importance of teaching students when and how to use AI translation appropriately, especially in academic or sensitive contexts. Curriculum designers may consider incorporating discussions on translation quality, ethics, and the critical evaluation of AI-generated texts. Meanwhile, AI developers are encouraged to continue refining their tools to better handle contextual meaning, idiomatic phrases, and cultural nuances—areas where current AI still lags behind human cognition. Overall, the data points to a blended future where both AI and human translation play complementary roles in language learning and communication.

Table 2. Should The Use Of AI Be Encouraged Among Students And Teachers?

Variable	Frequency	Percentage %
Yes	17	50.00
No	12	35.30
Not sure	5	14.70
Void	0	0.00
Total	34	100



Picture 2. Should The Use Of AI Be Encouraged Among Students And Teachers?

The analysis reveals a relatively even split in perceptions regarding AI integration in education. Half of the respondents (50.00%)—17 out of 34—support encouraging the use of AI among students and teachers, reflecting optimism toward its potential benefits. This group likely values AI for its ability to increase efficiency, provide personalized learning experiences, deliver instant feedback, and expand access to digital educational resources. Conversely, a significant minority (35.30%) opposes the integration of AI in educational settings, citing concerns such as over-reliance on technology, diminished critical thinking skills, potential job displacement, and ethical issues like academic dishonesty and data privacy. Additionally, 14.70% of respondents were undecided, which may indicate a lack of exposure or understanding of both the advantages and risks of AI. The fact that all responses were valid (0.00% void) suggests that the question was relevant and well-comprehended by participants.

These findings underscore the complexity of AI adoption in education, where enthusiasm is met with caution and uncertainty. For educators and school administrators, the results highlight the urgent need for professional development initiatives that introduce AI tools alongside ethical frameworks and pedagogical training. Students should also be guided to view AI not as a substitute for their own thinking, but as a complement to foster creativity and deeper understanding. Policymakers are encouraged to formulate clear and practical guidelines that balance innovation with responsible use, addressing potential misuse and ethical dilemmas. Meanwhile, AI developers and researchers must take into account educator feedback to ensure that AI systems are transparent, accessible, and aligned with educational objectives. Overall, successful integration of AI in education requires collaboration among all stakeholders to build systems that are both innovative and human-centered.

DISCUSSION

Learning Language learning entails effort put into a desire to comprehend and master a new language, mainly through formal education or institutional system, such as second language acquisition methods. The system engages an educator who provide direct guidance and structured teaching approach. Learning a language is full of advantages, it develops the brain and cognitive enhancement, units the memory and increase creativity capacity. Nevertheless, language learning is tasty and stressing, requiring dedication, consistency, and hard work. It goes along with diverse cognitive, emotional challenges, social and mental demands of grasping fundamental grammar basic concepts to attain fluency as to enable overcome pronunciation difficulties. Overcoming these numerous challenges is important in language acquisition to enhance improved learning. However, Artificial intelligence (AI) has introduced improved approach to language acquisition, making it easier and convenient for learners in language acquisition. The research thereby accessed the various AI language learning tools and concept.

A. Speech Technology: This is an assembled computing systems that enable electronic devices to identify, analyze, and understand spoken words or audio inputs. Basically, this entails detailed assessing, processing and comparing different digital sound data. It includes including Automatic Speech Recognition (ASR) and speech synthesis, known as Text-to-Speech (TTS), are two basic uses of this innovative technology. ASR is an important compartment of speech technology, it specializes in transforming spoken words into text by editing audio into discrete sounds, converting them to a digital form, and using algorithms to ascertain the most acceptable corresponding textual format, enabling computers to comprehend spoken language. Additionally, Speech Synthesis, specifically TTS, works in the opposite direction, converting text into audible spoken words. Virtual helping facilitates like Alexa utilize TTS helps to trigger word detection and Natural Language Processing (NLP) to understand user intent and connects with synthesized speech, the linked process serves as the foundation for interactive conversational communication. Moving forward, Makashova (2021) opined that ASR and TTS tasks serve an important purpose above communication, including assisting persons with disabilities, such as visually impaired, through accessibility technology. Speech technology is of integra benefit of AI in language acquisition as it has a practical application in various educational contexts, such as communication skills development, vocabulary assessment, pronunciation training and listening comprehension skill enhancement (Krasnova & Bulgakova, 2014).

B. Machine Translation(MT): This is an automated systemic process which allows seamless language translation, helping to solve the problem of cross-lingual communication in am advancing globalized world. The innovative technological in translation becomes important the various challenges associated with Traditional manual translation methods which ranges from time consuming, resource-

intensive and costly, providing MT as innovative and practical solution to enhance language translation efficiency. The innovative technological dynamic systems in language Education provides learners useful opportunities and enable language educators to recognize the innovative impact of MT tools in their classrooms interaction. Machine translation's ability to produce millions of translations daily in accordance with the new terminology is an attainment that surpasses the imagination of individual learners (Raheem, 2020). Research made on MT like Google Translate, unveiled its usefulness in facilitating the learning of word meanings, understanding of complex sentence structures, spelling accuracy, pronunciation, and sentence construction, thereby allowing valuable resource that will enable students in various language-learning (Shahriar, 2023; Wirantaka & Fijanah, 2021).

C. Chabot: As AI develops, chat boards have been established as applications across various domains, including educational support. Their versatility makes them to undertake various tasks, cutting across answering questions to offering directions. Huang et al. (2021) assets that Chabot as a software program that facilitates natural language conversations with users. Leveraging on AI abilities, Chabot's work on human dialogue principles and act as automated conversational agents, meant to assist users through natural language interactions in diverse contexts. Haristia's (2019) research shows that language learners favour chat boards principle of language learning due to their availability and the confidence they inspire, compared to direct conversation with human tutors. In addition, research from Belda-Medina and Calvo-Ferrer (2022) unveils the positive perceptions of Chabot integration, revealing their perceived utility and accessible to use.

D. AI Generated Content (AIGC): AI-generated content (AIGC) assumed the place of human writing and thinking, providing a diversified solution for content production. AIGC products, bolstered by its enhancement in large model algorithms and are occupying increasingly promising equipment that enabled our daily activities. These content production takes various forms, enabling the creation of entire pieces such as articles and quizzes or enabling creative brainstorming via human-like communication in chat (Wu et al., 2023). The advancing importance of AI-generated content makes it crucial to comprehend its maximum utilization. AI enable the production of language-based materials like exercises discussions, short stories and quizzes to match specific expertise levels in language acquisition. A good sample is Quizizz AI, a platform established to enhance quiz creation, automatically adapting to individual request. Quizizz enhances AI as a personalized teaching aid, quizzes can be formed under a minute, adequately enabling language learning (Degirmenci, 2021). The engaging and meaningful platforms provided by Quizizz will enable to gain fast learning process for students, enhancing improved reading skills (Pradnyadewi & Kristiani, 2021). Additionally, it enhances positive impact on grammar understanding, as an important improvement in evaluation of scores among students is evident (Rahayu & Purnawarman, 2018). The Advantages of AI in Language Learning AI exerts a significant influence across multiple domains, including education. This influence extends to foreign language learning and teaching, where the integration of AI is long overdue. While attempts to modernize language education with AI have been ongoing for years, their impact has remained constrained. However, converging neural network capabilities with AI-driven language learning holds promise for students, educators, and the corporate sector. AI's potential lies in its ability to personalize digital language instruction, reducing students' time, expenses, and challenges. AI algorithms can enhance learning across diverse sectors, allowing individuals to study conveniently. Moreover, incorporating AI language learning into traditional educational institutions can yield many benefits. In general, AI can significantly enhance language learning as follows:

a. Enhancing Personalized Learning Personalized learning tailor's instruction to individual students' needs to accelerate their progress while adhering to curriculum requirements. It allows students to explore their interests and strengths, fostering a sense of ownership over their learning journey (Bray & McClaskey, 2013). This approach empowers students to set higher goals, tackle complex problems, and generate meaningful outcomes. Central to student-centered learning is the high degree of involvement it requires, focusing on addressing each student's unique strengths and weaknesses (Makhambetova et al., 2021). It involves connecting prior knowledge with new information, and in the digital realm, personalized content is vital (Fitria, 2021). Integrating AI is crucial, allowing for tailored curriculum interactions that make educational content more accessible, engaging, and relevant (Følstad & Brandtzaeg, 2020). In language learning, AI tools offer personalized experiences based on individual needs and progress, saving students time and providing targeted support (De La Vall &

Araya, 2023). For instance, Rosetta Stone utilizes AI algorithms to offer tailored instruction and feedback in over 30 languages, accessible on mobile and desktop platforms.

b. **Providing Interactive Learning** Interactive learning emphasizes collaboration and teamwork, offering a hands-on, real-world approach to education. This approach not only injects fun and enjoyment into children's learning experiences but also increases opportunities for sharing, collaboration, and sustained motivation, addressing some of their fundamental human needs. Moreover, interactive language learning activities have significantly enhanced learners' speaking proficiency by fostering self-confidence, cultivating a conducive learning environment, bolstering motivation, and facilitating authentic conversations (Omar et al., 2020). In language learning, AI manifests in various forms, such as Chabot, virtual language tutors, language learning apps, and online courses, providing learners with real-time feedback and guidance that closely simulates interactions with human language instructors. Through these AI-driven applications, learners can develop a range of speaking skills, including fluency, grammatical accuracy, pronunciation, rhythm, organization of ideas, reading aloud, and presentation skills. This interactive approach with AI throughout the learning process affords learners more opportunities to engage with instructors and peers. It is a potent motivator for speaking practice, ultimately leading to more effective learning outcomes (Zou et al., 2023).

c. **Monitoring Constant Progress** AI can be used as a learning analytics tool that provides valuable support to instructors by enabling them to monitor learners' progress, pinpoint areas for improvement, and dynamically adapt course content. These analytics tools decode students' clickstream data, allowing instructors to gain insights into their performance, advancement, and untapped potential (Seo et al., 2021). Furthermore, AI fosters student autonomy by facilitating automated feedback cycles within the learning systems, enabling students to progress independently of the course instructor. These AI-enhanced learning systems result from extensive research on AI, including intelligent tutors, learning analytics, and educational data mining techniques (Kabudi et al., 2021). For instance, ChatGPT offers an adaptive assessment tool that informs teachers about class performance and areas of difficulty and customizes teaching methods while delivering personalized feedback to students, ultimately enhancing the assessment process and promoting student development (Liu et al., 2023).

d. **Availability & Flexibility** According to Almusaed et al. (2023), AI is critical in bridging educational access barriers by providing students with greater freedom and accessibility. It considerably improves educational access by allowing students to learn independently using multiple forms such as video lectures, online courses, and personalized learning plans. Additionally, AI assists educators by automating administrative duties, offering real-time feedback, and recognizing individual students' strengths and weaknesses to tailor training to their needs—for example, Duolingo, an AI used in language learning apps. Duolingo's AI-powered features include personalized lessons, speaking and listening exercises, and adaptive difficulty adjustments based on the user's progress and performance. The accessibility of AI-powered language learning tools at any time and from any location further empowers students to study on their own terms, removing the limits associated with traditional classroom learning.

e. **Providing Immersive Learning** Several AI-powered systems use Augmented Reality (AR) and Virtual Reality (VR) technology to develop immersive learning environments. These immersive activities successfully simulate real-life scenarios, assisting learners in gaining a deeper comprehension of the language. VR and AR provide interactive and engaging learning environments that engage students and improve knowledge retention. Radial et al.'s (2020) research has shown that students who participate in VR experiences retain more information and can successfully apply their learning. Furthermore, as Huang et al. (2021) demonstrated, AR tools like HP Reveal and VR tools like Google Expedition, Google Earth, and Tour Creator increase language acquisition by providing immersive learning experiences, increasing motivation, fostering interaction, and decreasing learning anxiety. **Potential Risk and Ethical Concerns of Using AI in Language Learning** Implementing AI in language learning raises significant concerns and risks that merit serious consideration. While AI has a growing role in education, particularly in language learning, it may progressively reduce human interaction—a factor closely tied to effective language learning especially in international communication and discourse-based learning (Tanabe, 2021). Interactions and interpersonal relationships foster creative language use, facilitating discussions and mutual understanding among learners (Muho & Kurani, 2014). However, AI systems increasing repetitive task automation, as Ahmad et al. (2023) highlighted,

hinder human cognitive development and erode decision-making capabilities. In contrast, traditional in-person classrooms provide a vital platform for meaningful teacher-student interactions that shape character and civic values. In such environments, students learn from their peers, question their instructors, and actively engage in their education. Nevertheless, the pervasive influence of AI technology threatens to curtail these interactions, potentially impacting students' overall development, including their character, civic responsibility, and decision-making skills. Hence, while AI-driven language learning tools can complement conventional teaching methods, it is crucial to acknowledge and preserve the irreplaceable value of human interaction in the language learning process (De La Vall & Araya, 2023). Moreover, the integration of AI in language learning poses a potential threat to learners' autonomy, a fundamental aspect of language education, empowering students to take charge of their learning process (Çakici, 2015; Najeib, 2013). While AI's capabilities have expanded with the utilization of big data and enhanced processing power (IRENA, 2019), it introduces the challenge of diminishing individual autonomy, potentially guiding individuals' choices (Danaher, 2018; Regan & Jesse, 2019). Excessive reliance on AI may result in detrimental student dependency, where tasks such as translation and question-answering are handed over to AI without active language skill development efforts. As (Ahmad et al., 2023) highlighted, this over-reliance can lead to a decline in human skills, fostering stress in scenarios requiring physical or cognitive abilities. Ultimately, students risk losing their capacity for independent language speaking, writing, and comprehension as AI becomes their primary source for these activities. Furthermore, AI struggles with context and cultural nuances, often resulting in inappropriate responses. Language is context-rich, and AI models, despite their language-processing prowess, may misinterpret meanings without proper context. This challenge extends to humor and sarcasm, a complex task in Natural Language Processing (Khurana et al., 2022). For example, ChatGPT might misinterpret sarcasm or humor, providing irrelevant responses.

Language understanding is intricate due to word meanings, extensive context, and evolving comprehension (Favre, 2019). Cultural differences further complicate language, affecting notions of politeness and offensiveness. Neglecting cultural diversity in AI design can hinder equitable access to technology (Messner, 2022). AI needs a better understanding of diverse cultures since it cannot do so itself (Hardman, 2022). Lastly, the use of AI language learning tools could jeopardize the role of language teachers, potentially reducing their demand. If people can learn all language skills through AI conveniently at home, the need for language teachers might decline. Bill Gates predicts advanced AI models like ChatGPT could soon serve as teachers (Abdullah, 2023). However, Chan and Tsi (2023) report that while some teachers and students believe AI might replace teachers, most argue that teachers' human qualities, including critical thinking and creativity, are irreplaceable. Ethical Principles Governing AI in Education AI technology has become integral to education, revolutionizing the learning process. It empowers students to engage in independent learning, allowing teachers to concentrate on imparting essential knowledge and guiding students' moral and behavioral development. However, the rapid development of AI technology brings both opportunities and challenges. To ensure its responsible use, it must adhere to ethical principles that prevent it from exceeding reasonable limits. In Nguyen et al. (2023) definition, ethical principles for AI in education (AIED) is defined as a set of guiding principles and guidelines focused on the design, implementation, and evolution of AI technologies in educational settings, with the overarching goal of aligning these technologies with societal values and prioritizing the well-being of all stakeholders, including educators, students, parents, AI developers, and policymakers. These principles have been derived through a thematic analysis of pertinent ethical guidelines and reports from international organizations, such as UNESCO, OECD, the European Commission, and the European Parliament.

They propose that ethical AI in education should address seven critical aspects: governance and stewardship, transparency and accountability, sustainability and proportionality, privacy, security and safety, inclusiveness, and human-centered AIED. These principles play a vital role in providing essential guidelines for the responsible development and application of AI in education, ensuring that it remains aligned with societal values. Given AI's reliance on big data and the potential for misuse, maintaining oversight is paramount to control its autonomous development. In this context, these principles serve as a crucial framework for the oversight and responsible management of AIED, establishing rules and ensuring its ethical design and usage. AI stewardship and governance involve risk management and consider AI, including models, algorithms, data, and human interactions (Isom, 2022). Governance creates rules and standards for AI, while stewardship ensures responsible

management. Unfortunately, these aspects have often been overlooked in recent discussions. Therefore, it is essential to consider various ethical perspectives, including data ethics, learning analytics ethics, and human rights, to ensure the ethical and responsible implementation of AIED, benefiting all stakeholders while upholding critical ethical principles. In applying analytics, educators and institutions should ensure that data and analysis techniques are used appropriately (Corrin et al., 2019). Data ethics in AIED emphasizes the importance of transparency in data usage. Transparency is crucial for educators, tech-experts, and AI practitioners to understand AI tools' purpose, requirements, and data quality, ultimately enhancing their effectiveness (Chaudhry et al., 2022). Despite the growing prominence of AI tools in education, challenges related to data transparency, ownership, accessibility, and explain ability persist. Data ownership issues raise questions about student rights, while explain ability is crucial for understanding AI's decision-making processes. Ethical principles emphasize transparency in data and algorithms, along with clear regulations and accountability.

Accountability involves recognizing and limiting authority while interrogating power, encompassing seven key features: context, range, agent, forum, standard, process, and implications (Novelli et al., 2023). Responsible AI implementation require attributing responsibility and addressing potential negative consequences, with educational stakeholders leading the way. This approach balances human oversight and AI use while considering sustainability and proportionality. In education, AI, including AIED, must prioritize environmental responsibility by using energy efficiently and minimizing ecological impact. This approach can harness AI's potential to integrate with renewable energy and, benefiting supply, decision-making, and autonomous control (Chen et al., 2023). Regulations should ensure these considerations are integrated into AIED's design, promoting innovation, accountability, and accessibility. In contrast, the proportionality principle ensures that AI methods are used only when justified and aligned with their intended goals (Karliuk, 2022). Privacy emerges as a crucial concern in AIED due to the extensive collection and analysis of personal data. AI will bring privacy and other risks that are hard to address only via individual decision-making; additional protections will be needed (Cardona et al., 2023). Protecting learners' privacy and well-being necessitates developers to consider the perspectives of both students and teachers when deploying AI in the classroom. Privacy violations mainly occur when people expose excessive personal information online (Akgun & Greenhow, 2021). Ethical concerns, such as using facial recognition or attendance tracking without consent, may arise. Building trust requires well-informed consent and confidentiality maintenance. Additionally, questions about data management, storage, and accessibility rights must be addressed after data collection. Educational learning systems aim to predict user behavior and performance but face risks like data manipulation and cyber threats. By learning from its interactions and adapting, AI holds great potential to significantly improve human health and well-being by addressing various challenges more effectively than humans (Conn, 2017).

The security principle underscores the importance of robustness against these risks to ensure data privacy. Incorruptibility in AIED aligns with data security and personal data protection, especially in virtual learning. IoT devices are ubiquitous and interconnected and often lack essential security features, leaving them vulnerable to cyber threats (Tariq et al., 2023). Furthermore, AIED raises safety concerns, emphasizing the need for protective measures to prevent user harm. Developers must prioritize safety through careful design and testing of AI systems, while oversight mechanisms and user training should be in place to maintain security. Accessibility and inclusiveness are paramount in AIED to uphold human rights and promote global justice. This involves ensuring affordability, user-friendly designs, and accommodation for diverse demographics, including individuals with disabilities. The inclusiveness principle highlights AIED's need to cater to a wide range of individuals, considering factors like infrastructure, equipment, skills, and societal acceptance to ensure equitable access (Nguyen et al., 2023). The digital divide, exacerbated by COVID-19, underscores the urgency of addressing inclusion to reduce educational disparities and discrimination. AIED development must prioritize unbiased data and algorithms to prevent perpetuating inequalities and avoid biased training data that could lead to unfair outcomes. AIED should prioritize fairness, equality, and quality education for all. In conclusion, AIED development and regulation must adopt a human-centric approach that values autonomy. Using AI without human mediation raises concerns about vulnerabilities in cybersecurity (Naik et al., 2022).

The Human-Centered AIED principle emphasizes enhancing human capabilities while preserving freedom of choice and control over AI processes. AIED should avoid manipulating

users' motivation and emotions, particularly in an educational context. Ensuring learner agency is vital to prevent AIED from undermining autonomy. AIED should promote the interdisciplinary development of negotiation-based adaptive learning systems to achieve this, allowing learners to shape their educational experience. This approach fosters collaboration between humans and machines, ultimately improving educational outcomes while ensuring humans retain control.

CONCLUSION

Within language learning, Artificial Intelligence (AI) offers a rich array of tools and technologies—such as machine translation, speech recognition, chatbots, virtual assistants, and AI-generated content—that significantly enhance the educational experience. These AI-powered solutions enable personalized instruction, interactive learning, progress monitoring, and accessibility beyond traditional classroom constraints. Learners benefit from tailored guidance and the flexibility to learn at their own pace, thereby fostering deeper engagement and language acquisition. However, these advancements are not without challenges. Reduced human interaction, diminished learner autonomy, difficulties in understanding cultural and contextual nuances, and shifting roles of language educators are critical concerns that demand thoughtful integration. To truly optimize the benefits of AI in language education, a balanced approach is necessary—one that maintains the irreplaceable value of human connection while leveraging the efficiency and scalability of technology.

Ethical principles serve as the foundation for guiding the responsible use of AI in Education (AIED). Core principles such as transparency, governance, sustainability, privacy, security, inclusiveness, and a human-centered approach ensure that AI supports, rather than undermines, educational integrity and human development. These values uphold accountability, protect learner data, and ensure equitable access to technological advancements. Accordingly, several key recommendations should be prioritized: (1) establish clear ethical policies to govern AI use, (2) maintain a balance between AI and human interaction, (3) empower educators to harness AI for personalized instruction without diminishing their pedagogical agency, (4) encourage students to critically engage with AI outputs to develop independent learning strategies, and (5) enforce institutional oversight to protect academic standards and data integrity. With such measures, AI can serve as a transformative and ethical force in language education, benefiting both learners and educators alike.

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