The Role of Artificial Intelligence in Teaching English as a Second Language in the Higher Education Sector: A Systematic Literature Review

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Abstract—**Artificial Intelligence (AI) has ushered a transformative era in language learning, making it more dynamic, personalised, and accessible than ever before. This study is focused on the rising roles of AI in higher education, mainly focusing on its applicability on Teaching English as a Second Language through a methodical evaluation of the existing literature. Data were gathered via a systematic review of existing scholarly articles published in Scopus and the Web of Science databases for academic research from 2018 to 2022. The review followed a systematic inclusive and exclusive qualitative research methodology by prioritising articles on language learning and teaching, course/program assessments and applications. The findings demonstrate the enormous contribution of AI on the quality of educational services, hands-on learning and teaching, teaching assessment methods and pedagogical implications. According to the study, AI will likely have an impact on language learning mostly through self-regulated aspects. As a result, higher education institutions should integrate AI into different aspects of teaching and learning in order to offer innovative ways to enhance the language learning process, necessitating a balanced approach to ethical and instructional considerations.**

Keywords—**Artificial intelligence (AI), teaching english as a second language, assessments, pedagogical implications**

I. INTRODUCTION

The role of Artificial Intelligence (AI) in Teaching English as a Second Language (TESL) has emerged as a transformative force in the field of language education. With the increasing demand for English proficiency worldwide and the rapid advancements in AI technologies, the integration of AI tools and platforms has opened new horizons for both educators and learners. This symbiotic relationship between AI and TESL instruction is reforming language learning, making it more adaptable, efficient, and engaging than ever before. (Chen et al. [1]). In this dynamic landscape, AI is not just a tool; it is a catalyst for fostering English language proficiency in diverse, global contexts. AI is increasingly playing a significant role in TESL by providing innovative tools and resources that enhance the language learning process. Most importantly, AI plays a significant role in transforming Learning Management Systems (LMS) to enhance the overall teaching and learning experience.

A. The Future of LMS-based Language Learning

The role of the LMS has been changing and is now seen as a tool that supports both the user and the administration across a range of contexts, whereas the traditional LMS was conceived just as a tool which supported the university education and administration. However, the next generation is much more concerned with the increased ability for these platforms to introduce more cognitive services, such as AI to assist both educators and students in the practice of teaching and learning.

These features are more aligned with modern learning design approaches centered on the 'learner experience,' which then complemented by the basic provision of communication and assessment tools powered by AI to offer more personalized, accessible language instruction, while learners benefit from tailored lessons, interactive experiences, and real-time feedback (Zou et al. [2]). This is seen very clearly in the recent advent of ChatGPT from Open AI, which has carried the whole learning and teaching experience to the next level.

Furthermore, AI will enhance the administrative efficiency of LMS platforms. Routine administrative tasks, such as grading assignments, tracking student progress, and managing course materials, can be automated through AI. (Chen et al. [1]). From a learner's perspective, AI-driven LMS can provide instant feedback and recommendations. It can identify areas where a student may be struggling and suggest additional resources or activities for improvement. This immediate and targeted support can foster independent learning and a deeper understanding of the material through identifying learner gaps. Moreover, the AI powered LMS will provide interactive educational content by engaging in discussions with students and address their questions within seconds. This will address conventional classroom management issues to a great extent. (Aldahwan et al. [3]). However, while the role of AI in managing LMS is promising, it also brings challenges and ethical considerations. Issues related to data privacy, security, and the potential for bias in AI systems must be addressed to ensure equitable access and outcomes for all learners.

II. LITERATURE REVIEW

AI has a lot potential to expand and enhance teaching and learning significantly within the higher education sector. The literature on the role AI in TESL underscores the transformative potential of AI-driven solutions in language education. Researchers in language studies have recognized the imperative of integrating advanced intelligent technologies into e-learning systems. This integration is deemed essential for enhancing the overall quality of learning experiences, aiming to provide personalized learning content, automated guidance, instant feedback, and adaptive learning paths. (Tang et al. [4]; Am et al. [5]). Continuous practice and improvement in language skills have been emphasized in the studies by Liu et al. [6] and Zhang et al. [7] with AI-driven language learning resources enabling learners to practice and enhance their language skills in real-world contexts. These simulator environments will lay the basic foundation for the development of language skills without the initial interference of a teacher. As per Mikic´ et al. [8], "learning opportunities created through AI should not be designed in a vacuum; rather it should match learner needs and desires as closely as possible". As a result, AI-driven learning systems, developed using various intelligent methodologies, notably AI-based algorithms, intelligent agents, and data mining techniques, have proven to be successful in the implementation of personalized learner models (Zawacki-Richer et al, [9]). The learner models can address diverse learner requirements by recognizing various learner motivations, pre-existing knowledge, individual personalities, and learning behaviors, all of which can influence their educational journey. (Abyaa et al. [10]). As a result, furnishing personalized learning content to each learner is not just a choice but a mandatory requirement. The process of collecting and regularly updating information about a learner through clearly defined procedures will be beneficial in developing modeling approaches and techniques, incorporating both knowledge-based and behavior-based AI models. (Ajroud et al [11]). Confronted by traditional norms, a transitional strategy involves acquiring data on the extensive learning experiences of an individual or group, which can be gathered and synchronized with a multitude of learning activities across various platforms. (smith et al. [12]; Zapta-River. [13]. Hence, AI will undoubtedly improve the quality of education by catering to different educational practices, improving teaching and learners' academic performance. Santoso et al. [14] & Yang et al. [15], emphasise the importance of AI-driven feedback in language learning applications, specially in the spoken language arena specifying its importance in pronunciation development. The implementation of chat bots and virtual language assistants, discussed by scholars like Liu et al. [6], has made interactive language practice accessible to learners at any time by e-learning assistant systems. These tools offer opportunities for learners to engage in conversations and receive immediate feedback, which contributes to improved language skills.

Unlike the traditional assessing systems, where leaner performance is judged through a set of questions, AI will play a crucial role in optimizing language assessment and placement, ensuring learners are appropriately challenged. Furthermore, adaptive assessments efficiently determine a candidate's precise level of knowledge by narrowing down the scope of the learner's abilities. (Chrysafiadi et al. [16]; Krouska et al. [17]) Authors such as Chen et al. [1] have examined on how AI facilitates real-time feedback on various language aspects, including grammar, listening, and vocabulary usage by enhancing learners' language proficiency. This real-time feedback mechanism plays a critical role in improving learners' language proficiency and accuracy. Mousavinasab et al. [18] highlights the benefits of AI in providing personalized language assessing pathways which will be finally evalutaed through a common rubric system. Therefore, when integrated into various learning platforms, an adaptive e-learning system has the potential to provide personalized learning opportunities, contributing to improved learning quality and enhanced performance for learners. (Vanitha et al. [19]). As identified by (Shvets et al. [20]), a crucial aspect of e-learning involves ensuring that learners receive support and feedback consistently throughout the learning process. Moreover, as feedback is an essential part of assessments, the success of AI integrated learning models relies on the engaging experience and accurate feedback on learner performance (Hassan et al. [21]).

According to Chaudhry. [22], the utilization of AI applications in the classroom benefits both educators and students by facilitating collaborative learning and conducive learning environments. AI's data-driven insights provide educators and learners with a deeper understanding of progress, allowing for informed adjustments in teaching methods and content. Its data-driven insights enable both learners and educators to track progress and make informed decisions, ultimately transforming language acquisition into a dynamic, personalized, and effective way. Some examples of autonomous intelligent agent systems, such as eTeacher, involve monitoring the learning activities and performance of learners by delivering personalized content, whereas another instance is Mod-Knowledge, which analyzes learner interactions to assess their knowledge state. (Trifa et al. [23]). These studies collectively demonstrate that AI is playing an increasingly important role in TESL, offering innovative tools to educators and learners for achieving language proficiency and communicative competence. The personalized, real-time, and accessible nature of AI-driven language learning resources is shaping the future of language education while also bringing institutional challenges as well as disparities in the language learning process.

III. METHODOLOGY

In this research, a systematic review methodology was employed to gather data from existing scholarly articles related to AI published within the timeframe of 2018 to 2022. The primary sources of data included the esteemed

TABLE I
CATEGORICAL DISTRIBUTION OF RELATED RESEARCH

Category	Techniques with examples	References	Common findings/features
Language Learning and Teaching (LLT)			Adopts a personalized approach to meet the specific needs of each individual learner
1. Learner Modelling	1.1 Prediction (AL-TESL-e-learning system)	[24]	Support learners in developing a deeper understanding of the learning process
2. Knowledge Tracing	2.1 Deep Knowledge Tracing (Udacity)	[25]	Construct models by initially collecting data and continuously updating the learner model through ongoing tracking
	2.2 Autonomous Agents (e-teacher, Mood knowledge)	[23]	
3. Visualisation of Learner's data	3.1 Open leaner Model (Flexi-OLM, UM toolkit, CALMsystem)	[26, 27, 28]	Collects learner data through examinations, surveys, learner preferences, and the study habits, system activities, and processes of learners.
	3.2 Learning Analytical Dashboards (SCELE, iTutor)	[14, 29]	Through the data repository, learners can retrieve information about their existing knowledge levels, challenges in the subject area, and any misconceptions
4. Personalised Learning	4.1 Collaborative Filtering (peer Grade, LogCF)	[30]	
	4.2 Knowledge Based Filtering (ScholarLite)	[31]	
	4.3 Hybrid Techniques (MoodleRec)	[32]	
Assessments			The ability to monitor and analyse the progress continuously
5. Adaptive Assessment	5.1 Student ranking, evaluation and assessment (TrueSkill)	[33]	Suggest available improvement paths by analysing the current learner knowledge and performance
6. Automated Feedback	6.1 Textual Feedback (Quizbot)	[34]	
	6.2 Video Feedback (ASSET)		
Pedagogical Applications			Customized according to various factors like learners' pre-existing knowledge, preferences, habits, behavior, etc
7. Learner guidance	7.1 Pedagogical/ Conversational Agents (Notebook)	[35]	Extracts insights from the accessible repositories and enhances learner models
	7.2 Multi Agents (F-SMILE)	[36]	Facilitates decision-making during the learner enrollment process
	7.3 Intelligent Tutoring Systems		Enhancement of existing study programs and educational practices
			Encourages self-motivation in learning and delivers personalized guidance by identifying areas of weakness or points for improvement
			Improves learners' learning efficiency
			Adapt to the diverse capabilities of learners by providing learning materials based on the learner's proficiency level.

academic databases, Scopus and the Web of Science, renowned for their comprehensive coverage of peer-reviewed literature. The systematic review process involved a structured search strategy, encompassing specific keywords, Boolean operators, and search filters, ensuring the identification of articles that precisely matched the research criteria. The selection criteria for inclusion in this review were meticulously defined, focusing on articles published within the stipulated time frame and originating from higher education institutions. The data collection process followed a two-step approach: an initial screening based on the examination of article titles and abstracts, followed by an in-depth full-text review. Relevant data from each selected article, such as the publication date, the title, the authorship, key findings specifying the areas of language teaching and learning, assessment methods and other pertinent details were systematically extracted. The synthesis of the gathered data involved categorization and summarization of key themes, trends, and findings specifying the prominent researches who were involved in introducing the learner models related to AI. Moreover, ethical considerations were diligently observed in compliance with copyright regulations and ethical standards. The systematic review methodology applied in this study is instrumental in providing a robust foundation for the analysis of scholarly

articles on AI in higher education institutions during the specified period, as sourced from Scopus and the Web of Science.

The Tab. 1 demonstrates the research contribution for the categories mentioned, and it provides a broader understanding of the research conducted related to the fields of learning and teaching, pedagogical applications, and assessments

IV. RESULTS AND DISCUSSION

The incorporation of AI in TESL has yielded significant research findings with profound implications for learning, assessments, and pedagogy. AI-driven language learning platforms have ushered in a new era of personalized and adaptive learning experiences. Research suggest that AI can analyze learner data to create tailored learning pathways, optimizing content and pace to suit individual needs. Real-time feedback on grammar, pronunciation, and vocabulary usage, another pivotal AI contribution that has demonstrated the potential to enhance language proficiency and accuracy in both spoken and written communication.
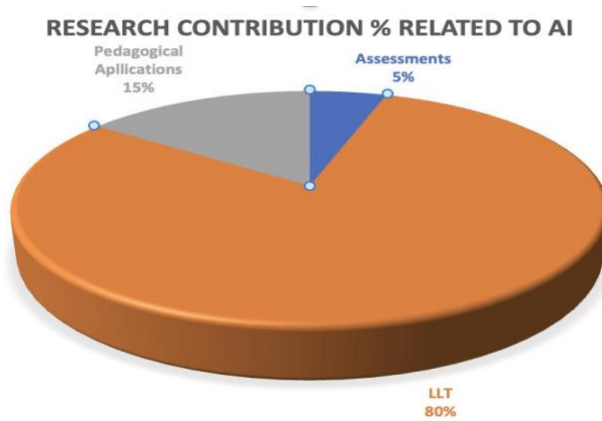

Fig. 1. Research contribution % related to AI

In the field of AI, there is a diverse landscape of research and application areas. Among these areas, Language Learning and Teaching represent a substantial focus, accounting for approximately 80% of AI-related endeavors as represented in the Fig. 1. Research conducted in this domain seeks to leverage AI technologies to enhance the overall learning experience. This includes the development of intelligent tutoring systems, adaptive learning platforms, and tools for automated content creation and recommendation.

In assessments, AI's role in evaluating language skills and placing learners in the appropriate courses or proficiency levels has also proven effective, ensuring that students are neither under challenged nor overwhelmed. Furthermore, AI's interactive tools, including chatbots and virtual language assistants, offer learners the opportunity for continuous language practice, with immediate feedback, ultimately contributing to improved conversational skills. However, research related to assessments constitutes nearly 5% of the

AI-related work in the field as depicted in the Figure 1. AI has the potential to revolutionize assessment processes by offering automated grading, adaptive testing, and data-driven insights into student performance. However, research is focused on developing AI-based assessment tools and methodologies that can provide more accurate and timely evaluation of learners' knowledge and skills and this is still under continuous research.

According to the Fig. 1, Pedagogical applications encompass roughly 15% of the AI activities within the learning and teaching sphere. These applications involve the design and implementation of AI-driven teaching methods and strategies. AI-powered educational tools can provide customized learning pathways, track student progress, and offer real-time feedback. This, in turn, can optimize teaching methods, making them more effective and efficient.

These findings underscore the transformative impact of AI in TESL, offering innovative means to enhance language learning. However, while the advantages are clear, it is essential to recognize the associated challenges, including ensuring data privacy, addressing potential bias in AI systems, and providing educators with adequate training to effectively integrate AI tools into the classroom. As AI's presence continues to grow, the pedagogical implications in TESL shows more promising, engaging, efficient, and personalized language learning experience while necessitating a balanced approach to ethical and instructional considerations.

A. Potential Negative Outcomes

The integration of Artificial Intelligence (AI) into language learning has undoubtedly brought numerous advantages, yet it also carries potential negative outcomes that warrant careful consideration. One significant concern is the risk of over dependence on technology to experience holistic language learning methods. Excessive dependence on AI-driven tools can diminish the role of human interaction, cultural immersion, and emotional connection in language learning. Language is not just about vocabulary, grammar and writing; it's also about forming connections, understanding cultural nuances, and navigating real-world conversations, which AI may not fully replicate. Furthermore, AI's collection of vast amounts of learner data raises significant data privacy and security concerns. Ensuring the responsible and ethical use of this data is a challenge that must be addressed. AI systems, if not carefully designed, can inadvertently perpetuate biases in the content they generate or recommend, potentially reinforcing stereotypes. Technical limitations and inconsistencies in AI systems can also lead to frustrations and impede the learning process. The reduction of human interaction in AI-driven language learning platforms may limit the development of vital communication skills. In summary, while AI offers significant benefits in language learning, acknowledging and addressing these potential negative outcomes is essential to strike a balance between the advantages of technology and the rich, multifaceted nature of language acquisition.

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