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Bridging Global AI Innovations with Local ESL Classrooms: A Conceptual Framework for Adaptive Language Learning Tools

Nur Shahira Mohd Salim[1,2,*], Abhirahmih Rajan[1,3], Melor Md Yunus[1],

[1] Faculty of Education, Universiti Kebangsaan Malaysia, Selangor, Malaysia
[2] SJKC Tanah Mas, Bidor, Perak, Malaysia
[3] SK Bandar Easter, Kota Tinggi, Johor, Malaysia

ABSTRACT

The integration of Artificial Intelligence (AI) in education has rapidly transformed sectors including English as a Second Language (ESL) learning. However, there remains a significant gap in adapting these global AI innovations to local educational contexts, particularly in ESL classrooms. This paper proposes a conceptual framework linking global AI advancements with local ESL practices by focusing on the development of adaptive learning tools to meet the diverse needs of ESL learners. The study synthesizes existing literature on AI applications in language learning and adaptive learning models, addressing both global trends and local educational challenges. Through this literature review, the paper explores AI's potential to personalize learning, enhance language acquisition, and overcome barriers like the digital divide. Expected outcomes suggest that while AI shows promise in fostering engagement and personalized learning, its effective implementation in local ESL classrooms requires attention to contextual factors such as internet access, teacher involvement, and cultural relevance. The proposed framework recommends a hybrid approach that integrates AI tools with traditional teaching practices, ensuring an effective, contextually relevant learning environment. In conclusion, the paper advocates for collaboration among AI developers, educators, and policymakers to adapt AI tools to local needs, offering a direction for future research and implementation of adaptive language learning tools in ESL education.

Keywords: Artificial intelligence (AI); English as a second language (ESL); adaptive learning; educational technology; personalised learning; conceptual framework; AI in education

1. Introduction

Education has been transformed by the rapid developments in artificial intelligence (AI). AI is now an efficient tool that is transforming traditional educational approaches and providing access to more customized, efficient, and engaging learning options. AI-powered tools are transforming language learning by offering personalized education based on each student's needs [1]. Language learning, particularly in the field of teaching English as a second language (ESL), is one of the most potential fields for incorporating AI. By providing personalized learning experiences, AI-driven technologies, such as adaptive learning tools, have shown potential to enhance language acquisition [2].

Despite the huge potential of AI advancements globally, there remain significant challenges in implementing them in local ESL classrooms, particularly in countries like Malaysia, which have distinct educational environments. These challenges include gaps in language proficiency, limited access to

* *Corresponding author.*
E-mail address: p144874@siswa.ukm.edu.my

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technology, and social factors that influence language teaching. In order to overcome these challenges and ensure equitable access for ESL learners, a local adaptation of global AI tools is essential [3]. Therefore, it is crucial to explore how AI can be adapted to meet local needs and maximize its potential in language education [4]. The significance of this study lies in its ability to address these gaps and enhance the academic performance of ESL students in Malaysia by integrating global AI advancements into local educational settings.

The purpose of this study is to provide a conceptual framework for implementing AI-powered adaptive learning resources into Malaysian ESL classes. The proposed framework aims to offer a long-term solution to enhance language acquisition using personalized AI-driven tools that incorporate knowledge from global AI developments while considering local educational environments. This study will explore how these tools may be developed and employed to meet the specific needs of ESL students, advancing the use of AI in education.

1.1 Literature Review

The integration of Artificial Intelligence (AI) in education has rapidly evolved, gaining significant momentum during the COVID-19 pandemic, as highlighted by [5-6]. The pandemic has accelerated the adoption of AI technologies, which has led to more adaptive and technology-driven learning practices [6]. AI-powered tools provide learners with personalised and adaptive learning opportunities in which users may adjust the content based on individual progress, engagement, and preferences [7]. Therefore, there is a significant potential of utilising AI to address learners' diverse needs, particularly in language education.

Studies have highlighted the growing adoption of AI-driven tools in second language acquisition, offering real-time feedback and enhanced learner engagement [8- 9]. In addition, AI- driven adaptive learning systems are widely considered beneficial to learners, as they tailor activities to individual interests and abilities, helping address learner-specific challenges and providing personalised feedback [10]. The study [11] emphasises that such systems enable students to progress at their own pace, enhancing their competency across subjects. Adaptive AI systems have proven to be effective in personalizing content delivery in the classroom. A study [12] highlights how AI can dynamically organize and personalize didactic content based on student profiles, using proximal learning patterns and neural networks to enhance learning outcomes. The study [12] indicates that adaptive AI integration in education plays a crucial role in supporting students' individual learning needs by delivering content tailored to learners' profiles, interests, and abilities. In addition, the findings from another study [13] suggest that AI-based instruction effectively enhances L2 speaking skills and fosters self-regulation among learners, demonstrating the potential of AI to optimize language learning experiences. As highlighted by Mohammad Ali [11], AI-driven tools designed to adapt to individual learner profiles enable content delivery that aligns with students' progress and needs. Through data-driven approaches, these tools offer personalized learning paths, allowing ESL students to work at their own pace while receiving tailored support. In a study by [14], AI-powered language learning platforms such as ELSA Speak, Duolingo, and Babbel, which use machine learning algorithms to analyze learner behavior and provide individualized learning paths, adjust lessons based on learner engagement and performance, offering tailored recommendations for additional practice. Therefore, AI has the potential to function as a personalized tutor by addressing the diverse needs of learners.

AI educational tools also provide immediate feedback and support to students, complementing teacher-led lessons in the classroom. Given that learners often face diverse challenges in mastering new skills [13], the use of adaptive tools can further enhance language acquisition by providing tailored exercises and real-time feedback, thereby increasing learners' proficiency, motivation, and

engagement through personalized learning processes. In the context of English as a Second Language (ESL) education, AI-powered tools can significantly enhance language acquisition by providing targeted practice and timely feedback, thus facilitating faster learning outcomes [15]. Meanwhile, the study [16] found that AI-powered apps, offering instant feedback, can improve language acquisition among young learners. These tools show the potential and effectiveness of AI in enhancing learning outcomes. According to [17], This level of customization also helps in ensuring students' strengths are reinforced, and their weaknesses are addressed, thus accelerating their language development [18]. Moreover, AI systems are not only beneficial in offering personalised exercises, but they also contribute to greater learner engagement by providing real-time feedback that motivates students to continue progressing [11,16]. Therefore, AI plays a critical role in enhancing the overall effectiveness of language learning, particularly in ESL classrooms where learners come from diverse linguistic backgrounds and learning paces. Additionally, adaptive AI systems in ESL classrooms can assist students in mastering writing and grammar through automated grammar feedback [19]. Personalized exercises, tailored to learners of varying levels of language proficiency, help maintain motivation by keeping students engaged [20]. Therefore, through appropriately challenging tasks adapted with AI, learners can remain focused and continue to make progress in their learning.

Despite the promising benefits of AI in language learning, the success of adaptive learning tools in ESL classrooms depends largely on the local context. In Malaysia, where English proficiency varies across regions, these tools must address specific language challenges and disparities in technological access [21]. To achieve this, educators require strong digital literacy skills to bridge the skills gap and foster an agile EFL learning environment. Digital literacy enables teachers and students to access linguistic resources like pronunciation and grammar patterns, thus enhancing the language learning process [21,22] The importance of digital literacy, especially during the COVID-19 pandemic is also about assuring an effective language teaching done by educators [21,23]. Therefore, integrating AI tools into Malaysian ESL classrooms must consider factors such as students' familiarity with technology, resource availability, and cultural context [24]. These considerations are vital for adapting technology to meet the unique needs of diverse learning environments.

The global reach of AI innovations presents a unique opportunity to bridge the gap between international advancements and local educational needs. In the study [26], it is stated that AI technologies that have been developed and tested in more advanced educational systems can be adapted and implemented in countries like Malaysia, where ESL learners often face specific challenges. However, a one-size-fits-all approach may not be feasible, and localized adaptations are essential to maximize the effectiveness of AI tools in these settings [25,26].

To conclude, the literature review emphasises the importance of contextualizing AI tools within the local educational environment, particularly in ESL classrooms. Observing global AI innovations alongside local learner needs can help develop a conceptual framework that ensures adaptive tools effectively support language acquisition.

2. Methodology

2.1 Conceptual Framework for Adaptive Language Learning Tools

Using Malaysia as a particular focus, this paper creates a conceptual framework for the incorporation of AI-powered adaptive learning aids into ESL classes. The framework makes sure that AI-driven technologies are both efficient and suitable for the local educational environment by addressing the gap between global AI advancements and local needs. An analysis of a variety of

research on AI in education, adaptive learning platforms, and ESL education became the basis for the creation of this framework.

2.2 Global Perspective: AI Innovations in Education

This framework highlights how AI technologies have the potential to transform education, based on advancements in the field. By personalizing learning paths and offering real-time feedback, AI-driven tools like machine learning programs, speech recognition systems, and data analysis significantly enhance student engagement [27]. According to the study of [8] on the incorporation of Natural Language Processing (NLP) in AI tools, language learning resources can be customised to meet a range of linguistic and learning backgrounds, translation and language-specific customization, thus ensuring students to progress at their own speed with performance-based interventions.

These global advancements in AI offer a promising direction for improving ESL education, especially when adapted to local contexts. In particular, according to the study [28], AI can provide individual support to ESL students with vocabulary acquisition, grammar proficiency, and pronunciation practice. Another example is the study [29], which stated that AI tools in ESL classrooms enable students to engage with the language use with real-time feedback, which promotes more efficient language learning.

2.3 Local Context: ESL Education in Malaysia

Considering the local context, the framework is designed to address the specific challenges faced by ESL learners in Malaysia. ESL education in Malaysia is marked by diverse language backgrounds, varying levels of English proficiency, and a gap in technological infrastructure between urban and rural areas [3]. Research [30] also highlighted that Malaysian ESL students often struggle with limited exposure to English outside the classroom, affecting their language acquisition and fluency. To cater to these challenges, the framework integrates AI tools that consider the local educational landscape, such as multilingual capabilities to support students who speak different native languages and offline functionality to accommodate regions with limited internet access.

2.4 Framework Components

The conceptual framework comprises several key components:

2.4.1 Personalised learning pathways

The use of AI in language learning allows for the creation of personalised learning pathways that adapt to each learner's unique needs. AI-powered tools analyse students' progress and adjust content to suit their proficiency level, offering individualized exercises that target specific areas of improvement. Personalised learning approaches are also effective in boosting student engagement and learning outcomes by catering to diverse learner profiles [30]. The integration of AI technologies in language learning tools has been demonstrated to provide personalised learning experiences through the analysis of user proficiency and adaptation of lesson content [31,32]. Furthermore, this adaptive approach is particularly beneficial in addressing the varying paces and needs of ESL learners, allowing them to progress at their own rate without feeling overwhelmed [10,32].

The research [33] done on the Cross-Cultural Intelligent Language Learning System (CILS) highlights the use of AI to deliver adaptive and personalized language learning experiences that are

tailored to learners' linguistic and cultural backgrounds. The study identifies CILS as an effective approach to enhance cross-cultural communication by leveraging adaptive AI technologies. Therefore, such personalization of content and methodology significantly improves learners' linguistic proficiency, intercultural competence, and engagement, as demonstrated through applications like Busuu and HelloTalk [33].

2.4.2 Real-time feedback and support

One of the core advantages of AI in education is its ability to provide immediate feedback. In language learning, AI tools offer instant corrections on grammar, pronunciation, and vocabulary usage, which can significantly enhance the learning process. This real-time support not only helps learners understand their mistakes but also reinforces correct usage by providing explanations and resources when necessary. Research indicates that many language learning applications leverage contextual and interactive activities to support learners effectively, making the process more engaging and immersive [34]. By integrating language learning with content mastery, AI-powered applications utilize engaging materials to create opportunities for meaningful language practice [31].

Furthermore, the immediate feedback provided by these tools enhances students' learning efficiency by enabling them to quickly identify and correct their mistakes, which accelerates skill acquisition and reinforces active learning [24]. In higher education, the integration of AI into learning management systems ensures that students can continuously improve their learning through ongoing and adaptive guidance tailored to their specific needs [36]. This approach not only supports learners in overcoming language barriers but also maintains their engagement and motivation throughout the learning journey.

2.4.3 Multilingual support

Considering Malaysia's linguistic diversity, AI tools must provide multilingual support to enhance understanding and inclusivity in language learning. This feature enables students to comprehend English concepts in their native languages, making it easier for them to grasp complex linguistic structures. Research highlights the benefits of multilingual AI systems, especially in multicultural societies where students' first languages vary widely [6]. By offering translation features or bilingual explanations, AI can bridge the gap between different languages, making learning more accessible and effective [36]. Also, the research [33] also emphasises the importance of cultural sensitivity in designing and implementing AI-driven learning systems. Therefore, it can be seen that the growing need for culturally responsive education in Malaysia, in which diverse linguistic backgrounds often present challenges in classroom settings. Thus, the integration of multilingual support and cultural sensitivity in AI tools is crucial in fostering an inclusive and effective learning environment in Malaysia. By recognizing and addressing linguistic and cultural diversity, AI-driven systems can enhance the learning experience for all students, ensuring that language barriers are minimized and educational equity is promoted. As Malaysia continues to embrace digital learning, the development of AI tools that cater to its multicultural and multilingual context will be instrumental in advancing language education for all learners.

2.4.4 Offline accessibility and digital equity

In rural or under-resourced areas, limited internet access remains a significant barrier to the effective use of AI tools. To address this challenge, the framework emphasizes the development of

AI tools capable of functioning offline, ensuring inclusivity for all students, regardless of their geographic or economic background. Offline accessibility is crucial for bridging the digital divide and providing equal educational opportunities, particularly for underserved communities where internet connectivity is often unreliable or unavailable [37].

In the Malaysian context, technology adoption in schools is uneven, especially in rural and suburban areas, due to inadequate facilities and infrastructure [37,38]. This disparity underscores the critical need for AI-driven tools that do not require constant internet access. Offline learning platforms have proven effective in supporting equitable access to education, as they can reach students in remote locations who might otherwise lack access to modern technological resources [39]. Socioeconomic disparities in access to technology and reliable internet connectivity exacerbate inequalities in learning opportunities, thereby widening the gap between students from different backgrounds [39,40]. By prioritizing offline functionality, AI-enhanced learning tools not only offer continuous support for students in underprivileged areas but also contribute to reducing educational inequities, promoting digital equity on a broader scale.

Meanwhile, a study [41] discusses the broader implications of AI on employment in Malaysia, highlighting the need for targeted skills development to address the challenges posed by AI adoption. While this study does not directly focus on AI integration in education, it suggests that the education system must evolve to incorporate AI-related skills and competencies, thus preparing students for the future workforce. This is particularly relevant when considering offline accessibility and digital equity, as students from diverse backgrounds must have equal opportunities to engage with AI technologies. Ensuring access to these tools, especially in underserved areas, will help foster a more inclusive educational environment, promote digital literacy, and reduce the digital divide.

2.4.5 Teacher involvement and guidance

While AI plays a significant role in personalizing content, the involvement of teachers remains essential for ensuring holistic learning. Teachers provide emotional support, motivation, and guidance through complex concepts that AI tools alone cannot address. The study [42] argue that AI should complement traditional teaching methods, with teachers maintaining a central role in monitoring students' overall progress and addressing their non-academic needs. The integration of AI tools should be viewed as part of a collaborative approach, where educators work alongside technology to enhance the learning experience. Research highlights the importance of teacher-student interactions, even in AI-enhanced classrooms, as they foster motivation and a sense of belonging.

2.5 Conceptual Framework Development

The development of the conceptual framework for AI-powered language learning tools follows a mixed-methods approach. This approach combines both conceptual analysis of existing AI technologies and a contextual understanding of the needs and challenges faced by ESL learners, particularly in Malaysia.

2.5.1 Conceptual analysis of AI in education

The initial stage of the framework development involved an extensive review of existing literature on AI technologies in education. This review helped identify key AI tools, such as language learning apps, that have demonstrated positive impacts in global contexts. A careful analysis of these tools,

their capabilities, and their limitations was crucial in shaping the core components of the framework. In particular, the effectiveness of personalised learning pathways, real-time feedback, and multilingual support in AI tools was highlighted as central to enhancing the language learning process for ESL students [43].

2.5.2 Understanding local context and learner needs

The framework also considers the local context of Malaysian ESL classrooms. Malaysia's diverse linguistic and cultural landscape, with multiple languages spoken by students, necessitates the inclusion of multilingual support in AI tools to accommodate various learners' backgrounds [21]. As a multilingual, multiracial country, Malaysia's education sector can benefit significantly from understanding local needs and contexts when developing AI tools for education. The study [44] examines the integration of conversational AI, particularly chatbots like ChatGPT, within problem-based teaching methodologies. This approach offers significant potential, as AI can provide personalized learning experiences that promote cultural understanding and overcome language barriers. By adapting AI tools to the unique linguistic and cultural backgrounds of Malaysian students, educators can ensure that these technologies are inclusive and effective in enhancing educational outcomes in this diverse context. Additionally, it is crucial that AI tools are accessible in both urban and rural areas, given the disparities in technological access and internet connectivity [24]. Research also highlights the importance of considering cultural nuances in teaching and learning, which influence how AI tools should be adapted to ensure they resonate with students' lived experiences.

2.5.3 Addressing barriers to AI adoption in Malaysian classrooms

An important part of the framework's development was recognizing the barriers to AI adoption in Malaysian classrooms. Issues such as lack of teacher digital literacy, insufficient access to technological resources, and resistance to AI integration were identified as key challenges [23]. The study [45] stated that the development process included strategies to overcome these barriers, such as professional development programs for teachers, teacher involvement in tool design, and ensuring AI tools are cost-effective and accessible to all students. By addressing these barriers, the framework aims to create a more inclusive and effective environment for AI adoption in Malaysian classrooms. Overcoming challenges such as digital literacy gaps, resource limitations, and resistance to change is crucial for ensuring that AI tools can be seamlessly integrated into teaching and learning. Through targeted strategies like professional development, teacher involvement, and ensuring accessibility, Malaysia can build a more robust and equitable educational system that leverages AI to enhance learning outcomes for all students.

3. Results

3.1 The Impact and Potential of the Conceptual Framework

Language learning outcomes in Malaysian ESL classrooms could be enhanced by implementing the proposed conceptual framework for AI-driven adaptive learning tools. This framework seeks to address the main challenges faced by ESL learners in Malaysia, leveraging the potential of global AI advancements, with a focus on personalised learning, real-time feedback, and multilingual support.

3.2 Personalised Learning Pathways

The development of customised learning pathways for ESL students is a central objective of the framework. The study on the impact of utilising AI tools on learners' language proficiency and intercultural communication in second language education, highlights that personalised learning approaches can increase learners' engagement and enhance their language retention [9]. In this context, AI-powered tools can be used to design exercises tailored to a learner's ability while also adjusting content delivery based on their achievements. This personalised approach has been shown to improve engagement and retention in language acquisition [46]. Based on AI-adaptive tools and real-time performance, learners are able to progress in their language learning such as grammar and pronunciation at their own pace, improving learning outcomes [8].

Study [46] looks at how AI-generated customised reading texts impacted reading comprehension and engagement among ESL students in secondary schools in Sabah, Malaysia. This study focused on adapting reading materials to meet the individual needs of learners. The results indicated that the AI-generated materials, with their engaging and tailored content, significantly improved reading comprehension, particularly among students with low and intermediate proficiency. Similarly, a study [47] found that personal advancement through AI-driven vocabulary exercises such as in Duolingo app not only improved language comprehension but also led to increased student motivation and higher retention rates. Thus, these studies emphasise the importance of customising AI-driven learning resources to enhance the academic performance of ESL students, especially those at lower and intermediate proficiency levels. The findings align with the framework's primary goal of fostering increased motivation and active engagement in language acquisition.

3.3 Real-Time Feedback and Support

Real-time feedback is one of the most transformative contributions of AI in language learning. AI systems deliver instant corrections and explanations for errors in areas such as pronunciation, sentence structure, and word choice. This immediacy significantly enhances learners' ability to internalize language structures, avoid reinforcing mistakes, and improve fluency [48]. Moreover, real-time feedback is enriched by the integration of AI-enabled resources like grammar guides and pronunciation exercises, which address students' challenges in the moment. The use of AI in communicative language teaching is also beneficial, as it allows learners to access feedback and study materials anytime, anywhere, making language learning more accessible even for students in remote areas [49].

The shift toward virtual learning, supported by AI-powered tools such as ChatGPT, has reduced reliance on traditional face-to-face classrooms. These tools not only provide instant feedback but also reshape learner engagement through features like learning analytics and adaptive support [50]. For instance, AI-driven systems analyse learners' performance to tailor feedback and lessons to their unique needs, integrating educational theories into online platforms to deliver personalised guidance [48]. This real-time support ensures students receive immediate, context-specific feedback while fostering a more dynamic and effective learning experience [15].

3.4 Multilingual and Culturally Relevant Content

The framework's focus on multilingual capabilities is another significant outcome. The study [51] emphasise that integrating cultural nuances into AI responses creates a more relatable and engaging learning environment, thus enhancing the learning experience. AI tools can be utilized to support

learners in their native languages when learning English, ensuring a smoother transition from one language to another. This aspect is particularly crucial in Malaysia, where students speak a variety of languages such as Malay, Mandarin, and Tamil. Offering multilingual support helps students understand complex English concepts through familiar linguistic structures, thus bridging the gap between local language backgrounds and the target language.

Research [52] highlights the potential of AI models that are tailored to local language needs, such as those that better understand Malaysian English. By adapting AI tools to reflect the unique language mix in Malaysia, learners are provided with a more relevant and accessible way to improve their English skills. In addition, according to the study [53], the integration of AI in education within Sabah, Malaysia, requires careful consideration of the region's intricate sociocultural dynamics and equity challenges. Ensuring that technological advancements benefit all students equitably is important to create an inclusive and accessible educational environment.

As Malaysia has a rich linguistic diversity, AI tools designed to cater to these specific needs could greatly enhance language learning experiences, offering more personalised, effective support for students who navigate multiple languages daily. Collaborative partnerships between educational institutions and local communities are the key in ensuring that AI tools are developed and implemented in ways that respect and reflect the local sociocultural context, further promoting inclusivity and equity in educational practices [53]. By recognizing the unique linguistic and cultural context of Malaysia, AI tools have the potential to provide targeted support for students navigating multiple languages in their daily lives.

3.5 Offline Accessibility

This conceptual framework emphasises the importance of offline accessibility as a key component. It is essential to ensure that AI-powered learning tools function effectively without the need for constant internet access, especially in Malaysian regions where internet connectivity may be limited. This approach makes the use of these tools more feasible in rural schools, where the adoption of advanced educational technologies is often hindered by technological barriers.

For instance, initiatives like Learning Equality's Kolibri platform address educational gaps in underserved communities by providing offline access to high-quality educational resources [54]. Similarly, the Moodle App has been implemented in rural Africa to improve learning outcomes, showcasing the potential of offline technologies to enhance education in regions with poor internet access [55].

AI-powered learning tools can play a critical role in bridging the educational divide in Malaysian rural schools through their offline capabilities. By enabling students to access high-quality educational materials regardless of their internet connectivity, these tools ensure that all students have equal opportunities to benefit from innovative learning experiences.

3.6 Teacher Involvement and Professional Development

The study [56] highlighted the importance of teaching sociolinguistic competence to ESL learners in Malaysian schools. They emphasised the need to design language activities that impart sociocultural rules of language and contextual discourse, focusing on universal intelligibility rather than adherence to native accents. Therefore, it is essential for teachers to be aware of the importance of sociocultural context in curriculum delivery.

The framework also highlights the importance of teacher involvement, ensuring that AI tools complement, rather than replace, traditional teaching methods. Teachers will play a crucial role in

guiding students through the learning process [57]. Furthermore, the framework suggests a continuous professional development program for teachers to become proficient in using AI tools effectively within the classroom.

In summary, the results of this conceptual framework demonstrate a clear path forward for the integration of AI technologies into ESL education. By offering personalised learning experiences, immediate feedback, multilingual support, and offline accessibility, the framework addresses the current challenges faced by Malaysian ESL learners while utilizing the potential of global AI innovations to transform local educational practices.

4. Discussion

In this section, the key results of our conceptual framework are interpreted by considering the implications for both global and local ESL education contexts. By bridging AI innovations with local educational needs, this framework presents a unique opportunity to adapt language learning tools to a variety of learner profiles, especially in diverse classroom settings.

4.1 Global Insights: Impact of AI on Language Learning

Globally, AI technologies in education have been widely acknowledged for their potential to enhance language learning through adaptive learning systems, real-time feedback, and personalised learning experiences among learners [50]. The success of AI-powered language tools in various countries illustrates their ability to cater to the diverse needs of learners, providing solutions in addressing the challenges commonly faced in traditional language classrooms [50,59]. The incorporation of AI in ESL instruction aligns with trends towards adapting AI as intelligent tutoring systems, where AI plays an important role in facilitating learners' language acquisition through interactive and dynamic learning environments [60].

However, while AI-powered tools have demonstrated potential in many contexts, the integration into the local ESL classrooms requires careful consideration. Previous research states that local educators must assess the socio-cultural relevance among learners and technological accessibility within their teaching environments [61,62]. The study [63] also stated that students' proficiency in their native language and cultural backgrounds influence their English acquisition, affecting both motivation and learning outcomes. Therefore, it is essential to acknowledge cultural and linguistic diversity, as students' backgrounds shape how they engage with learning tools [53]. According to study [29] AI tools tailored to specific linguistic and cultural contexts yield higher engagement and improved learning outcomes. These findings show the importance of adapting AI technologies to meet local educational needs, a core principle of the proposed framework.

4.2 Local Insights: Addressing Local Contexts in ESL Classrooms

The proposed framework for adaptive language learning tools focuses on integrating global AI innovations while addressing the specific needs of local ESL classrooms. In local contexts, the diversity of students' proficiency levels, technological access, and learning styles demands a contextualized approach to implement AI in education. Therefore, the framework is designed to be flexible with features that can be customised to local educational settings.

While these tools have the potential to transform language learning, several challenges must be addressed for successful integration. In the context of ESL education in Malaysia, AI-driven tools hold significant promise, but their integration into classrooms is not without challenges. Contrary to its

potential benefits, the study [64] stated that despite AI becoming more widespread in ESL instruction, some educators hold misconceptions on AI technology simply as robotic technology, instead of its broader applications in everyday life and education. Such misconceptions may hinder AI adoption in ESL classrooms, limiting its potential to enhance learning [6,65].

In addition, one of the most pressing challenges for local ESL classrooms is the digital divide. In Malaysia, the access to the internet and digital devices is often limited in certain regions particularly rural areas, which affects the effectiveness of AI tools in those contexts [66]. For instance, research [67] highlights how poor connectivity in places like Pulau Tuba in Malaysia limits the use of AI tools in education. To address this, the research suggested mobile apps to be designed for effective low-connectivity or offline use, ensuring that students in these areas can still benefit from AI-driven learning tools. The proposed framework takes this into account by suggesting offline capabilities for AI tools, allowing students to continue learning even without a constant internet connection. Studies on AI-adaptive system [6,7] also supports the idea offering learning resources that can function offline as it may significantly improves engagement in areas with poor internet access, thus enhancing learning experience.

Moreover, the role of teacher involvement in guiding students through the AI-driven learning process is emphasised in the framework. According to study [17], AI tools can evaluate learners' progress, strengths, and weaknesses, enabling the creation of personalised lessons and feedback. However, while AI tools can support personalised learning, they cannot replace the crucial role of the teacher in providing emotional support and mentorship through their pedagogical expertise. Teachers play a crucial role in the effective integration of AI into education by providing guidance and support towards learners in navigating AI tools by ensuring these technologies are utilized to enhance learning outcomes. While AI can offer personalized learning experiences, the irreplaceable human qualities of teachers that is vital in fostering a supportive learning environment [68].

Studies suggest that a blended learning approach, where AI tools are used in conjunction with face-to-face instruction and teacher training, lead to the best outcomes for ESL students [69-70]. Furthermore, the study [71] also emphasises that teachers can shift their focus towards developing students' critical thinking and creativity by using AI as a tool to complement and enrich personalized educational approaches. Teachers can collaborate with AI to build an effective and holistic learning experience. By addressing these local challenges, the proposed framework ensures that AI-driven tools can be effectively implemented in diverse ESL learning environments, bridging the gap between global innovations and local needs.

4.3 Practical Implications and Future Research

This framework has important practical implications for the development and deployment of AI-powered language learning tools. By ensuring that these tools are adaptable to local contexts, we can address the diverse needs of ESL learners across the world. Future research should focus on empirical studies that explore the real-world application of adaptive language learning tools in various global and local contexts. Specifically, more research is needed on the long-term effects of using AI in ESL classrooms, as well as the ethical considerations surrounding AI in education, such as data privacy and the potential for bias in AI algorithms. While AI offers many advantages, it also raises important ethical concerns that need to be addressed. Study [43] pointed out issues such as excessive cognitive load and academic dishonesty such as the prevalence of plagiarism and cheating with use of AI in English Language Teaching (ELT).

A significant ethical concern raised by teachers regarding the use of AI tools in education was highlighted in study [59] plagiarism and unethical practices where students were found to copy entire

assignments generated by AI tools, leading to a negative perception of these technologies among educators. To address the lack of technological expertise among educators, assessment strategies must evolve to mitigate academic and ethical misconduct among learners. Therefore, it is suggested for the establishment of clear ethical guidelines and implementation of strong data protection measures that are crucial in building trust and ensuring the responsible integration of AI in education among learners [45,59].

While the potential of AI in education is often emphasised, it is crucial for educators to remain mindful of its limitations. Furthermore, the study [45] argued that the ethical challenges associated with AI in education are often overlooked, with research typically focusing on its positive impacts in education. The need for further investigation into these issues is stressed to better understand and address the potential risks of implementing AI in educational settings.

Further exploration into the pedagogical practices that best integrate AI tools into ESL classrooms is also important. Research should investigate how AI can complement traditional teaching methods and what teaching strategies are effectively aligned to the usage of AI in language learning. In addition, teacher preparation programs and professional development opportunities should also be focused on helping future educators to integrate AI into their existing curricula, while aligning with the pedagogical goals of their students. Moreover, collaboration between educational technology developers and educators is crucial in creating tools that not only function effectively, but also resonate with local teaching methods, classroom dynamics, and cultural nuances. The impact of teachers engaging with AI developers, sharing their expertise, and guiding the development of educational tools through AI is also significant. By collaborating with developers, teachers can ensure that AI tools are better aligned with the classroom realities and learners' needs [72]. This collaboration fosters the creation of more effective, practical, and relevant educational technologies, leading to improved learning outcomes and a more responsive educational environment [73]. Finally, Teacher preparation programs and professional development opportunities should focus on equipping educators to integrate AI into their curricula. As highlighted by the study [74], incorporating AI into teacher education programs can bridge the gap between instructional strategies and pedagogical goals, thus ultimately enhancing educational outcomes.

4. Conclusions

In conclusion, this conceptual paper presents a framework that integrates global AI advancements with local ESL classrooms, focusing on adaptive language learning resources to enhance language acquisition across diverse learner groups. The integration of modern AI technologies with local schools provides a flexible, scalable solution to the challenges faced in conventional ESL classes [2].

The integration of AI-powered adaptive educational tools holds significant potential for personalised language acquisition, offering ESL students tailored learning experiences and real-time feedback. The study [3] emphasises that local concerns, such as teacher involvement, social relevance, and technical accessibility, must be addressed for AI solutions to be implemented effectively. Addressing the digital divide in resource-limited areas is crucial to ensuring equal access to AI-powered language tools [4]. This approach highlights the importance of collaboration among AI developers, educators, and governments to create educational tools that are both culturally and educationally appropriate.

Future studies should explore the long-term impact of AI in ESL classrooms, particularly in underprivileged and diverse communities [1]. Additionally, ethical issues such as algorithmic bias, data security, and privacy should be thoroughly addressed [2]. To ensure AI technologies enhance,

rather than replace, the role of teachers, the suggested framework emphasises the crucial role of teachers as facilitators in the learning process. By combining AI technologies with teacher expertise, this hybrid approach has the potential to transform ESL instruction, equipping students with the skills necessary to meet the challenges of the 21st century.

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