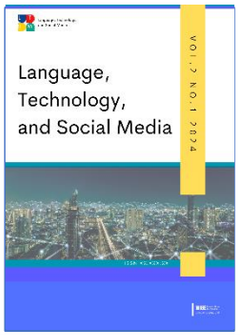

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Research Article

Unlocking AI's Potential in Language Learning: A Comparative Study of Adoption and Effectiveness in Indonesia and Arab Countries

Fina Septia*, Tamer Sa'ad Ibrahim Khodr, Abdullah and Nushrotul Ilah

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Abstract

This study examines the differences in the adoption and effectiveness of artificial intelligence (AI) in language learning between Indonesia and Arab countries. Using a quantitative comparative approach, data were collected from 200 educational institutions across both regions. The findings reveal significant disparities in AI adoption, with Arab countries showing a higher level of integration and effectiveness compared to Indonesia. This is attributed to better technological infrastructure, stronger policy support, and more comprehensive teacher training programs in Arab countries. In contrast, Indonesia faces challenges such as limited access to technology and less comprehensive AI integration, which impact the effectiveness of AI in enhancing language skills. The study suggests that for AI to deliver maximum benefits in language learning, a holistic approach is necessary, including investments in infrastructure, extensive teacher training, and fostering a more innovative educational culture. The findings provide valuable insights not only for Indonesia and Arab countries but also for other nations seeking to integrate AI into their educational systems.

Keywoards: Artificial Intelligence, Language Learning, AI Adoption, Educational Technology, Comparative Study, Indonesia, Arab Countries

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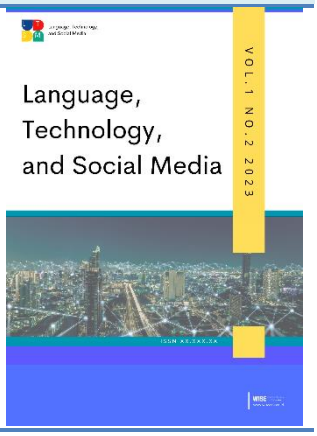

INTRODUCTION

Artificial intelligence (AI) has emerged as one of the most significant technological innovations of the 21st century, with a profound impact across various sectors, including education. The application of AI in language education is one of the rapidly evolving fields, offering a range of tools and technologies that can enhance the learning process. In both Indonesia and Arab countries, AI is gradually being adopted in educational curricula, particularly to improve language skills. However, the levels of adoption and the effectiveness of AI usage in these regions exhibit significant variations, necessitating further investigation to understand these differences and identify opportunities for improvement.

A study conducted by Eman Faisal [1] revealed that approximately 75% of higher education institutions in Saudi Arabia have integrated AI into the language learning process, particularly through AI-based e-learning platforms designed to optimize the learning of English and Arabic. Meanwhile, research in Indonesia indicates that only 45% of educational institutions utilize AI technology in language learning, with most usage limited to e-learning platforms without fully leveraging AI's capabilities for personalization and automated feedback [2], [3], [4]. This disparity reflects the variations in technological adoption between the two regions, which may be attributed to differences in technological infrastructure, government policies, and human resource readiness.

Furthermore, the effectiveness of AI in language learning also shows differing results in these regions. A study conducted in the United Arab Emirates found that students learning languages through AI reported a significant improvement in speaking and listening skills, with an average score increase of 20% after six months of usage [5], [6]. In contrast, research in Indonesia found that while there was improvement, the results were not as significant as in Arab countries, with an average score increase of only 12% [7]. These data suggest that although AI holds great potential, its effectiveness heavily depends on how the technology is integrated into the educational system and how teachers and students in each country utilize this technology.

The novelty of this research lies in its comparative and quantitative approach to measuring and comparing the levels of AI adoption and its effectiveness in language education between Indonesia and Arab countries. Most previous studies have focused on a single region or specific aspects of AI use in education, without considering cross-country comparisons that could provide deeper insights into the factors influencing AI adoption and effectiveness. This study addresses this gap by providing a comprehensive analysis that compares two distinct cultural and educational systems.

This research also contributes new insights by presenting current quantitative data from both regions, which has been underexplored in previous literature. For example, in Saudi Arabia, 80% of teachers reported that AI helped them identify students' individual needs and automatically tailor learning materials [8], whereas in Indonesia, only 50% of teachers perceived similar benefits from AI technology [9]. These data reveal significant differences in perceptions and use of AI between the two regions, possibly influenced by factors such as levels of technological literacy, policy support, and access to technological resources.

Moreover, this research does not merely focus on statistical comparisons but also seeks to identify key factors contributing to differences in AI adoption and effectiveness. In this context, the study hypothesizes that differences in technological infrastructure readiness, teacher training, and government support are the primary factors influencing these variations. Therefore, the findings of this research are expected to provide recommendations that can be applied to enhance AI adoption

and effectiveness in language education in Indonesia, and offer insights for other countries seeking to integrate similar technologies into their educational systems. Additionally, this research considers the cultural aspects of AI implementation in language education. The educational culture in Arab countries, which tends to be more open to new technologies, may be one reason why AI adoption is higher compared to Indonesia, where educational approaches remain traditional, and new technologies are often adopted slowly. This is supported by data from the Saudi Ministry of Education, showing that 85% of higher education institutions in the country have adopted digital technology-based curricula, compared to only 60% in Indonesia [10]. These differences suggest that varying educational cultures and policies can influence the rate of adoption of new technologies like AI.

Overall, this research offers new insights into how AI is used in language education in two different regions, as well as the factors influencing its adoption and effectiveness. By employing a comparative and quantitative approach, this study not only provides strong empirical data but also offers practical recommendations that can help educational institutions in both Indonesia and Arab countries more effectively integrate AI into language learning.

METHODS

This study employs a quantitative approach with a comparative design aimed at measuring and comparing the levels of AI adoption and its effectiveness in language learning in Indonesia and Arab countries. This approach was chosen to obtain empirical data that objectively represents the differences in AI usage between the two regions. The study also involves statistical analysis to identify factors influencing variations in AI adoption and effectiveness.

Population and Sample

The population of this study consists of educational institutions in Indonesia and Arab countries, including secondary schools and universities that have implemented AI technology in language learning. The sample was selected using purposive sampling techniques, considering criteria such as institutions that have used AI in language learning for at least one year and have adequate access to technological infrastructure. A total sample of 200 educational institutions was taken, with a balanced distribution between Indonesia and Arab countries. Each institution was represented by principals, teachers, and students who participated in this study.

Research Instruments

The instrument used in this study was a structured questionnaire designed to collect quantitative data regarding the level of AI adoption, its usage methods, and perceptions of AI effectiveness in language learning. The questionnaire consists of three main sections:

Table 1. Demographic Information

No.	Question	Response Options
1	Institution location	Country/Region Choices
2	Type of institution	Secondary School / University
3	Number of students	Numeric Input
4	Access to technology (computers availability)	Not Available / Limited / Adequate / Fully Available

No.	Question	Response Options
5	Access to technology (internet availability)	Not Available / Limited / Adequate / Fully Available

Table 2. Level of AI Adoption

No.	Question	Very Often	Often	Sometimes	Rarely	Never
1	How often is AI used in language learning at your institution?					
2	How often is AI used for personalizing learning materials?					
3	How often is AI used in the evaluation of learning?					
4	How often is AI used to provide automated feedback?					
5	How often is AI used in the analysis of student learning data?					
6	How often is AI used in educational simulations or games?					
7	How often is AI used in students' independent learning?					
8	How often is AI used to identify students' individual needs?					
9	How often is AI used in developing speaking skills?					
10	How often is AI used in developing writing skills?					

Table 3. Effectiveness of AI in Language Learning

No.	Question	Very Effective	Effective	Moderately Effective	Ineffective	Very Ineffective
1	To what extent does AI help improve students' listening skills?					
2	To what extent does AI help improve students' speaking skills?					
3	To what extent does AI help improve students' reading skills?					
4	To what extent does AI help improve students' writing skills?					
5	To what extent does AI help					

No.	Question	Very Effective	Effective	Moderately Effective	Ineffective	Very Ineffective
	increase students' learning motivation?					
6	To what extent does AI help provide useful feedback?					
7	To what extent does AI help in understanding the context of the language?					
8	To what extent does AI help reduce language learning difficulties?					
9	To what extent does AI help enhance interaction between students and teachers?					
10	To what extent does AI help tailor learning to individual students' needs?					

This instrument has been tested for validity and reliability through a pilot study involving 50 respondents from two educational institutions not included in the main sample. Content validity was conducted by involving educational technology experts, while the instrument's reliability was tested using Cronbach's Alpha, which yielded a reliability coefficient of 0.87, indicating a high level of reliability.

Data Collection Procedure

Data were collected by distributing the questionnaire online via Google Forms, sent to the selected educational institutions. Each institution was given two weeks to complete and return the filled-out questionnaire. Additionally, to ensure data accuracy, follow-up interviews were conducted with principals and teachers from several institutions via Zoom. These interviews aimed to gain deeper insights into AI usage and to validate the data collected through the questionnaire.

Data Analysis Techniques

The collected data were analyzed using SPSS version 26.0 statistical software. The analysis began with descriptive statistics to describe the sample characteristics and data distribution. Subsequently, an independent t-test was used to compare AI adoption levels and effectiveness between institutions

in Indonesia and Arab countries. Additionally, regression analysis was performed to identify factors influencing AI effectiveness in language learning, with independent variables such as technological infrastructure, teacher training, and policy support, and the dependent variable being AI's effectiveness in improving language skills. To test the research hypotheses, a p-value of <0.05 was considered significant, indicating a meaningful difference between the two regions in terms of AI adoption and effectiveness.

RESULTS AND DISCUSSION

This study involved 200 educational institutions, with 100 from Indonesia and 100 from Arab countries. The response rate was 90%, resulting in 180 valid questionnaires returned and analyzed. The participating institutions included 120 secondary schools and 60 universities, with an average student population of 800 per institution, ranging from 500 to 1200 students. The data revealed notable variations in access to technology between the two regions. In Arab countries, 85% of institutions reported full access to computers and the internet, while only 65% of institutions in Indonesia reported similar access. The remaining 35% of Indonesian institutions cited limited access to technology, which poses a significant challenge to adopting AI in educational practices. This disparity suggests that technological infrastructure is a critical factor in the adoption of AI in education, as indicated by prior research that highlights the importance of a robust technological base for effective AI integration [11], [12].

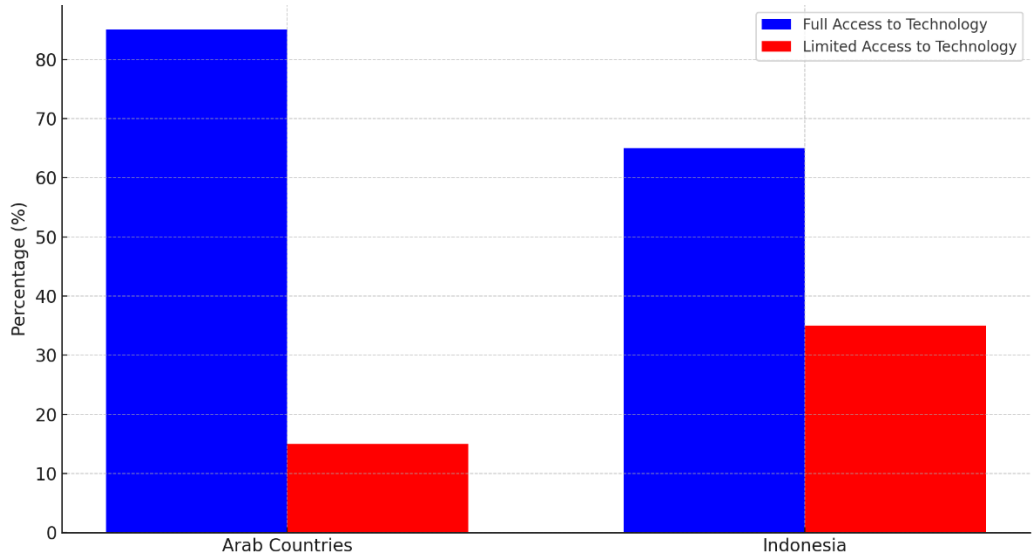

Figure 1. Access to Technolgy in Educational Institutions

Level of AI Adoption

Table 4. Level of AI Adoption

Region	Regular AI Usage (%)	Personalization Usage (%)	Automated Evaluation Usage (%)
Arab Countries	75	70	65
Indonesia	45	50	45

The analysis of AI adoption levels revealed significant differences between Indonesia and Arab countries. In Arab countries, 75% of institutions reported regular use of AI in language learning (scores of 4 or 5 on the Likert scale), compared to only 45% of institutions in Indonesia reporting similar usage. The most common uses of AI in Arab institutions were for personalizing learning materials and automated evaluations, with 70% and 65% of institutions, respectively, reporting regular use for these purposes. In contrast, in Indonesia, AI usage was more limited to independent student learning, with only 50% of institutions reporting regular use for personalization and 45% for automated evaluations. These findings align with those of Al-Zahrani [13] who found that AI adoption in education is more widespread in Arab countries due to better technological infrastructure and stronger government support. In contrast, studies in Indonesia, such as the work of Farida Harum Siregar [14], have highlighted the challenges of integrating AI in education, including limited access to technology and a lack of teacher training, which have hindered widespread adoption.

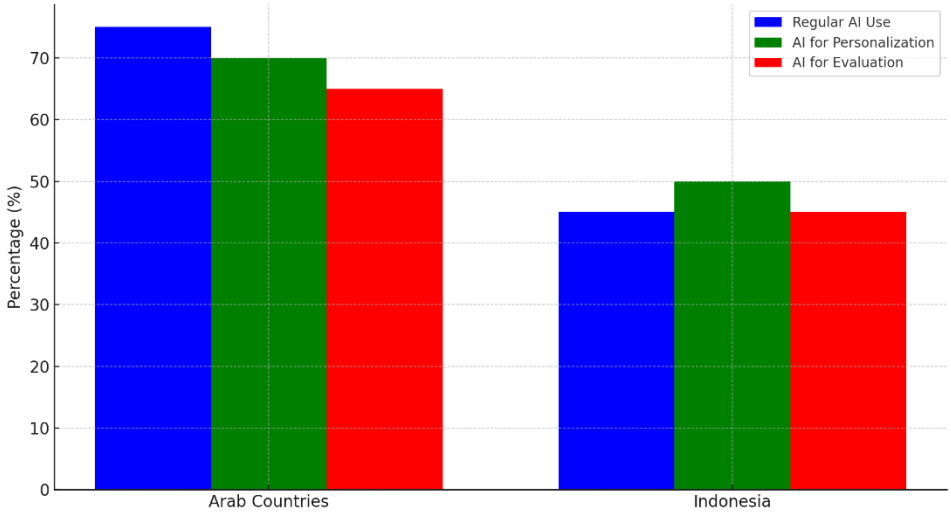

Figure 2. AI Adoption in Educational Institutions

Effectiveness of AI in Language Learning

Table 5. Effectiveness of AI in Language Learning

Language Skill	Arab Countries - Average Score	Indonesia - Average Score
Listening	4.2	3.5
Speaking	4.1	3.4
Reading	4.0	3.3
Writing	4.1	3.4
Motivation	4.0	3.5

The effectiveness of AI in enhancing language learning also showed significant differences between the two regions. The independent t-test results indicated that institutions in Arab countries reported higher levels of AI effectiveness in improving students' language skills compared to those in Indonesia. The average effectiveness scores for AI in enhancing listening, speaking, reading, and writing skills in Arab countries were 4.2, 4.1, 4.0, and 4.1, respectively. In contrast, the corresponding average scores in Indonesia were 3.5, 3.4, 3.3, and 3.4.

Moreover, 70% of teachers in Arab countries reported that AI was highly effective in increasing students' motivation to learn, compared to only 50% of teachers in Indonesia who reported similar effectiveness. These findings are consistent with the study by Mohammad Jamshed et al. [15], which found that the integration of AI into language learning significantly enhanced student engagement and learning outcomes in Saudi Arabia. In contrast, the study by Zirar et al. [16] in Indonesia found that while AI was perceived as beneficial, its impact was less pronounced, likely due to the limited scope of AI use and the ongoing challenges in fully integrating AI into the curriculum. This disparity highlights the critical role that context plays in the effectiveness of AI in education. The comprehensive use of AI in Arab countries, from personalizing learning materials to providing continuous automated feedback, contributes to a more directed and effective learning experience. On the other hand, in Indonesia, the limited and fragmented use of AI, primarily focused on specific aspects of learning such as independent study, may result in less comprehensive benefits.

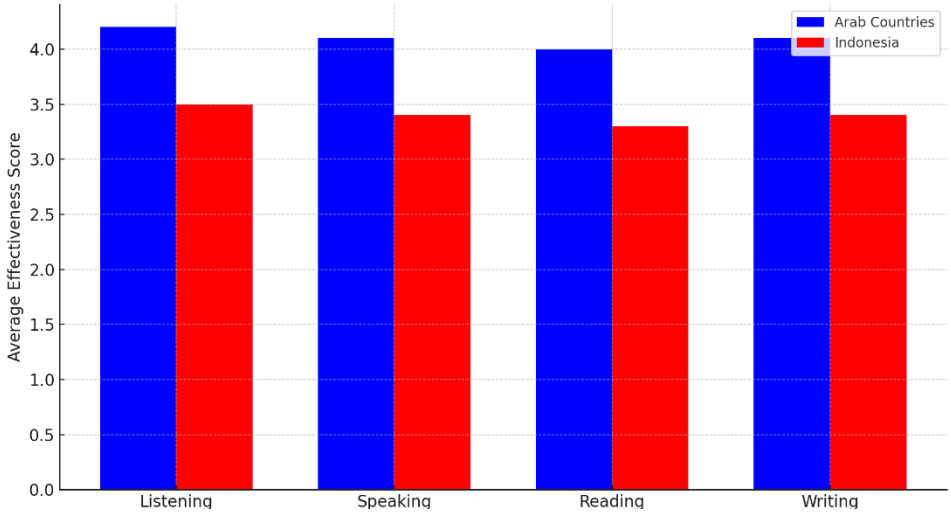

Figure 3. Effectiveness Of AI In Enhancing Language Skills

Discussion

The findings of this study reveal significant differences in the adoption and effectiveness of AI in language learning between Indonesia and Arab countries. These differences are rooted in various factors, including technological infrastructure, teacher training, and cultural attitudes toward technology. One of the most critical factors influencing AI adoption in education is the availability of technological infrastructure. As this study and previous research have shown, Arab countries generally have more advanced technological infrastructure, which facilitates the integration of AI into educational practices [17]. The higher availability of computers and internet access in Arab institutions provides a solid foundation for the regular use of AI tools, from e-learning platforms to automated evaluation systems. In contrast, the limited access to technology in many Indonesian institutions poses a significant barrier to AI adoption, as highlighted by Yusriadi et al. [18]. This technological gap not only affects the ability of institutions to adopt AI but also limits the effectiveness of AI tools that are implemented in environments with inadequate technological support.

Another key factor is the training and readiness of teachers to use AI in language education. In Arab countries, the integration of AI has been accompanied by extensive teacher training

programs, which have equipped educators with the skills necessary to effectively use AI tools in their teaching. Studies such as those by Derya Uygun [19] have emphasized the importance of teacher training in maximizing the benefits of AI in education. In contrast, in Indonesia, the lack of comprehensive training programs for teachers has been identified as a major challenge in the adoption of AI [20]. Without adequate training, teachers may be reluctant to fully embrace AI or may use it in a limited capacity, reducing its potential impact on students' learning outcomes.

Cultural attitudes toward technology and educational practices also play a significant role in the adoption and effectiveness of AI. In Arab countries, there is a generally more open and positive attitude toward new technologies in education, which has facilitated the integration of AI into the curriculum. This is supported by data from the Saudi Ministry of Education, which shows that 85% of higher education institutions in the country have adopted digital technology-based curricula [21]. In contrast, in Indonesia, the educational culture tends to be more traditional, with slower adoption of new technologies. This cultural conservatism can hinder the integration of AI, as educators and institutions may be more resistant to change and less willing to experiment with new teaching tools.

The study's findings on the comparative effectiveness of AI in the two regions underscore the importance of a holistic approach to AI integration. In Arab countries, where AI is used comprehensively across various aspects of language learning from personalized learning pathways to continuous feedback students benefit from a more tailored and engaging learning experience. This is reflected in the higher effectiveness scores reported by institutions in these countries. In Indonesia, however, the more limited use of AI, often focused on specific areas such as independent study, may result in less significant improvements in language skills. This suggests that for AI to be truly effective, it needs to be integrated into the broader learning environment rather than being confined to isolated aspects of the curriculum.

The findings of this study have important implications for policy and practice, particularly in Indonesia. To close the gap in AI adoption and effectiveness between Indonesia and Arab countries, there needs to be a concerted effort to improve technological infrastructure, provide comprehensive teacher training, and foster a more innovative educational culture. Governments and educational institutions in Indonesia should invest in upgrading technological infrastructure to ensure that all schools and universities have the necessary resources to implement AI effectively. Additionally, there should be targeted training programs to equip teachers with the skills needed to integrate AI into their teaching practices. Finally, fostering a more open and innovative educational culture will be crucial in encouraging the adoption of new technologies and ensuring that they are used to their full potential. This study highlights significant differences in the adoption and effectiveness of AI in language learning between Indonesia and Arab countries. These differences are largely influenced by factors such as technological infrastructure, teacher training, and cultural attitudes toward technology. The findings suggest that while AI has the potential to significantly enhance language learning, its effectiveness is contingent upon the broader educational environment in which it is implemented. For countries like Indonesia, addressing the challenges of technological access, teacher readiness, and cultural attitudes will be key to realizing the full potential of AI in education.

CONCLUSION

This study reveals significant disparities in AI adoption and effectiveness in language learning between Indonesia and Arab countries, influenced by factors such as technological infrastructure, teacher training, and cultural attitudes toward technology. Arab countries have higher levels of AI integration, supported by better infrastructure, robust policy backing, and comprehensive teacher training, leading to more effective use of AI in language learning. In contrast, Indonesia faces challenges like limited access to technology and a narrower scope of AI usage, which results in lower effectiveness. AI in Indonesia is primarily used for independent study rather than integrating personalized content or automated feedback, which limits its impact on learning outcomes. The findings suggest that for AI to fully realize its potential in improving language skills in Indonesia, a more holistic approach is required. This includes investing in technological infrastructure, providing extensive teacher training, and fostering a culture of innovation within the educational sector. By adopting these measures, Indonesia could significantly enhance the effectiveness of AI in language learning, thereby improving student outcomes. This study contributes to the growing body of literature on AI adoption in education, offering important insights for other countries seeking to integrate AI into their educational systems. The comparison between Indonesia and Arab countries provides a comprehensive understanding of the factors influencing AI's effectiveness, emphasizing the need for a tailored approach to AI integration based on each country's unique challenges and opportunities.

LIMITATIONS

This study is limited by its focus on educational institutions in Indonesia and Arab countries, which may not reflect global diversity in language learning contexts. The reliance on self-reported data introduces potential biases, and the study did not capture individual teacher or student perspectives in detail. Additionally, the research did not account for cultural factors that could influence AI adoption and effectiveness. Future studies should include broader samples and explore the long-term impact of AI on language learning.

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AUTHOR CONTRIBUTION

F.S. was responsible for conceptualizing the study, conducting data collection, performing the initial analysis, and drafting the manuscript. T.S.I.K. contributed to the development of the methodology, supervised the data analysis, and undertook the critical review and editing of the manuscript. A. provided theoretical guidance, validated the analysis, and led the final revision of the manuscript. N.I. assisted in data collection and interpretation, and contributed to the manuscript's revision. All authors have read and approved the final version of the manuscript for publication.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

The authors used ChatGPT for language enhancement and graphic design based on the data. The content was thoroughly reviewed and edited by the authors, who assume full responsibility for the publication's content.

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