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A Systematic Literature Review: the Use of Artificial Intelligence (AI) in Teaching Malay Language Primary Schools

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ABSTRACT:*Artificial Intelligence (AI) technology plays an important role in the education sector by enhancing the teaching process and offering a more effective classroom experience for students. This systematic literature review aims to evaluate the extent of AI technology integration in the teaching of the Malay language by primary school teachers, identify the factors influencing its use, and examine its impact on teaching. Five databases—Scopus, Web of Science, Google Scholar, MyJurnal, and MyCite—were used to source relevant articles published between 2020 and 2025. From a total of 249 articles retrieved, only 15 were selected for analysis after a screening process guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart. The findings indicate that Malay language teachers' readiness to implement AI in primary schools remains stable across the years. However, there is a disparity in the selection of teacher populations across different school types and locations, with an evident gap between urban and rural school representation. This imbalance is influenced by several factors, including teacher attitudes towards technology, limited exposure to AI tools, and unequal access to technological resources. Despite these challenges, the application of AI in Malay language teaching has shown a positive impact by diversifying instructional methods, enabling personalized learning based on students' needs and capabilities, and enhancing the overall quality of education in line with current educational trends.*

KEYWORDS -*AI technology, teaching, teacher readiness, influencing factors, educational impact*

I. INTRODUCTION

Technological advancements in Malaysia have significantly impacted the education sector. The emergence of Industrial Revolution 5.0, already underway in several developed countries, emphasizes the ethical and human-centered integration of Artificial Intelligence (AI) technology in education. This direction aligns with the launch of the Digital Education Policy (DPD) on 28 November 2023 by Malaysia's Minister of Education, Fadhlina Sidek, aimed at producing digitally fluent students (Fatin SyazanaZulkafali, 2022). Consequently, teachers today are not only expected to focus on foundational literacy skills—reading, writing, and arithmetic—but also to acquire competencies in managing rapidly evolving educational technologies.

AI has emerged as a transformative tool in education. According to Budi Sulistiyo et al. (2024), AI represents a significant technological development increasingly recognized within the education field. Mohamoud Abdeldaim Mohamed and Tahany Sabry (2024) similarly note a substantial rise in AI-powered tools in recent years, with the potential to revolutionize traditional teaching and learning methods. This trend reflects the potential of AI to enhance the quality of education in Malaysia.

However, a 2022 study conducted by the National Higher Education Research Institute revealed that technological literacy among educators and students in Malaysia remains low. Approximately 35% of teachers reportedly lack proficiency in using educational technologies, including AI-based applications. This finding suggests that while AI has potential, its effective implementation is hindered by a gap in digital readiness.

Teachers bear the responsibility of equipping themselves with adequate knowledge and understanding of 21st-century education practices. Their readiness to adopt technological tools is critical to successful integration. This is supported by the Malaysia Education Blueprint (MEB) 2013–2025, which advocates for technology integration in classroom instruction, referencing past achievements and international benchmarks (MEB Executive Summary 2013–2025). Specifically, Shift 7 of Wave 3 emphasizes the use of technology to improve instructional quality and develop high-performing human capital, including competent and motivated educators (Siti Noor Ismail et al., 2020).

Despite these initiatives, many Malaysian teachers express hesitance toward integrating technology in their instruction. As noted by Nur Udhwa Ashikin Mohd Rani et al. (2024), teachers often remain comfortable with teacher-centered approaches that rely minimally on technological tools. Attard et al. (2020) emphasize that the effective use of AI is closely tied to teachers' foundational understanding of the technology. Without adequate training and exposure, teachers are likely to use AI minimally or avoid it altogether. This challenge is particularly evident among senior teachers, who may lack exposure to digital pedagogies (Rubathey et al., 2024). In contrast, novice teachers generally show enthusiasm for AI tools, although environmental constraints and limited AI knowledge may eventually push them back toward traditional methods.

Moreover, teachers recognize the limitations of AI in education. AI tools can assist in sourcing information and recommending instructional content but should not be used as final decision-makers (Chai et al., 2021). Lin (2022) identified instances where AI-based assessment systems incorrectly predicted student performance due to automated data processing errors. Such inaccuracies may demotivate students, especially if flawed assessments cannot be corrected.

Ilyana Jalaluddin (2022) asserts that flexible and creative pedagogical strategies—supported by technological integration—are essential for effective classroom teaching. However, challenges such as infrastructure limitations and digital access inequality continue to hinder the use of AI in schools. According to UNESCO (2021), the digital divide remains a significant barrier, particularly for rural schools and developing regions (Ina Murni Hashim, 2024). This observation is consistent with Saifudin and Hamzah (2023), who attribute the failure to implement technology-enhanced instruction to limited access to technological tools and resources.

Given this context, the present study aims to evaluate the level of AI technology integration in the teaching of Malay language by primary school teachers. Three research objectives were used to guide the selection of articles for the literature review. The findings were synthesized to address these objectives. This systematic literature review was conducted following the guidelines set by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework.

II. RESEARCH OBJECTIVES

This study proposes the following three research objectives:

1. To identify the level of readiness among Malay language teachers in integrating AI technology into teaching at the primary school level.

2. To examine the factors influencing Malay language teachers in innovating their teaching practices using AI.

3. To determine the effects of AI technology integration on the teaching practices of Malay language teachers.

III. RESEARCH METHODOLOGY

SOURCES

Only journal articles published between 2020 and 2025 were included in this study to ensure that the findings are relevant to current issues in the field of education. The reviewed articles were sourced from Scopus, Web of Science, Google Scholar, MyJurnal, and MyCite databases.

ELIGIBILITY CRITERIAS AND EXCLUSIONS

The screening process was conducted after the articles were identified. A set of criteria (Table 1) was applied to determine whether an article would be included or excluded from the study. The first stage of screening involved excluding articles that were systematic literature reviews, book series, books, book chapters, or conference proceedings. Only articles published between 2020 and 2025 were selected for inclusion in this study. The authors reviewed research papers written in both Malay and English. The scope of the review focused specifically on the application of artificial intelligence (AI) technology in teaching by Malay language teachers in Malaysian primary schools. Finally, only articles with full-text access were selected for analysis in accordance with the study's objectives.

Table 1. Eligibility and Exclusion Criteria

Criteria	Inclusion	Exclusion
Source Type	Journal articles	Books, book series, book chapters, systematic literature reviews, and conference proceedings
Language	Malay and English	Languages other than Malay and English
Publication Period	Publications from the most recent five years (2020-2025)	Publications from 2019 and earlier
Research Focus	Application of AI in teaching	Application of AI outside the field of education
Study Subjects	Malay language teachers in primary schools	Teachers of other subjects and those from preschool, secondary school, or university levels
Country of Study	Malaysia	Countries other than Malaysia
Access	Full-text access available	Full-text access not available

SYSTEMATIC REVIEW PROCESS

The researchers found that a significant number of relevant studies were published between 2020 and 2025, as this period saw a rapid increase in the use of technology, particularly following the enforcement of the Movement Control Order (MCO) during the COVID-19 pandemic in Malaysia, which necessitated the implementation of online learning. The journal articles collected were analyzed using the PRISMA method.

This method involves four stages: identification, screening, eligibility, and inclusion. Through this process, relevant journal articles were systematically synthesized. The PRISMA flow diagram is presented in Figure 1, adapted and modified from Page et al. (2021).

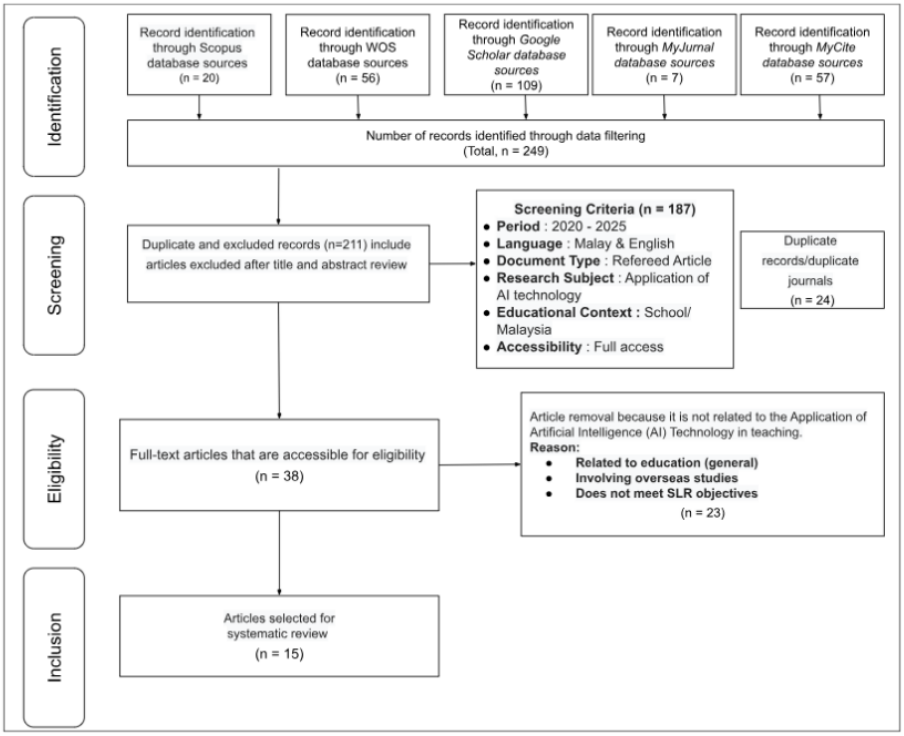

Figure 1. *PRISMA* Systematic Literature Review adapted from Page et al. (2021)

a) Identification

Only journal articles published between 2020 and 2025 were included in this study to ensure that the findings are relevant to current issues in the field of education. The selected articles were sourced from Scopus, Web of Science, Google Scholar, MyJurnal, and MyCite. These five databases are recognized as comprehensive sources of publication metadata and impact indicators. From the selected databases, a total of 249 potentially relevant articles were identified: 20 from Scopus, 56 from Web of Science, 109 from Google Scholar, 7 from MyJurnal, and 57 from MyCite.

Table 2. Database Identification

Database	Keywords
Scopus	'used of technology' or 'artificial intelligence' or ‘teaching’ or ‘school’
Web of Science	'used of technology' or 'teaching' or 'teachers' or 'teacher readiness' or 'school' or 'artificial intelligence' or 'factors influencing teachers in innovating teaching’ or ‘Malaysia'
Google Scholar	'use of technology', and 'teaching', and 'teacher', and 'teacher readiness', and 'artificial intelligence (AI)', and 'factors influencing the improvement of teaching quality'
MyJurnal	‘AI technology’ or ‘teaching’
MyCite	‘Technology in teaching’ and ‘Malay language’

b) Screening

The screening process resulted in the exclusion of 211 articles that did not meet the inclusion criteria for this study. A total of 24 articles were removed due to duplication, while 187 articles were excluded for not fulfilling the predetermined criteria. The screening criteria included: publication within the period of 2020 to 2025, language limited to Malay and English, document type restricted to peer-reviewed journal articles, study subject focused on the application of AI technology, educational context confined to school-based settings in Malaysia, and full-text accessibility. Based on these inclusion and exclusion criteria, 38 articles remained for further evaluation in the next stage of the review process.

c) Eligibility

A total of 38 articles underwent a second round of screening to ensure they met the required standards for inclusion in this study. During this phase, the titles, abstracts, findings, and discussions of the articles were re-examined to support the exclusion process. As a result, 23 articles were removed because they did not address the application of Artificial Intelligence (AI) technology in teaching. These articles were excluded due to their lack of focus on Malay language teaching, being conducted outside of Malaysia, or not aligning with the objectives of the systematic literature review (SLR).

d) Inclusion

Following the screening process, only 15 articles were selected as they met the required standards and criteria of the study.

IV. LIST OF *SYSTEMATIC LITERATURE REVIEW STUDIES*

A total of 15 articles focused on the discussion of the application of AI in teaching. The selection of these studies was guided by the objectives of the research and limited to the keywords specified in this article. Table 3 presents the details of the 15 journal articles and conference proceedings identified through the systematic literature review (SLR), including the authors' names, year of publication, titles, links, and key findings.

Table 3. Analysis of study data

Bil.	Author's name	Year of Publication	Method	Title	Links	Result
1.	Muhammad HamideeRidzuan	2024	Qualitative	Innovative Pedagogy: The Synergy of AI And Communication For 21st Century Teaching	https://journal.uitm.edu.my/ojs/index.php/e-JOMS/article/view/4955/2573	Educators often face various challenges such as: ● Time constraints ● Lack of training ● Uncertainty regarding the effectiveness of AI in teaching. The use of AI significantly increases pedagogical effectiveness.
2.	Noormarizan Mohamed Nawi & Ariff Mohamad	2024	Quantitative	The Relationship Between Technology Mastery in Online Malay Language Teaching and Listening and Speaking Skills	https://www.msocialsciences.com/index.php/mjssh/article/view/2491	The level of information technology knowledge of Malay Language teachers during the Covid-19 pandemic is not positive, with most teachers not having knowledge of online systems.
3.	Intan Marfarrina Omar et al.	2021	Quantitative	Level of Technology Knowledge, Skills and Use of ICT in Teaching and Facilitation of Malay Language Teachers in Kelantan	https://jupidi.um.edu.my/article/view/28475	● Respondents in this study have a high level of technological knowledge, but their ICT skills are still at a moderate level. ● Malay teachers are not given the opportunity to attend intensive courses regularly related to skills in developing programs using writing systems or language using technology.

4.	Norhana Ahad	2024	Quantitative	Practices of Melaka Polytechnic (PMK) Staff on the Use of Artificial Intelligence (AI) Applications in the Teaching Process	https://lnk.ink/jurnalAI	89.8% have knowledge about AI and often use this technology. The level of knowledge and frequency of use of AI among respondents is high.
5.	Mohd Effizan Wahid &Rosnidar Ain	2025	Quantitative Qualitative	Integration of Artificial Intelligence in Poetry: A Revolution in Creative Teaching and Learning	https://lnk.ink/jurnalAI2	● Learning using AI shows low student engagement in: ■ Problem-solving skills ■ Discussion ● Constraints in such activities are believed to affect the potential of AI in improving students' understanding of pantun. ● Constraints in student access to AI are caused by factors such as: ■ Lack of access to technological devices such as smartphones and computers.
6.	Azura Senawi et al.	2024	Quantitative Qualitative	Attitudes and Motivations of Malay Teachers in Chinese Private Schools in Applying Artificial Intelligence for Teaching Malay as a Second Language	https://spaj.ukm.my/jpbm/index.php/jpbm/article/view/396	● AI can help improve the quality and standard of education by providing better tools and resources for teachers and students. ● Teaching techniques have also changed, from conventional teaching methods to technology-based methods. ● All study participants were skilled in using popular AI applications, namely Chat GPT, Pelantar e-school, Quizizz and Kahoot.

7.	Regina Kana et al.	2024	Quantitative	The Effectiveness and Impact of Using Artificial Intelligence Technology in Teaching Malay Language Literacy Skills for Iban Students in Rural Primary Schools in Kapit District	https://spaj.ukm.my/jpbm/index.php/jpbm/article/view/397	The study findings show that: ● The level of effectiveness of AI in teaching Malay language literacy skills is at a moderate level overall (mean 2.76). ● The impact of using AI in teaching Malay language literacy skills is at a moderate level overall (mean 2.72). ● The use of AI technology in the teaching process has proven effective in improving students' understanding, literacy skills and interest in learning Malay.
8.	Sarah Alia Mohamed Faisal & Nor Hafizah Adnan	2021	Quantitative	Level of Teacher Readiness and Acceptance in Practicing the Use of Digital Technology Ri 4.0 as Teaching Aids in Primary Education	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=1qhy5tEAAAAJ&citation_for_view=1qhy5tEAAAAJ:5nxA0vEk-isC	● The level of readiness of teachers in practicing the use of RI 4.0 digital technology as teaching aids in primary education is at a moderate level. ● A total of 70 respondents did not agree that they had been exposed to digital technology information. ● Many teachers have still not been given exposure to this digital technology.
9.	Muhammad Syarifuddin Abd Razak et al.	2024	Quantitative	Development of Self-Learning Materials Based on Artificial Intelligence: Needs Analysis Based on	https://ejournal.upsi.edu.my/index.php/JPB/article/download/9743/5331	● All teachers (100%) agreed on the need to develop AI-based self-learning materials. ● The majority of teachers (83.3%) chose interactive modules as the appropriate type of AI-based self-learning materials.

				Teacher Perceptions		
10.	Salbihana Samsudin et al.	2024	Qualitative	Prospective Teachers' Perceptions of the Impact of Artificial Intelligence (AI) Applications in Teaching and Learning	http://eprints.iab.edu.my/v2/id/eprint/1565	● 100% of teacher trainees agree that AI applications: ● Make it easier to find teaching materials ● Increase student interest ● Help determine appropriate teaching methods.
11.	Maya Shafiqah Shaharom et al.	2024	Quantitative	Level of Teacher Knowledge Competence on the Use of Technology-Based Materials in Teaching in the State of Selangor	https://attarbawiy.uis.edu.my/index.php/jurnal/article/view/210	Teachers have a moderately high level of knowledge in the use of technology-based teaching aids.
12.	Nor Asiah Mohamad @ Razak et al.	2024	Qualitative	Exploring Challenges and Impacts: Views from School Teachers in Teaching Malay Language Subjects in Virtual Learning Environments	https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4918013	● Virtual learning using applications such as Zoom, Skype, MS Teams, Google Hangout, Google Meet, Whatsapp and many more can open up more opportunities for teachers to explore various existing teaching and learning methods. ● Puts pressure on teachers especially in preparing teaching materials. ● Still not confident in the transparency found in the

						assessments that students do themselves at home online.
13.	Nur Udhwa Ashikin Mohd Rani et al.	2024	Quantitative	Willingness of Malay Language Teachers to Implement Artificial Intelligence in Teaching	https://spaj.ukm.my/jpbm/index.php/jpbm/article/view/394	● The level of readiness of Malay language teachers in implementing AI for teaching is at a high level with an overall mean value of 4.47. ● The factor that obtained the highest mean value (mean 4.68) in influencing the level of readiness of Malay language teachers to implement AI in teaching is the factor of knowledge and skills.
14.	Geoffrey F. C. Lim et al.	2024	Quantitative	Integrating Technology in Education: The Challenge for Teachers	https://www.researchgate.net/profile/Geoffrey-F-C-Lim/publication/379084171_Pengintegrasian_Teknologi_dalam_Pendidikan_Cabaran_Guru_Contrastive_Analysis_Technological_Integration_in_Education_Challenges_for_Educators/links/65faabe3f3b56b5b2d15a59	Among the challenges identified are: ● Lack of training ● Low technical skills ● Teachers' attitudes towards technology ● Cost and resource constraints ● Difficulties in providing digital teaching materials

					5/Pengintegrasian-Teknologi-dalam-Pendidikan-Cabaran-Guru-Contrastive-Analysis-Technological-Integration-in-Education-Challenges-for-Educators.pdf	
15.	Dahliyah Abdul Jalil	2024	Quantitative	Understanding and Use of Artificial Intelligence (AI) in Teaching by Primary School Teachers in Semporna District	https://ejournal.upsi.edu.my/index.php/JPB/article/download/10531/5379	There are several barriers identified: ● Lack of training ● Limited resources ● Concerns about the impact of artificial intelligence (AI) on the role of teachers.

V. RESEARCH RESULT

Objective 1: To Identify The Level Of Readiness Among Malay Language Teachers In Integrating AI Technology Into Teaching AtThe Primary School Level

Based on the article analysis, the level of teachers' readiness in applying AI technology in classroom teaching can be categorized into three levels: low, moderate, and high. This classification is presented in Table 5, which is divided into three sections, each highlighting studies that correspond to the respective readiness levels.

Table 4. The level of readiness teacher in applying AI in teaching

The Level Of Readiness Among Malay Language Teachers In Integrating AI Technology Into Teaching	Article Research
Low and not comprehensive	● Geoffrey F. C. Lim et al. (2024) ● Muhammad Syarifuddin Abd Razak et al. (2024) ● Sarah Alia Mohamed Faisal & Nor Hafizah Adnan (2021)
Moderate level due to lack of preparation and lack of exposure to implementing AI technology-based teaching	● Intan Marfarrina Omar et al. (2021) ● Dahliyah Abdul Jalil (2024) ● Salbihana Samsudin et al. (2024)
High and ready to implement teaching by integrating AI technology well	● Nur Udhwa Ashikin Mohd Rani et al. (2024) ● Azura Senawi et al. (2024) ● Maya Shafiqah Shaharom et al. (2024)

For the low level of teacher readiness, this is supported by three analyzed articles. The analysis clearly shows that teachers are more comfortable using traditional teaching methods compared to AI technology, due to their limited proficiency in using AI software and equipment. Additionally, significant time is required to set up ICT tools, further discouraging the use of such technologies in teaching.

In contrast, the moderate level of teacher readiness is evidenced by the study of Intan Marfarina Omar and Dahliyah Abdul Jalil (2024), which states that teachers' technological skills are at a moderate level because they are not regularly given opportunities to attend intensive courses related to developing language-based programs or systems using AI technologies.

As for the high level of teacher readiness, this is demonstrated in three articles. The study by Nur Udhwa Ashikin Mohd Rani et al. (2024) reported an overall readiness mean score of 4.47, indicating that Malay language teachers agreed that the use of AI facilitates the process of finding teaching materials. These findings are consistent with studies by Salbihana Samsudin et al. (2024) and Azura Senawi et al. (2024), which found that AI applications in education enable teachers to access a wide range of teaching materials without limitations, thereby promoting broader information sharing. The researchers also noted that foundational knowledge and skills in AI technology allow Malay language teachers to effectively and appropriately utilize AI in alignment with their intended learning objectives.

Objective 2 : To Examine The Factors Influencing Malay Language Teachers In Innovating Their Teaching Practices Through The Use Of AI

Table 5 presents the factors influencing teachers in innovating their teaching practices using AI, as identified from the reviewed articles. Three key factors were found to affect teachers' integration of AI technology into the teaching and learning process.

Table 5. Factors Influencing Malay Language Teachers In Innovating Their Teaching Practices Through The Use Of AI

Factors Influencing Malay Language Teachers In Innovating Their Teaching Practices Through The Use Of AI	**Article Research**
Access to technological equipment and resources, including stable internet connectivity	● Geoffrey F. C. Lim et al. (2024) ● Nor Asiah Mohamad @ Razak (2024)
Teachers' knowledge and skills in using AI technology	● Dahliyah Abdul Jalil (2024) ● Nur Udhwa Ashikin Mohd Rani et al. (2024) ● Intan Marfarrina Omar et al. (2021) ● Regina Kana et al. (2024)
A positive attitude towards AI technology encourages teachers to adopt AI in their teaching practices	● Azura Senawi et al. (2024) ● Norhana Ahad (2024)

Based on Table 5, which summarizes the factors influencing teachers in innovating their teaching using AI, researchers have identified three main factors that affect the integration of AI technology into teaching: access to technological equipment and resources (including stable internet access), teachers' knowledge and skills in using AI, and positive attitudes toward AI technology. These factors encourage teachers to adopt AI in their instructional practices and innovate the teaching and learning process (T&L) to enhance teaching quality and diversify instructional approaches according to students' varying needs in the classroom.

Two articles highlighted that limited access to equipment and technological resources, including unstable internet connections, contributes to some teachers' lack of readiness to apply AI in their teaching. Geoffrey F. C. Lim et al. (2024) reported that teachers often spend a significant amount of time setting up ICT equipment before class begins, which discourages them from integrating AI and leads them to prefer conventional teaching methods in the classroom.

Additionally, four articles emphasized that teachers' knowledge and skills in using AI are crucial factors motivating them to adopt AI in teaching. Intan Idura Mohamad Isa and Hishamuddin Ahmad (2024) noted that sufficient knowledge and technical competence enable teachers to effectively integrate AI into the teaching process. At the same time, basic knowledge and skills allow teachers to operate related tools and software during instruction. These findings are consistent with the study by Normadiah Mohamad and Rafizah Daud (2023), which states that one of the key determinants influencing teachers' readiness to use AI effectively is their level of knowledge and expertise. Thus, teachers who can successfully integrate AI in the classroom are likely to possess high levels of understanding, enabling them to fully utilize AI tools and diversify their teaching strategies.

Article analysis also highlights that teachers' positive attitudes toward AI technology play a vital role in enhancing their motivation to integrate AI, improve instructional quality, and diversify teaching methods based on students' needs and diversity. The analysis shows that negative attitudes—such as resistance to technological change and continued reliance on traditional methods—can hinder effective AI integration. Therefore, cultivating a positive mindset is essential in encouraging Malay language teachers to design and implement AI-enhanced instruction to improve students' comprehension and language learning skills.

Objective 3: To Determine The Effects Of AI Technology Integration on The Teaching Practices Of Malay Language Teachers

The application of AI-based learning tools in the teaching process not only enhances the quality of instruction but also improves students' academic achievement. Table 6 presents three key impacts of AI technology integration in the teaching of Malay language, specifically related to teachers, students, and the overall quality of education.

Table 6. The Effects Of AI Technology Integration OnThe Teaching Practices Of Malay Language Teachers

The Effects Of AI Technology Integration OnThe Teaching Practices Of Malay Language Teachers	**Article Research**
TEACHERS Diversifying teachers' instructional methods to be more creative and innovative	● Geoffrey F. C. Lim et al. (2024) ● Noormarizan Mohamed Nawi & Ariff Mohamad (2024)
STUDENTS Designing instruction based on students' needs and abilities	● Nor Asiah Mohamad @ Razak (2024) ● Azura Senawi et al. (2024) ● Norhana Ahad (2024) ● Geoffrey F. C. Lim et al. (2024) ● Regina Kana et al. (2024) ● Azura Senawi et al. (2024 ● hammadHamideeRidzuan (2024)
EDUCATION QUALITY Enhancing the quality of education by addressing the educational gap	● Regina Kana et al. (2024) ● Mohd Effizan Wahid et al. (2025)

Based on Table 6, the findings from the reviewed articles indicate that the application of AI technology in the teaching of Malay language can be seen through the diversification of instructional methods that are more creative and innovative, tailored to students' needs and current educational trends. The emergence of AI technology has prompted a necessary shift in instructional approaches, moving away from teacher-centered methods focused solely on delivering knowledge, to approaches where teachers act as facilitators, encouraging students to think critically and creatively. This clearly demonstrates that AI integration enables teaching practices to become more innovative and aligned with the diverse needs of students in the classroom.

In addition, researchers highlighted that the use of AI allows teachers to design instruction according to students' individual needs and abilities. This is supported by Nur Udhwaashikin Mohd Rani et al. (2024), who asserted that integrating AI into Malay language teaching promotes personalized learning, enabling students to

learn at their own pace and level of ability to achieve learning objectives. In this context, AI provides teachers with access to a wide range of educational resources appropriate to each student's level and capabilities, ultimately helping students achieve learning outcomes more effectively.

Furthermore, the impact of AI integration in Malay language teaching is evident in its alignment with the needs of contemporary education, particularly in bridging the gap between urban and rural students by providing equal access to high-quality learning resources. These findings are consistent with the perspective of Kashveenjit Kaur (2021), who noted that the use of AI in education not only transforms the education system but also reshapes the way knowledge is shared, and learning is approached, thereby expanding students' skills and knowledge in line with global challenges.

VI. RESEARCH DISCUSSION

Teachers' Readiness Level in the Application of AI Technology in Teaching

Based on the study's findings, it was revealed that the readiness level of Malay language teachers to integrate AI technology into their teaching is generally high and positive, leading to more creative and innovative instructional practices that align with current educational developments and students' needs. However, some findings also indicate that the readiness of certain Malay language teachers to apply AI technology in education is not comprehensive and remains uneven.

A. Teachers' readiness level is neither comprehensive nor consistent.

The findings indicate that the readiness level of teachers to use technology in teaching remains incomplete and inconsistent. Primary school teachers are still generally unprepared to integrate AI technology into their teaching practices due to limited proficiency, time constraints, and technical issues, including poor internet connectivity in schools, which hinders the effective use of technology. This is consistent with the view of Siti Aishah Zainudin and Kamariah Abu Bakar (2021), who noted that teachers often spend a significant amount of time setting up ICT equipment before lessons begin—unless a dedicated classroom is available with pre-installed tools.

Furthermore, teachers' lack of interest or willingness to learn about new technologies also influences their level of readiness to integrate AI in the teaching process. This is supported by Geoffrey F. C. Lim et al. (2024), who emphasized that teacher attitudes are a key factor affecting readiness to incorporate AI technology in instruction.

On the other hand, ZetraHainul Putra et al. (2022) stated that the application of AI in education facilitates more efficient, structured, and goal-oriented task execution. In the educational context, integrating technology into teaching helps to bridge instructional gaps and address the limitations of traditional teaching methods (Raphaella Batha Augustine Sampar &Suziyani Mohamed, 2023). This suggests that technology integration is crucial for fostering more creative and innovative teaching practices that align with current educational developments and the diverse needs of students, ultimately leading to improved learning outcomes.

Therefore, Malay language teachers must be adequately prepared to optimize the use of AI in teaching. As noted by Mohd AzuanTukiar et al. (2022), readiness to implement technology remains a significant challenge for the effective integration of AI into instructional practices.

B. The level of teachers' readiness is generally high and satisfactory

The findings revealed that teachers' readiness to integrate technology into teaching is generally high and positive. This analysis indicates that teachers demonstrate a willingness to adopt new digital skills and are

open to effectively integrating technology into their instructional practices (Intan Marfarrina Omar et al., 2021; Dahliyah Abdul Jalil, 2024; Salbihana Samsudin et al., 2024). A high level of readiness reflects teachers' acceptance and acquisition of new technological competencies, which aligns with current educational trends. This enables them to integrate technology in more creative ways, offering students better learning opportunities and supporting the achievement of learning outcomes more effectively.

As a result, teachers are able to diversify their teaching methods and instructional materials based on students' varied needs through the integration of technology (Muhammad Syarifuddin Abd Razak et al., 2024). However, a high level of readiness does not guarantee comprehensive technology integration if time constraints and technical issues continue to hinder implementation. For instance, Siti Aishah Zainudin & Kamariah Abu Bakar (2021) noted that teachers often spend significant time setting up ICT equipment before class, which limits their ability to conduct technology-based lessons efficiently.

Overall, the findings show that the readiness level of Malay language teachers to apply technology in primary school teaching is inconsistent, and influenced by several factors, including teacher preparedness, acceptance of new technological skills, and unavoidable time and technical limitations. Moreover, Diantama (2023) emphasized that the use of AI technology in teaching not only exposes students to digital tools but also promotes collaboration, creativity, and the achievement of higher-quality learning outcomes.

Therefore, the readiness of Malay language teachers to incorporate technology into their teaching practices must be continuously improved through workshops, briefings, and professional development courses focused on technological skills (Geoffrey F. C. Lim et al., 2024). This is essential to ensure that teachers are able to deliver instruction that is effective, creative, and high in quality, ultimately enhancing students' learning outcomes in the classroom.

Factors Influencing Teachers in Innovating Instruction Through the Use of AI

Based on the research findings, three key factors influence teachers in integrating AI technology into their teaching: access to equipment and technological resources, teachers' knowledge and skills in using AI technology, and a positive attitude towards AI. These factors encourage Malay language teachers to adopt AI in their instruction, enabling them to diversify their teaching methods in more creative ways that are tailored to students' abilities and capabilities, ultimately supporting the achievement of learning outcomes.

a) Access to Equipment and Technological Resources

AI technology should be inclusively integrated to ensure accessibility for all students, regardless of their backgrounds or abilities, throughout the teaching process (Intan Idura Mohamad Isa & Hishamuddin Ahmad, 2024). This aligns with the goals of the Malaysian Education Development Plan (PPPM 2013–2025), whereby the Ministry of Education Malaysia (KPM) introduced digital learning as a process in which teachers utilise digital technology to achieve objectives during lessons (UsninZolhilmi Adnan & Hazrati Husnin, 2024). However, some teachers argue that access to technological equipment and resources, including stable internet connectivity, poses a challenge in incorporating AI into classroom teaching (Geoffrey F. C. Lim et al., 2024; Nor Asiah Mohamad @ Razak, 2024). This is due to a lack of infrastructure and technological resources, prompting teachers to lean more towards conventional teaching methods. Geoffrey F. C. Lim et al. (2024) also emphasisethat teachers must have adequate access to equipment and technological resources in order to successfully integrate them into teaching. Therefore, sufficient access to these tools and the extent of teachers' access are crucial in ensuring effective use of AI technology in teaching the Malay language.

b) Teachers' Knowledge and Skills in Using AI Technology

A lack of fundamental understanding of AI prevents educators from fully utilising the technology in their teaching (Dewanto, A. C., 2023). In this regard, research findings underscore the importance of having basic knowledge and skills in AI to enable teachers to integrate it effectively, thereby enhancing the quality of instruction through more creative and innovative teaching approaches. This is because educators who receive adequate training and learning opportunities are better equipped to use AI technology efficiently in the teaching process (Intan Marfarrina Omar et al., 2021). This aligns with the findings of Regina Kana et al. (2024), which highlight the challenge of limited teacher training, particularly in rural schools, when it comes to adopting technology. Furthermore, sufficient teacher knowledge and skills not only allow for effective lesson planning using AI, but also enable teachers to understand and manage related tools and software (Thian Khian Niam &Zaimuariffudin Shukri Nordin, 2024). Similarly, Dahliyah Abdul Jalil (2024) found that preschool teachers who were trained in using AI creatively applied the technology in early childhood education. Consequently, these findings clearly illustrate that when Malay language teachers are equipped with the necessary AI-related knowledge and skills, they are empowered to design more creative teaching activities that align with 21st-century pedagogical needs and cater to students' diverse learning requirements.

c) A Positive Attitude Towards AI Technology Encourages Teachers to Use AI in Teaching

According to Azura Senawi et al. (2024), teachers who possess a positive attitude towards technology are more inclined to explore and utilise AI in their teaching practices. This means that a teacher's positive mindset increases their willingness to adopt AI technology and to design AI-based classroom activities aimed at enhancing teaching quality and promoting digital literacy among students (Geoffrey F. C. Lim et al., 2024). In line with this, two studies highlight that teachers' attitudes towards AI technology are a key determinant in the acceptance and integration of AI in education. These findings indicate that a positive attitude encourages teachers to use AI tools during instruction, whereas a negative outlook may hinder them from exploring the technology's potential in improving the quality of Malay language teaching.

Although Tan & Yap (2024) point out that the integration of AI in teaching still faces challenges, particularly because some teachers lack a strong technological background, this lack of exposure contributes to a reluctance to explore AI for producing more engaging and learner-centred teaching materials, which in turn affects teaching quality.

In summary, the analysis reveals that access to equipment and technological resources, teacher training on AI, and a positive attitude towards AI are crucial factors in encouraging teachers to adopt AI in their teaching. These factors significantly influence teachers' ability to innovate in their instructional methods using AI to enhance teaching quality. At the same time, AI contributes to the creation of engaging and effective learning experiences that cater to students' diverse needs in the classroom (Geoffrey F. C. Lim et al., 2024; Nor Asiah Mohamad @ Razak, 2024; Dahliyah Abdul Jalil, 2024; Nur Udhwa Ashikin Mohd Rani et al., 2024; Intan Marfarrina Omar et al., 2021; Regina Kana et al., 2024; Azura Senawi et al., 2024; Norhana Ahad, 2024). Ultimately, technological knowledge and appropriate training are key to enhancing the application and effectiveness of AI in teaching and learning, particularly in the Malay language subject.

Impacts of Applying Artificial Intelligence (AI) Technology in Malay Language Teaching

Based on research findings, there are three key impacts of applying AI technology in the teaching of the Malay language. These include diversifying teachers' instructional methods to accommodate students from various educational backgrounds, planning lessons according to learners' individual needs and abilities, and enhancing the overall quality of education by addressing educational disparities.

a) Diversifying Teachers' Teaching Methods According to Students' Varied Educational Backgrounds

Raphaella Batha Augustine Sampar and Suziyani Mohamed (2023) assert that integrating technology into teaching helps teachers bridge gaps and address the limitations of traditional teaching methods. This suggests that the integration of AI technology supports teachers in providing a variety of engaging and appropriate teaching materials tailored to the diverse needs of students in the classroom. This aligns with the findings of Azura Senawi et al. (2024), who demonstrate that the use of AI in Malay language teaching continues to positively influence teachers by helping them design more targeted lessons focused on individual learner needs. According to Muhammad Syarifuddin Abd Razak (2024), integrating AI technology into the learning process enables students to solve problems progressively based on their individual capabilities. Through this approach, teachers can support the development of students' problem-solving abilities effectively, in line with their learning capacities in the Malay language.

Clearly, the use of AI technology in Malay language teaching assists teachers in diversifying their instructional strategies according to students' levels of understanding and learning needs, while also allowing them to monitor learners' progress—thereby improving overall teaching quality. Ultimately, the effectiveness of AI in this context enhances the creative delivery of instruction that caters to student diversity, leading to improved learning outcomes and greater interest and motivation among students from various educational backgrounds to learn the language.

b) Planning Lessons According to Students' Needs and Abilities

Research findings indicate that the effectiveness of using AI technology lies in enhancing student learning by providing instruction tailored to their proficiency levels, creating meaningful learning experiences, and motivating them to continue learning the language in the classroom. With AI, teachers are able to adapt their teaching according to the specific needs and learning capacities of each student, which in turn fosters greater interest in learning the Malay language.This is consistent with a study by Lin (2022), which found that AI can support the development of personalised learning by analysing students' mastery of skills, delivering optimised educational activities, and encouraging learners to study at their own pace to achieve learning goals. Consequently, the use of AI technology by teachers is highly effective in planning lessons that match each student's needs and abilities, enabling them to maximize their learning outcomes. Supporting this, a study by Azura Senawi et al. (2024) confirms that AI-based teaching meets individual student needs, particularly for those learning Malay as a second language. Similarly, Regina Kana et al. (2024) note that AI helps overcome challenges in understanding grammar by offering exercises tailored to students' weaknesses. These findings suggest that the integration of AI into teaching improves student learning by providing customised and differentiated learning activities, helping learners improve their mastery and achieve their full potential in Malay language education.

Moreover, AI tools offer interactive and engaging learning materials that boost student interest in acquiring language skills (Nur Hazilah Omar, 2023). At the same time, AI enhances students' digital literacy in line with the Ministry of Education Malaysia's goal to nurture a tech-savvy generation. This aligns with the new curriculum to be introduced in 2027, which places emphasis on students' digital fluency (Dahliyah Abdul Jalil, 2024). It is therefore evident that the successful integration of AI technology not only raises the standard of teaching but also significantly enriches student learning, especially for those from diverse educational backgrounds.

c) Enhancing Education Quality by Bridging Educational Gaps

Beyond teachers and students, the integration of AI technology in teaching also has a significant impact on our education system. The continued use of AI in the teaching process has the potential to revolutionise the quality of education across all educational institutions, including at the primary school level. This aligns with the new curriculum to be introduced in 2027, which places greater emphasis on developing students' fluency in digital

skills. The importance of Artificial Intelligence (AI) in Malaysia's education system has inspired the Ministry of Education (KPM) to introduce a new subject called *Technology and Digital*, aimed at familiarising primary school students with the fundamentals of AI (Dahliyah Abdul Jalil, 2024). This clearly highlights the significance of integrating AI into Malay language teaching at the primary level to fulfil KPM's aspiration of strengthening digital fluency among primary pupils. The Sustainable Development Goals (SDG) stress the importance of quality education as a cornerstone of sustainable development (Thian Khian Niam &Zaimuariffudin Shukri Nordin, 2024). Quality education not only provides access to knowledge but also reinforces essential skills, values, and awareness of sustainability. In this context, the application of AI in teaching can contribute to achieving these goals by elevating educational standards.

In conclusion, the analysis clearly shows that the use of AI technology in Malay language teaching has a far-reaching impact on teachers, students, and the overall education system, moving us closer to achieving high-quality education. The variety of teaching methods enabled by advanced AI technologies not only enhances the quality of teaching, but also indirectly improves students' language proficiency and stimulates their interest in learning.

VII. IMPLICATION OD THE STUDY

The study presents four key implications that involve multiple stakeholders, particularly educators. These include: an improvement in the quality of classroom teaching, a deeper understanding of the requirements related to AI technology, the wise and selective use of AI technology, and strong support for the integration of AI into teaching practices.

1. **Improvement in the Quality of Classroom Teachin:** AI technology enables teachers to design lessons that can be tailored to meet the diverse needs of students (Azura Senawi et al., 2024). This allows learners from various educational backgrounds to master the skills or concepts being taught while maximising their understanding in achieving the intended learning outcomes. High levels of AI integration can enhance the learning experience of primary school pupils by offering interactive and adaptive tools. In turn, this directly supports more developmentally appropriate learning opportunities, providing instruction that better matches pupils' individual needs.

2. **Enhancing Understanding of AI Technology Requirements:** Teachers with a deeper understanding of AI technology are more inclined to apply it in ways that improve the quality and effectiveness of education. A thorough grasp of AI is crucial for fostering a positive attitude among teachers, encouraging them to adopt the technology in their teaching to diversify instructional methods according to student diversity.This aligns with the findings of Habsah Mohamad Sabli et al. (2024), which demonstrate that limited knowledge and understanding among teachers regarding AI integration lead to a lack of readiness and minimal use of AI in their teaching practices.

3. **Wise and Limited Use of AI Technology:** Although the use of AI technology is on the rise, it is essential to ensure that primary school teachers apply it wisely, without replacing the crucial human interaction that underpins primary education. School administrators and teachers should engage in dialogue and reach mutual agreements when developing balanced strategies to integrate AI in the classroom, ensuring that the technology does not displace the teacher–student relationship. Such an approach helps maintain students' social and emotional development, which remains a priority in Malaysia's educational policy. Furthermore, teachers play a vital role in using their professional judgement to design comprehensive learning activities that incorporate AI meaningfully. In doing so, they can enhance pupils' learning outcomes while considering the diversity of learners within the classroom.

4. **Support for the Integration of AI Technology in Teaching:** The widespread use of AI technology in education requires strong support from school leadership and educational policies to ensure that teachers can continuously integrate AI into their teaching practices. Clear policies and guidelines on the use of AI in primary education—particularly concerning ethical standards and data privacy, must be established to ensure that it is implemented safely and responsibly by primary school teachers (Dahliyah Abdul Jalil, 2024).

VIII. RECOMMENDATIONS FOR FUTURE RESEARCH

There are four recommendations for future research that could broaden the use of AI in education, yielding significant impact, not only by enhancing the quality of teaching but also by improving students' learning comprehension in accordance with their abilities and potential.

1. **Provision of Financial and Infrastructure Support in Rural Schools:** The Ministry of Education (KPM) should provide financial and infrastructural support, particularly for primary school teachers in rural areas, by implementing and maintaining AI tools or software, including Internet access in government primary schools. This is a vital step towards creating a more inclusive, engaging, and innovative learning environment through the integration of AI in the classroom. At the same time, adequate infrastructure will encourage teachers to utilize technological tools that facilitate more effective language teaching.

2. **Knowledge and Experience Exchange Programmes Between Schools:** Organisingprogrammes or workshops that facilitate the exchange of knowledge and experiences between schools that have implemented AI technology can provide valuable insights and practical guidance to teachers particularly Malay language teachers on how to effectively utilise AI to enhance the quality of their teaching.

3. **Continuous Professional Development Programmes:** The Ministry of Education (KPM) consistently organizes ongoing professional development programmes to keep teachers updated on the latest advancements in AI and educational technology. This, in turn, indirectly enhances teachers' motivation to optimise the continuous use of AI in their teaching practices.

4. **AI Technology Training for Primary School Teachers in Rural Areas:** The Ministry of Education (KPM) should provide continuous training for teachers particularly those in rural primary schools. Through such initiatives, teachers will gain the necessary knowledge to utilize AI tools effectively in their teaching practices

IX. CONCLUSION

This systematic literature review (SLR) demonstrates that the application of Artificial Intelligence (AI) in the delivery of Malay language instruction significantly enhances students' understanding. It also affirms AI's crucial role in transforming the education landscape (Resnawita and Deti Karmanita, 2024). Future research proposed by the researchers should focus on improving and innovating the quality of teaching through the use of AI. This study remains relevant, as analysis shows that many teachers have yet to adapt their teaching methods to incorporate AI, largely due to their comfort with conventional approaches.

In addition, the researchers propose further investigation into teachers' levels of knowledge regarding AI technology, particularly involving primary school teachers across Malaysia, using a mixed-methods approach that combines both quantitative and qualitative research. This is important as there is currently a lack of studies examining primary teachers' understanding of technology, skills, and the use of Information and Communication Technology (ICT) in the teaching of the Malay language.

In conclusion, this study clearly shows that AI technology is becoming increasingly integrated and prioritised in today's educational landscape, with its application in teaching contributing positively to students' learning outcomes.

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