

# Readiness and Challenges in Integration of Artificial Intelligence (AI) Technology in Lesson Plan

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## ABSTRACT

This independent study examines the readiness and challenges faced by teachers in integrating Artificial Intelligence (AI) into lesson planning. The study, which uses a qualitative research approach involving interviews and classroom observations with selected eight teachers. In addition, there are questions about both the integration of AI in lessons for qualitative data analysis. According to the findings, suggestions that more studies analysed shows that use of AI have a potential to improve lesson design, engagement and personalization. The main issues noted from the studies are insufficient infrastructure, a lack of exposure to AI technologies and a lack of clarity regarding how to match AI characteristics with curricular objectives. Nevertheless, a number of participants indicated that they would be open to integrate AI given the right assistance and training. The study adds to the current discussion about the digital transformation of teaching methods and provides insights into the practical circumstances necessary for the successful integration of AI in education.

**Keywords:** Artificial Intelligence, Lesson Planning, Teacher Readiness, Personalized learning, Primary Education, Qualitative research

## INTRODUCTION

Education must transform its methods to stay compatible with technological advancements characteristic of the Fourth Industrial Revolution. Artificial intelligence (AI) integration into teaching practices creates transformative opportunities for improving student learning experiences. Artificial intelligence assists teachers with efficient lesson planning while delivering customized educational content for every student and enabling ongoing assessment to track their progress. The innovative educational strategies that put students at the center of their learning experience while enhancing both engagement and comprehension. When educational systems adopt AI tools students achieve better preparation for technological advancements throughout their lives which supports continuous learning and skill enhancement (Abdullah & Latip, 2022).

Aligned with the Digital Education Policy (Ministry of Education Malaysia, 2023), educators must be prepared to face a more technology-driven educational environment, in accordance with Strategic Core 2, which is to develop digitally literate educators capable of implementing technology-based teaching and learning (T&L). Furthermore, the Malaysia Education Blueprint 2013–2025 (MEB) also calls for the empowerment of Information and Communication Technology (ICT) through Shift 7 to improve the quality of T&L among educators (Ministry of Education Malaysia, 2023).

The digital revolution is transforming lives, and AI is its continuation. AI employs science and engineering to design and study intelligent computer systems (MotaValtierra et al., 2020). AI systems analyze data, extract relevant information, make intelligent decisions, and adapt to changing settings to complete tasks and achieve objectives (Su et al., 2022). AI continuously advances new concepts and research toward smarter robots. The AI capabilities include image recognition, natural language processing, autonomous driving and medical diagnosis.

Primary school educators establish essential learning foundations which are crucial for student development. The success of implementing AI technology in T&L depends significantly on teachers' preparedness to use it in their planning. Teachers encounter multiple obstacles including inadequate infrastructure, insufficient

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professional AI training and doubts about AI's success in real classroom situations (Rahman, 2023).

Hence, this study is conducted to explore the integration of artificial intelligence (AI) technology in lesson planning. This study investigates primary school teachers' preparedness and the obstacles they encounter. The results of this research will provide a framework for policymakers and educational institutions to develop suitable training and support programs that enable AI technology use in Malaysia primary schools.

## LITERATURE REVIEW

### Artificial Intelligence (AI) in Education

In the 21<sup>st</sup> century artificial intelligence (AI) has become an important technology that refers the capability of computer systems that typically require human intelligence (Su et.al., 2022). The field of AI has grown enormously and serves as assistive tool in adaptive learning, learning content management and automated assessment systems. It enhances personalized learning which is more efficient and supportive in students' educational needs (Ng & Ibrahim, 2021). Furthermore, AI has shown that teachers may able to use AI-based innovations to support the teaching process more practical and effective (Luckin et.al., 2020). According to Mota Valtierra et al. (2020), many people believe that AI could significantly enhance education by creating detailed and high quality learning data. This kind of data is perfect for tracking progress and performing analytics.

### Teacher Readiness in AI Integration

Teacher readiness is all about the a blend of knowledge, skills and attitudes towards using new technologies. As highlighted by Hassan et al.(2021), that a teacher's readiness is the key factor in the successful integration of technology into the classroom. A study conducted by Abdul Jalil (2024) revealed that many preschool teachers in Malaysia still struggle with basic AI concepts, which is tough to implement these technologies in early education. Lim and Hamzah (2022) pointed out that younger teachers and those trained in information technology show greater level of readiness, likely because they are more familiar with modern tech and are willing to try out new teaching methods. Research by Rahman and Chong (2024), also showed that teacher readiness is closely tied to the support they receive from their institutions, such as professional development and sufficient learning resources. Teachers who underwent structured AI training felt more confident and willing to use this technology in their lesson planning.

### Challenges in AI Integration

Artificial Intelligence (AI) has a lot to offer in the education sector, its implementation isn't without its challenges. This is especially evident in primary schools, where teachers often find themselves against variety of hurdles, including gaps in knowledge, skills, infrastructure and ethical issues that can make it tough to effectively integrate technology in their classrooms. Research of Ting and Norman (2024) discovered that many teachers struggle to adapt AI concepts and adapt their teaching methods to fit AI based strategies. A lot of educators have confessed that they lack the technical skills that needed to integrate AI into their lesson planning. Moreover, their already packed schedules make it hard to find the time to learn about or thoroughly explore AI.

This scenario leads many teachers to engage with technology only at a basic level, preventing them from fully utilize the potential of AI's potential to customize learning or analyze student performance in real time. Thian and Zaimuariffudin (2024) emphasize the infrastructure issues are a major hurdle for implementing AI, especially in rural regions like Sarawak. The shortage of computers, slow internet access and limited access to modern AI software make it tough for teachers to carry out AI based teaching effectively. This creates a noticeable digital divide between urban and rural schools. When technology isn't equally accessible, achieving the goal of a comprehensive national digital education transformation becomes a real challenge.

The integration of AI in education faces several challenges, including physical and knowledge limitations. A significant factor here is the quality of professional training that are available to teachers. According to a study by Yusof and Lai (2020), highlights that training teachers receive is too general and doesn't adequately into

paractical AI applications for the classroom. As a result, without focused and relevant training, teachers often find themselves in their comfort zones and may feel hesitant about using AI in their lessons. Rahman and Chong (2024), point out that ongoing support from school administrators and technical guidance are crucial for making sure AI is used effectively and appropriately.

In discussions about the use of AI in schools, ethical issues and data privacy are really important topics to consider. According to Tan et al (2023), highlight that teachers and parents are concern about how student data is protected when AI system are involved. Moreover, educators worry that AI might take away the personal touch in education, which is important for nurturing social connections and teacher-student bond that help shape the values and character of young learners.

Additionally, there are challenges tied to how well the curriculum aligns with AI integration. A lot of curricula are still designed to traditional methods that don't effectively include technology. This creates difficulties for teachers trying to bring AI into their everyday lesson plans, as they often lack of guidance and suitable teaching resources (Abdul Jalil, 2024). This issue matters by the inflexibility of tech based assessments, leading teachers prefer traditional way of teaching methods that fit the exam syllabus.

Recently, there have been a concern about how teachers are worried about losing their professional independence. Some educators worry that AI might start taking over important aspects of teaching, like making decisions about how to teach and evaluating student progress. As highlighted by Lee et al. (2023), this has left some teachers feel uneasy about AI's capability on analyzing automatically students' performance, which makes them fear they might lose their roles as the main educators. In short, the challenges of integrating AI into the classroom go beyond just technical or physical infrastructure. They also touch on psychological, social, ethical and educational policy issues. For AI to be effectively utilized in classrooms, we need a comprehensive strategy that includes effective training for teachers, proper infrastructure, strong data privacy policies and empowering educators to feel confident and at ease with using technology in their classrooms.

### **Teacher Demographics and Their Influence on AI Integration**

Teacher demographics include the various personal and professional traits of educators, such as their age, gender, education level, teaching experience and whether they work in urban or rural environments. These elements play a crucial role in influence how teachers perceive, understand and are prepared to integrate technology especially AI into their classrooms.

According to a study by Lim and Hamzah (2022), indicates that teachers younger than 40 are generally more willing to embrace AI technologies in their teaching compared to those over 50. This is mainly because they had more exposure to technology during their education and training, along with higher level of digital literacy. When it comes to gender, various studies have shown that there isn't a notable difference between male and female teachers when it comes to use technology. However, there are some interesting patterns in the types of tools they prefer (Lee et al., 2023). Male teachers are more inclined towards analytic software, while female teachers often focus on interactive applications for teaching languages and social subjects studies.

Education level also significantly influences technological readiness. Teachers with qualifications in information technology education are more prepared to incorporate AI into their lesson planning (Abdullah & Latip, 2022). They not only understand the functions of AI but are also capable of aligning the technology with current pedagogical needs.

Regarding teaching experience, more experienced teachers tend to adhere to conventional methods and often require more time and training to adopt new technologies (Yusof & Lai, 2020). In contrast, novice teachers or teacher trainees are generally more flexible and willing to explore alternative approaches involving AI.

School location is another important factor. Teachers working in urban areas typically have better access to technological resources, professional training, and technical support compared to their rural counterparts (Thian & Zaimuariffudin, 2024). This infrastructural gap poses a major barrier to the widespread adoption of AI across the country. Therefore, demographic factors not only influence teachers' acceptance of AI but also determine

the types of support strategies and training interventions that must be tailored to different target groups. **Related Studies**

|   | Title   | Authors   | Year | Readiness | Challenges | Primary School | Data Analysis              | Country  |
|---|---|---|------|-----------|------------|----------------|----------------------------|----------|
| 1 | Understanding and Use of Artificial Intelligence (AI) in Teaching and Learning Among Preschool Teachers in the District of Semporna   | Dahliyah Abdul Jalil  | 2024 | /         | /          | /              | Quantitative               | Malaysia |
| 2 | Artificial Intelligence in Education and Schools  | Ahmet Gocen, Fatih Aydemir                                      | 2020 |           | /          |                | Qualitative                | Turkey   |
| 3 | Integrating Innovative Teaching Strategies: Assessing the Effectiveness of Flipped Classrooms, Blended Learning, and Task-Oriented Methods in Enhancing Academic Performance in Vocational IT Education | Augustine, L., & Mohamed, H.                                    | 2024 |           | /          |                | Qualitative                | Malaysia |
| 4 | Artificial Intelligence in Education. Promise and Implications for Teaching and Learning  | Holmes, W., Bialik, M., & Fadel, C                              | 2021 | /         |            |                | Quantitative               | London   |
| 5 | Intelligence Unleashed: An argument for AI in Education   | Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B.         | 2020 | /         | /          |                | Quantitative               | London   |
| 6 | Artificial Intelligence in Education: a Systematic Review   | Nicolae moroianu1 , Silvia-elena iacob2 , Alexandra constantin3 | 2023 |           | /          | /              | Quantitative & Qualitative | Romania  |

|    |   |   |      |   |   |   |              |             |
|----|---|---|------|---|---|---|--------------|-------------|
| 7  | Challenges in the use of artificial intelligence technology in assessing students' academic performance in the 21st century               | Ng, M. H., & Ibrahim, N.Intan Idura Mohamad Isal Hishamuddin Ahmad2 | 2024 | / | / | / | Qualitative  | Malaysia    |
| 8  | Informatics and Artificial Intelligence (AI) Education in Korea: Situation Analysis Using the Darmstadt Model                             | Seong Won.L, Youngjun.L, Ji Yeon.H & Dageom.L.                      | 2022 | / | / | / | Qualitative  | South Korea |
| 9  | Artificial intelligence in education: A comprehensive review  | Shahvaroughi Farahani.M, & Ghazal Ghasemi                           | 2024 | / | / |   | Qualitative  | Iran        |
| 10 | Ethical Considerations in the Application of Artificial Intelligence in Education   | Nianliang Ding  | 2025 | / | / |   | Qualitative  | China       |
| 11 | The Influence of Artificial Intelligence (AI) Use in Differentiated Teaching and Learning by Malay Language Teachers in Sarawak, Malaysia | Thian, C. H., & Zaimuariffudin, S.                                  | 2024 | / | / | / | Qualitative  | Malaysia    |
| 12 | Teachers' Perceptions about the Use of Artificial Intelligence (AI) in Teacher Teaching at the Middle School Level                        | Ting Siew Chear & Helmi Norman                                      | 2024 | / | / |   | Quantitative | Malaysia    |
| 13 | Extending Technology Acceptance Model to higher-education students' use of digital academic reading tools on computers                    | Yupeng, L.,& Zhonggen Yu  | 2023 | / | / |   | Quantitative | China       |
| 14 | Use of Artificial Intelligence (AI) Technologies in Education According   | Erol, Mustafa & Erol, Ahmet.  | 2024 | / | / | / |              | Turkey      |

|    |   |            |      |   |   |  |             |             |
|----|---|------------|------|---|---|--|-------------|-------------|
|    | to Primary School Teachers: Opportunities and Challenges  |            |      |   |   |  | Qualitative |             |
| 15 | Embracing the future of Artificial Intelligence in the classroom: the relevance of AI literacy, prompt engineering, and critical thinking in modern education | Walter, Y. | 2024 | / | / |  | Qualitative | Switzerland |

The paper above for the study explained 15 research on the readiness as well as the challenges in integration of AI in education in the primary schools and some related to lesson plan since 2020 through 2025. The research was based on variety of people from different countries who were contributing as teachers mostly in primary and secondary schools. In the above 15 studies, it is marked that seven of these have used qualitative research design study while seven used as quantitative method, one article used mixed method. Besides that, only five was conducted in the context of Malaysia and the other 10 were conducted in abroad. Those table shows the selected studies articles.

Although many instructors are open to using AI, research from Malaysia and other countries shows that exposure, resources, and training affect how prepared they are. For example, Dahliyah Abdul Jalil (2024) found that although Semporna preschool instructors demonstrated a basic comprehension of AI, they required further support and training. Similar to this, Ting Siew Chear & Helmi Norman (2024) found that middle school teachers' use of AI was significantly influenced by institutional and social support. Almost all the studies show the importance of Ai in classrooms.

Therefore, a larger sample almost eight articles able to give an insight of readiness and challenges faced by teachers on integrating AI during their teaching in classrooms. Context-specific readiness for AI integration varies greatly; while most teachers have positive attitudes, many lack technical expertise and support networks. High implementation costs and training deficits are issues in Malaysia (Dahliyah, 2024; Ng et al., 2024), whereas ethical implementation and long-term curriculum alignment are issues in Korea and the UK (Seong et al., 2022; Holmes et al., 2021). Researched articles showed that influence of teacher readiness toward integrating AI elaborate further the dimensions of the challenges. The research conducted by Nicolae Moroianu et.al (2023), also discussed that most teachers lacked AI literacy and challenges included curriculum misalignment and unclear AI policies. By the used of qualitative method in the researches articles show that most of teachers were interviewed with the aim of identifying the level of acceptance or readiness and challenges of teachers when integrating AI during lessons.

From the qualitative researches articles addressed that readiness can be measured and is influenced by perceived utility, ease of use, and social support. Among the challenges include technological infrastructure, insufficient training, and age-related digital deficits. Teachers are generally eager but ill-prepared. Research findings demonstrate that perceived usefulness and external support affect moderate preparedness levels while infrastructure limitations and insufficient training remain the main barriers (Dahliyah, 2024: Ting & Norman, 2024). Qualitative research shows deeper ethical and pedagogical concerns while demonstrating that preparation depends more heavily on institutional culture and personal attitudes (Erol & Erol, 2024: Ng et al., 2024).

Quantitative research show that perceived utility and outside help have a moderate effect on preparedness with infrastructure and training being the main challenges (e.g., Dahliyah, 2024: Ting & Norman, 2024). Apart from that, according to qualitative research it reveals that institutional culture and individual attitude have a greater

effect on preparedness of teacher in integrating AI (e.g., Erol & Erol, 2024; Ng et al., 2024).

## CONCLUSION

The research analyses the adoption of AI in education, with a focus on teacher readiness, implementation challenges and pedagogical implications for using AI in lesson planning. Results show that, although the majority of teachers are open to use AI based tool, willingness may be contingent on the available level of technical skills, training opportunities and institutional support. Some of the barriers include professional unreadiness, inadequate infrastructure and doubts on AI's capability to supplement or take over the human teaching aspects. But AI is still good as a supporting system for adaptive learning, effective administration and interactive teaching. The literature also underscores the importance of providing teachers with the curriculum change and AI literacy capabilities so that they can integrate AI into their teaching strategies effectively. Further research should address other school settings, in particular at elementary school as well, as apply those both qualitative and quantitative methods in order to gain a better understanding of the practice-oriented needs and context of the teachers. Comprehensive teacher training and supportive legislation are required to ensure that AI is used in lesson planning and classroom instruction in an ethical and meaningful way.

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