

Exploring Gen X Lecturers' Challenges and Recommendations for Integrating AI in Teaching: A Preliminary Qualitative Study from Malaysian Higher Education Perspective

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ABSTRACT

Integrating artificial intelligence (AI) presents opportunities and difficulties today. This situation presents a significant challenge in higher education, especially for Gen X lecturers, often digital immigrants. This qualitative study explores the challenges Gen X lecturers face in Malaysian higher education when integrating AI into their teaching practices and proposes recommendations to enhance AI acceptance. Data was collected using a semi-structured interview approach from five senior lecturers at a public university, all from Generation X cohort. Thematic analysis revealed four main challenges: limited knowledge and exposure to AI, institutional and resource constraints, interpersonal issues, and ethical concerns. Participants emphasized their reliance on self-learning, limited institutional support, and rejection of AI usage because it is considered complicated. Ethical concerns, particularly plagiarism and academic integrity, are increasingly complicating the integration of AI into their teaching and learning activities. To address these issues, the study suggests enhancing institutional support by establishing AI center and financial assistance, fostering collaborative teaching among lecturers, providing practical AI training, and ensuring equitable access to the necessary AI tools. The findings align with national initiatives like MY AI NEXUS 2024, which aim to bridge the educational technological gap. This study underscores the importance of targeted interventions to support Gen X lecturers in embracing AI, ultimately contributing to a more effective and inclusive AI-driven education system.

Keywords: AI Tools, Challenges, Recommendations, Generation X, Higher Education

INTRODUCTION

Artificial Intelligence (AI) has become increasingly embedded in everyday life and is now influencing the way individuals communicate, work, learn, and solve problems. In higher education, AI technologies provide new opportunities to support teaching and learning through adaptive learning, automated feedback, learning analytics, intelligent tutoring systems, automated assessment, and administrative support. AI-based tools such as ChatGPT, QuillBot, Grammarly, and other machine learning or natural language processing applications are increasingly used to assist academic writing, assessment, feedback, and classroom preparation (Chan & Lee, 2023; Sadiq et al., 2026). As AI continues to reshape industries and social structures, higher education institutions face the challenge of preparing students with the knowledge, skills, and digital competencies needed to function in an AI-driven future (Mantha & Krishna, 2024).

This challenge is particularly relevant in Malaysia, where initiatives such as the Malaysia Artificial Intelligence Nexus 2024 (*MY AI NEXUS*, 2024) reflect the country's commitment to strengthening AI capabilities across various sectors, including higher education. The establishment of the first Faculty of Artificial Intelligence at

Universiti Teknologi Malaysia (UTM) and the formation of the Malaysia AI Consortium further demonstrate the government's effort to accelerate AI adoption within the higher education landscape. However, successful AI integration depends not only on national initiatives, institutional frameworks, or technological infrastructure, but also on the readiness and willingness of educators to use AI meaningfully in teaching and learning (Liangyu et al., 2024; Sadiq et al., 2026).

Lecturers remain central to the success of AI integration because they determine how AI tools are interpreted, accepted, and applied in actual teaching practices. Although students are increasingly exposed to AI technologies, educators must be prepared to guide their use in ways that are ethical, purposeful, and pedagogically meaningful. Previous studies suggest that teachers' readiness, confidence, acceptance, and pedagogical beliefs influence the effective implementation of AI in education (Ayanwale et al., 2022; Cabero-Almenara et al., 2024). Therefore, AI adoption should not be viewed merely as a technical process, but as a professional and pedagogical transition that requires educators to adapt their teaching beliefs, practices, and roles.

Within this context, Generation X lecturers, who were born between 1965 and 1980, are positioned at an important crossroad in higher education (Choudhary et al., 2024). Many Gen X lecturers began their academic careers during a period when teaching was less dependent on digital technologies and more grounded in conventional classroom practices. As a result, they may face dual challenges: adapting to rapidly changing AI tools while also rethinking established pedagogical approaches. Unlike younger educators who may have been exposed to digital technologies earlier, Gen X lecturers may experience barriers such as varying levels of technological confidence, resistance to change, limited exposure to advanced digital tools, and insufficient targeted professional development opportunities (Kolnhofer-Derecskei et al., 2017; Abdol Ghapar et al., 2023; Culp-Roche et al., 2020).

Therefore, this study aims to explore the challenges faced by Gen X lecturers in integrating AI into their teaching practices and to gather their suggestions for overcoming these obstacles. By adopting a qualitative approach, this study seeks to provide deeper insights into the experiences of educators who are navigating AI adoption during a period of rapid educational transformation. The findings are expected to inform institutional policies, professional development initiatives, and practical support systems that align with the aspirations of MY AI NEXUS 2024 while addressing the realities faced by lecturers as key agents of change in Malaysian higher education.

PROBLEM STATEMENT

The rapid development of Artificial Intelligence (AI) has reshaped higher education by introducing new possibilities for teaching, learning, assessment, feedback, learning analytics, and administrative support. In Malaysia, initiatives such as the Malaysia Artificial Intelligence Nexus 2024 (*MY AI NEXUS*, 2024) and the establishment of the Faculty of Artificial Intelligence at Universiti Teknologi Malaysia (UTM) underscore the nation's commitment to strengthening AI innovation and positioning higher education as an important driver of digital transformation (Ahmed et al., 2022; Ministry of Higher Education, 2015). However, while these initiatives provide a strong foundation for AI adoption, the successful integration of AI into teaching practices depends not only on national policy direction or technological infrastructure, but also on lecturers' readiness, confidence, and willingness to use AI meaningfully in their pedagogical practices. Recent studies show that lecturers' adoption of AI is influenced by perceived usefulness, ease of use, self-efficacy, institutional support, trust, technological compatibility, and personal innovativeness (Liangyu et al., 2024; Sadiq et al., 2026).

Although AI offers many opportunities for higher education, its implementation remains uneven because lecturers differ in their levels of awareness, digital confidence, exposure, and readiness. Studies in the Malaysian context indicate that lecturers with stronger technological backgrounds may demonstrate higher levels of AI awareness and adoption readiness compared with lecturers from non-technical disciplines (Ahmad et al., 2025). Similarly, Said and Ismail (2026) found that AI application usage among vocational college lecturers was influenced by technology acceptance, self-efficacy, and instructional leadership, while actual AI usage remained lower than lecturers' general readiness. These findings suggest that there is still a gap between recognizing the potential of AI and applying it effectively in teaching practice.

This issue is particularly important among Generation X lecturers, who were born between 1965 and 1980 and continue to play an important role in Malaysia's higher education landscape (Saman et al., 2024). Many Gen X lecturers began their academic careers before digital technologies became central to higher education. As a result, they may face specific challenges in adapting to AI-based teaching tools, including varying levels of technological proficiency, limited exposure to AI applications, resistance to change, and the need to reimagine established teaching approaches in response to AI advancements (Abdol Ghapar et al., 2023; Saman et al., 2024). Since educators' beliefs, confidence, and pedagogical orientations influence their technology adoption, AI integration should not be viewed merely as a technical process but also as a pedagogical and professional transition (Ayanwale et al., 2022; Cabero-Almenara et al., 2024).

Without addressing these challenges, Malaysia's AI-driven education agenda may face a disconnect between policy aspirations and classroom-level implementation (Ministry of Higher Education, 2015). The literature suggests that effective AI adoption requires adequate training, institutional resources, leadership support, and recognition of educators' readiness needs (Ahmed et al., 2022; Said & Ismail, 2026). If Gen X lecturers are not sufficiently supported, AI tools may be underused or used only at a surface level, limiting their potential to improve teaching and learning outcomes. Therefore, this study seeks to explore the challenges faced by Gen X lecturers in Malaysian higher education when integrating AI into their teaching practices and to propose practical recommendations that can support more inclusive, effective, and sustainable AI adoption.

RESEARCH GAPS

Despite Malaysia's proactive initiatives, such as the Malaysia Artificial Intelligence Nexus 2024 (*MY AI NEXUS*, 2024) and the establishment of the Faculty of Artificial Intelligence at Universiti Teknologi Malaysia (UTM), limited understanding remains of how these advancements translate into practical implementation at the educator level. Existing studies have examined AI adoption among educators and academicians through various models, including TAM, UTAUT, UTAUT2, and meta-UTAUT. These studies highlight factors such as performance expectancy, effort expectancy, facilitating conditions, social influence, self-efficacy, trust, compatibility, attitude, and behavioral intention as important predictors of AI adoption (Cabero-Almenara et al., 2024; Liangyu et al., 2024; Sadiq et al., 2026). However, most of these studies focus on lecturers or educators in general rather than examining how generational differences may shape AI readiness and adoption.

A further gap concerns the limited attention given to Generation X lecturers in Malaysian higher education. Gen X lecturers represent an important group of educators who continue to contribute to teaching, mentoring, curriculum delivery, and student development. However, their academic careers began in a period when digital tools were less dominant in higher education. As AI becomes increasingly embedded in teaching and learning, Gen X lecturers may encounter challenges that differ from younger educators who are more accustomed to digital environments. These challenges may include technological proficiency, adaptability, limited access to targeted professional development, uncertainty about AI's pedagogical value, and the need to adjust long-established teaching practices (Chan & Lee, 2023). Yet, current research does not sufficiently explain how these generational experiences influence AI integration in Malaysian higher education.

Another important gap lies in the difference between AI readiness and actual AI usage. Studies have shown that lecturers may recognise the benefits of AI but still face difficulties translating readiness into classroom practice due to barriers such as limited training, infrastructure constraints, lack of confidence, and insufficient institutional support (Ahmad et al., 2025; Said & Ismail, 2026). Current research in Malaysia has also focused largely on systemic readiness, policy direction, and infrastructure development, with less attention given to differences in generational capacity among educators when adopting AI tools (Choudhary et al., 2024). This gap is important because the success of Malaysia's AI initiatives depends significantly on educators' ability to adopt AI effectively in their actual teaching practices.

Moreover, much of the existing research on AI adoption focuses on quantitative measurement of acceptance factors, while less attention has been given to lecturers' lived experiences, perceived barriers, and practical recommendations for support. Without strategies that are sensitive to the needs of Gen X lecturers, national AI policies may not achieve their intended outcomes due to a disconnect between policy objectives and classroom

realities (Saman et al., 2024). The absence of practical frameworks to address this disparity may further limit meaningful AI integration within educational institutions (Smith & Brown, 2024).

Therefore, this study addresses these gaps by qualitatively exploring the challenges faced by Gen X lecturers in integrating AI into teaching practices within Malaysian higher education. It also seeks to identify recommendations that can strengthen institutional support, professional development, access to AI tools, and lecturers' confidence in using AI. The findings are expected to provide valuable insights for policymakers and higher education institutions, contributing to a more inclusive and sustainable AI-driven transformation of Malaysian higher education.

RESEARCH OBJECTIVES

RO1: To explore the challenges faced by Gen X lecturers in Malaysian higher education when integrating AI into their teaching practices.

RO2: To propose recommendations for improving the integration of AI in teaching practices in Malaysian higher education.

RESEARCH QUESTIONS

RQ1: What specific challenges do Gen X lecturers in Malaysian higher education face when integrating AI into their teaching practices?

RQ2: What recommendations can be proposed to enhance the integration of AI in teaching practices in Malaysian higher education?

LITERATURE REVIEW

Artificial Intelligence (AI) is increasingly transforming education by offering tools that support teaching, learning, assessment, feedback, and administrative processes. In higher education, AI-based technologies such as intelligent tutoring systems, adaptive learning platforms, automated grading systems, learning analytics, and virtual assistants have been used to personalize learning experiences, provide real-time feedback, support students' progress, and reduce educators' routine workload (Crompton & Burke, 2023; Martzoukou et al., 2020). These developments show that AI is no longer limited to technical fields but has become part of wider educational transformation. In Malaysia, higher education institutions are also moving towards AI integration as part of broader efforts to modernize teaching and learning practices and prepare graduates for an increasingly digital future (Osman et al., 2023).

The adoption of AI in higher education, however, depends significantly on lecturers' readiness and willingness to use AI tools meaningfully in their teaching practices. Studies on AI adoption among lecturers and academicians have shown that acceptance is influenced by factors such as perceived usefulness, ease of use, performance expectancy, effort expectancy, self-efficacy, trust, compatibility, facilitating conditions, and personal innovativeness (Liangyu et al., 2024; Sadiq et al., 2026). Similarly, Cabero-Almenara et al. (2024) found that university teachers' pedagogical beliefs influence their acceptance of generative AI, with educators who adopt more constructivist and student-centered beliefs being more open to using AI in education. These findings suggest that AI adoption is not merely a technical matter, but also involves educators' beliefs, confidence, pedagogical orientation, and institutional environment.

Despite the benefits of AI, educators continue to face several challenges when adopting AI tools in teaching and learning. These include concerns related to data privacy, ethical use, academic integrity, lack of training, limited infrastructure, insufficient institutional support, and uncertainty about the pedagogical value of AI (Saiful' et al., 2024). In the Malaysian context, Ahmad et al. (2025) found that lecturers from ICT backgrounds showed slightly higher AI awareness and readiness compared with lecturers from non-technical disciplines, suggesting that prior digital exposure can influence confidence in adopting AI. Said & Ismail (2026) also reported that technology acceptance, self-efficacy, and instructional leadership significantly influenced AI application usage among

vocational college lecturers, although actual AI usage remained lower than lecturers' general readiness. These findings highlight a gap between awareness of AI's potential and its practical implementation in teaching.

These challenges may be more pronounced among Generation X lecturers, who were born between 1965 and 1980. Gen X lecturers occupy a unique position in higher education because many began their academic careers during a period when teaching was more dependent on traditional methods and less shaped by digital technologies (Abdol Ghapar et al., 2023; Chan & Lee, 2023; Kolnhofer-Derecskei et al., 2017). Unlike younger educators who may be more familiar with digital tools, Gen X lecturers may have had limited exposure to advanced technologies during their formative academic and professional years (Polat et al., 2019). As a result, they may face challenges such as lower technological confidence, resistance to change, difficulty adjusting to fast-changing AI tools, and a steep learning curve in mastering AI-based teaching applications (Mantha & Krishna, 2024).

In addition, the integration of AI may require Gen X lecturers to re-examine their existing pedagogical practices. Since AI tools can influence how lecturers design learning activities, provide feedback, assess students, and manage classroom interaction, lecturers need more than technical skills; they also need pedagogical guidance on how to use AI appropriately and ethically. Ayanwale et al. (2022) emphasized that teachers' readiness and confidence are important for successful AI implementation, while Ahmed et al. (2022) highlighted the importance of providing educators with adequate resources, support, and recognition when adopting AI-based teaching solutions. Therefore, for Gen X lecturers, professional development should not only introduce AI tools but also demonstrate how these tools can be aligned with teaching goals, student needs, and disciplinary contexts.

The Malaysian government has also shown increasing commitment to preparing higher education for an AI-driven future. Policy directions and national initiatives have emphasized the importance of digital transformation, AI readiness, and collaboration between universities, industries, and government sectors (Ministry of Education, 2023; Saman et al., 2024). However, policy-level aspirations may not automatically translate into effective classroom implementation. Research on Malaysian AI adoption has shown that lecturers' use of AI can be affected by institutional support, infrastructure, training opportunities, leadership practices, and the availability of suitable technological resources (Ahmad et al., 2025; Sadiq et al., 2026; Said & Ismail, 2026). Therefore, successful AI integration requires institutions to address both technological and human factors.

In Malaysia, AI integration in higher education is also shaped by cultural, institutional, infrastructural, and generational factors. Cultural attitudes towards technology, differences in digital experience, institutional readiness, and access to training may influence how lecturers perceive and use AI tools (Litchfield & Matteis, 2016; Moussa Omar et al., 2022). These contextual factors are important because lecturers do not adopt AI in isolation; their readiness is shaped by the support systems, expectations, and resources available within their institutions. Understanding these factors is necessary to ensure that AI adoption strategies are inclusive and responsive to the diverse needs of lecturers across generations.

Although existing studies have examined AI adoption in education, much of the current literature focuses on educators in general, institutional readiness, technology acceptance, or infrastructure development. Limited attention has been given to how generational differences shape lecturers' confidence, adaptability, and practical engagement with AI tools in teaching. This gap is important because Gen X lecturers remain key contributors to Malaysian higher education, yet their experiences may differ from younger educators who have had greater exposure to digital technologies throughout their academic and professional development.

Therefore, this literature review highlights the need to examine the experiences of Gen X lecturers in integrating AI into their teaching practices. By focusing on their challenges and recommendations, this study contributes to a more inclusive understanding of AI adoption in Malaysian higher education. The findings are expected to support the development of targeted professional development, stronger institutional support, and practical strategies that help Gen X lecturers navigate AI integration more confidently and effectively.

METHODOLOGY

Due to the complex and exploratory nature of AI integration in teaching, this study employed a qualitative approach to obtain an in-depth understanding of the challenges and recommendations experienced by Generation X lecturers at a higher academic institution in Malaysia. A qualitative research design was considered appropriate

because it allows researchers to explore participants' personal experiences, perceptions, and meanings, particularly in relation to emerging technologies such as artificial intelligence (Creswell & Poth, 2017). Since AI adoption in teaching involves individual readiness, institutional support, ethical concerns, and personal teaching practices, the qualitative approach enabled the researchers to capture rich and detailed insights from the participants' perspectives.

A purposive sampling technique was applied to select participants who met specific criteria aligned with the objectives of this study. Purposive sampling was appropriate because the study required participants who had direct experience with the phenomenon being explored. In this study, participants were selected based on the following criteria: they had to be Generation X lecturers born between 1965 and 1980, currently teaching at a higher academic institution in Malaysia, have some awareness or experience related to AI tools, and be willing to share their experiences through interviews.

The final sample consisted of five female senior lecturers from different faculties. The participants were aged between 52 and 58 years. The sample size was limited to five participants as a preliminary study and narrowly focused to a group of respondents who fulfilled the required criteria. Since this study adopted a qualitative approach, the emphasis was not on achieving a large sample size or statistical generalization, but on obtaining rich, relevant, and meaningful data from participants who had direct experience with the issue being explored. The five participants were considered appropriate because they represented the target generational cohort, had teaching experience in higher education, and were able to provide in-depth perspectives on the challenges and recommendations related to AI integration in teaching. Furthermore, feedback from this preliminary study will be used for further improvement for the actual study.

Data Collection Process

The data collection process involved several stages. First, the interview questions were developed based on the research objectives and relevant literature on AI integration in higher education. The questions focused on two main areas: the challenges faced by Generation X lecturers when integrating AI into teaching practices and their recommendations for improving AI adoption in higher education. To ensure the suitability and clarity of the interview questions, one expert in the field reviewed and validated the interview guide before the actual data collection was conducted.

Second, semi-structured interviews were carried out with the five selected participants. This method was used because it allowed the researchers to ask prepared questions while also giving participants the flexibility to explain their views, provide examples, and elaborate on their personal experiences. Before each interview, participants were informed about the purpose of the study, and their consent was obtained. The interviews were conducted face-to-face at a time convenient for the participants. Each interview session lasted approximately 30 to 35 minutes.

Third, all interview sessions were audio-recorded with the participants' permission to ensure that the information shared during the interviews was accurately captured. The recordings were then transcribed verbatim using the TurboScribe application. After the transcription process, the researchers manually checked the transcripts against the audio recordings to ensure accuracy and correct any errors in the automated transcription. This step helped ensure that the data used for analysis reflected the participants' actual responses.

Data Analysis Procedure

The interview data were analyzed using thematic analysis based on the six-phase framework proposed by Braun and Clarke (2006). The first phase involved familiarization with the data, where the researchers repeatedly read the interview transcripts to gain a deeper understanding of the participants' responses. During this stage, important ideas, repeated issues, and initial patterns related to AI integration were noted.

The second phase involved generating initial codes. The researchers identified meaningful segments of the data that were relevant to the research objectives. These codes represented key issues raised by the participants, such as limited exposure to AI, reliance on self-learning, difficulty generating prompts, lack of institutional access,

workload constraints, plagiarism concerns, and the need for hands-on training. In total, 21 initial codes were identified, consisting of 12 codes related to challenges and 9 codes related to recommendations.

The third phase involved searching for broader themes by grouping related codes together. The researchers examined the relationships between the initial codes and organised them into broader categories. For the challenges of AI integration, four themes were developed: knowledge and exposure to AI, institutional and resource constraints, interpersonal issues, and ethical concerns. For the recommendations, four themes were identified: institutional and infrastructure support, collaborative teaching, training, and accessibility to AI tools.

The fourth and fifth phases involved reviewing, refining, defining, and naming the themes. The researchers compared the themes with the original interview data to ensure that the themes accurately represented the participants' experiences. Any overlapping or unclear themes were refined to improve clarity and coherence. Finally, the sixth phase involved reporting the findings by explaining each theme and supporting the discussion with direct quotations from the participants.

Trustworthiness

To ensure the trustworthiness of the study, several measures were applied. First, credibility was strengthened through semi-structured interviews, which allowed participants to provide detailed explanations and examples based on their own experiences. The interview questions were also reviewed by an expert before data collection to ensure that they were appropriate and aligned with the research objectives.

Second, member checking was conducted by allowing participants to review the identified themes and confirm whether the findings reflected their actual experiences. This helped reduce researcher bias and improve the accuracy of interpretation. Third, dependability was supported through a clear and systematic description of the research process, including participant selection, interview procedures, transcription, coding, and theme development.

Fourth, confirmability was enhanced by using participants' direct quotations to support the findings, ensuring that the interpretation was grounded in the data rather than the researchers' assumptions. Finally, transferability was addressed by providing detailed information about the participants' background, institutional context, and selection criteria, allowing readers to understand the study context and determine the relevance of the findings to similar settings.

Data Analysis

Table 1 Participant's Profile

Participant	Gender	Age	Designation	Faculty
Participant 1	Female	52	Senior lecturer	Business Management
Participant 2	Female	53	Senior lecturer	Business Management
Participant 3	Female	55	Senior lecturer	Information Management
Participant 4	Female	54	Associate Professor	Business Management
Participant 5	Female	58	Senior lecturer	Accountancy

In this study, the researchers conducted a thematic analysis based on the framework established by Braun and Clarke (2006) to analyze the data. The data analysis involved six steps. The process starts with familiarization, where the researchers need to carefully review the transcribe to gain a comprehensive understanding of the interview content. Next, initial coding is generated to identify the key patterns and concepts related to challenges and recommendations for integrating AI in higher education. Table 1 indicates the background profiles of the participants. They represent three different faculties in the higher education institution and have many years of teaching experience between them.

Table 2 demonstrates the initial coding process. From the interview, 21 initial codes were identified: 12 codes related to the challenges of AI integration and 9 codes related to recommendations for addressing the issues.

Table 2 Generating Initial Coding

Research Objective 1: Challenges of AI Integration		Research Objective 2: Recommendations	
Limited exposure to AI	High workload	University support	Establish an AI center
Reliance on a few AI	Time constraints	Financial support	Advocates for collaborative teaching
Dependence on peers/webinar.	Limited institutional access to resources.	Hands on training	Willingness to invest in personal AI tools
Difficulty in generating prompts in AI tools.	Internet connectivity issues.	Subscribe AI apps	Ethical guidelines on AI usage
Self-learning / from Youtube	Authenticity / originality of work	Invite AI experts to conduct related trainings	
Plagiarism	Reluctance to embrace AI		

Next, these codes were further analysed through axial coding process to reveal the connections and categorise them into border themes (Korstjens & Moser, 2018). The researchers conducted a continuous process of refining themes to ensure that the analysis is reliable and accurately represents the data. This process involves consistently comparing the data with the emerging themes. To improve the reliability of the findings, participant feedback is gathered by allowing them to review the identified themes by confirming the accuracy and alignment with their experiences. Lastly, the final themes are reported to provide a comprehensive analysis of the participants' perspectives. These findings offer valuable insights into how Gen X lecturers integrate AI into educational settings. Table 3 presents four themes related to the challenges of AI integration, while Table 4 highlights four themes for recommendations regarding AI integration.

Table 3 Challenges of AI Integration

Knowledge and Exposure on AI	Institutional and Resource Constraints	Interpersonal Issues	Ethical Concerns
Limited exposure to AI.	High workload.	Dependence on peers / webinars.	Plagiarism.
Self-learning/ from YouTube.	Time constraints.	Reluctance to embrace AI.	Authenticity/ originality of work.
Difficulty generating prompts in AI tools.	Limited institutional access.		
Reliance on a few AI tools.	Internet connectivity		

Table 4 Recommendations for AI Integration

Institutional and Infrastructure Support	Collaborative teaching	Training	Accessibility to AI tools
University support.	Advocates for collaborative teaching.	Hands-on training.	Subscribe for AI.
Ethical guidelines on AI usage.		Invite AI experts to conduct the training.	Willingness to invest in personal AI tools
Establish an AI center.			
Financial support.			

FINDINGS

In this study, a total of 5 participants participated in semi-structured interviews to share their experiences and viewpoints related to AI in higher education. A diverse group represented the participants in terms of demographic characteristics. They comprised five female senior lecturers aged 52 to 58 years from various faculties, including business management, information technology, and accountancy, as shown in Table 1. Based

on the interview conducted, the findings revealed four major themes that described the challenges faced by Gen X lecturers when integrating AI into their teaching practices. These themes are knowledge and exposure to AI, institutional and resource constraints, interpersonal issues, and ethical concerns.

Additionally, four major themes were identified for recommendations to address the challenges faced by Gen X lecturers. These themes are institutional and infrastructure support, collaborative teaching, training, and accessibility to AI tools. The further discussion involved explaining each theme and supporting it with direct quotations from the participants.

Challenges of AI Integration

Gen X lecturers face four main challenges when integrating AI into their teaching practices. Further discussions take place below.

Knowledge and Exposure to AI

In this study, the main challenge encountered by Generation X lecturers is their limited knowledge and exposure to AI. Many lecturers have primarily interacted with commonly used AI tools such as ChatGPT, Grammarly, and QuillBot. For example, Participant 2 mentioned, *"I usually use the chatbot like chat GPT. That's all. Or I usually go to Google search to search for all the information I needed"*, which highlights her limited awareness of other AI tools such as Perplexity and Consensus. Similarly, Participant 3 noted that she only discovered Perplexity recently through her colleagues. This lack of awareness restricts lecturers' ability to explore and learn about emerging AI technologies that could support their teaching practices.

This finding is consistent with Sadiq et al. (2026), who found that although lecturers in Malaysian universities had used AI-enabled tools such as Turnitin, Grammarly, QuillBot, and ChatGPT, their general knowledge of AI was mostly at an average level. Ahmad et al. (2025) also found that lecturers' AI awareness and readiness may differ according to their disciplinary and technological background, suggesting that prior digital exposure can shape confidence in adopting AI tools.

However, the findings also show that exposure can positively influence lecturers' willingness to use AI. Participant 1 highlighted that, *"When it comes to Perplexity, this AI is one of my favorites after ChatGPT"*. This indicates that when lecturers are introduced to suitable AI tools and understand their functions, they are more likely to use them to strengthen their teaching practices. This is aligned with Ahmad Anuar et al. (2024), who explained that effort expectancy, performance expectancy, social influence, and facilitating conditions are important in shaping academicians' behavioral intention to use AI in higher education.

Similarly, Said & Ismail (2026) found that technology acceptance and self-efficacy significantly influenced AI application usage among lecturers, indicating that confidence and positive perceptions are important for actual AI integration. Despite this, many lecturers also struggle to generate effective prompts, which limits their ability to maximize the potential of AI tools in teaching. Participant 3 expressed frustration concerning this issue by saying, *"I often struggle with how to generate the right prompts to ask questions when using ChatGPT"*. Participant 1 shared a similar experience by mentioning, *"I am struggling with how to generate the right prompts to ask questions when using ChatGPT. I need to learn what is the best prompt when asking in ChatGPT. When I ask about a specific topic, the responses tend to be quite broad, which requires me to refine my prompts to get more detailed answers"*. This indicates that general responses from ChatGPT require lecturers to refine their prompts several times before receiving useful answers.

This challenge reflects the need for practical AI literacy, as effective use of AI tools requires not only access to technology but also the ability to communicate with the tool clearly and purposefully. Ayanwale et al. (2022) emphasized that teachers' confidence and readiness are important for AI implementation, while Sadiq et al. (2026) highlighted self-efficacy as one of the key predictors of lecturers' intention to adopt AI-based tools.

Moreover, limited access to formal training causes lecturers to depend on self-learning through platforms such as YouTube, webinars, and peers, which creates gaps in their understanding of AI.

Participant 3 stated that *“I also learn from YouTube by myself if I need more understanding of AI”*. Similarly, Participant 2 mentioned relying heavily on friends and webinars for learning about AI. This shows that without structured training, many lecturers experience inconsistent learning processes. Although self-learning from various sources can add value to AI exposure, it may not provide the depth of knowledge and practical skills needed by academicians to integrate AI effectively into teaching.

Ahmed et al. (2022) similarly found that educators need adequate resources, support, and recognition to adopt AI-based pedagogical solutions, while Ahmad et al. (2025) highlighted the need for targeted professional development to strengthen lecturers’ AI awareness, confidence, and adoption readiness. These findings align well with the study conducted by Kolnhofer-Derecskei et al. (2017), who stated that Gen X lecturers, often referred to as “digital immigrants”, may struggle with new technologies due to limited exposure during the early stage of their careers.

This is supported by Choudhary et al. (2024), who highlighted that informal learning methods can contribute to knowledge gaps in learning.

The AI Talent Roadmap in Malaysia (2024–2030) also identifies the need to strengthen AI-related talent and digital skills through training initiatives for educators and students. Thus, a lack of knowledge and exposure can limit lecturers’ adoption of AI in higher education. Support from universities, including structured training, technical assistance, infrastructure, and institutional encouragement, is crucial for increasing lecturers’ confidence and skills in utilizing emerging technologies such as AI.

Institutional and Resource Constraints

Another challenge that limits Gen X lecturers in integrating AI into teaching practices is institutional and resource constraints. These constraints include heavy workloads, time limitations, limited access to AI resources, and Internet connectivity issues. Heavy workloads and time constraints were among the main reasons many lecturers were unable to attend training, workshops, and webinars related to AI. Participant 3 mentioned, *“.....because of my busy schedule, I frequently miss them as they coincide with my classes”*. Similarly, Participant 5 agreed that scheduling conflicts contribute to this issue, stating, *“Challenges include scheduling conflicts, such as common times for collaborative sessions across campuses”*.

These findings indicate that even when AI-related training is available, lecturers may not be able to participate due to teaching commitments and institutional scheduling demands.

Limited access to AI resources further worsens this situation, particularly when institutional subscriptions to relevant AI tools are restricted. Participant 1 recalled that access to QuillBot was allocated on a first-come basis, stating, *“Since it was based on a first-come, first-served system, some of my friends were unable to register in time”*. Participant 2 also expressed a similar concern by saying, *“Unfortunately, they only provide 100 accounts. I was not among the first 100 registrants, and the number of accounts is limited”*.

This limitation restricts lecturers’ ability to explore, learn, and utilise AI tools consistently in their teaching practices. This finding is consistent with Ahmed et al. (2022), who highlighted that educators require adequate institutional resources, technological equipment, support, and recognition to adopt AI-based pedagogical solutions effectively.

Similarly, Sadiq et al. (2026) emphasized that facilitating conditions, including access to resources, training, and technical support, are important factors in lecturers’ intention to adopt AI-based tools. In addition, unreliable Internet connectivity was identified as another challenge faced by Gen X lecturers when integrating AI into teaching, especially during peak usage periods. Participant 4 remarked, *“It was not frequent, but it became a problem during heavy Internet traffic. Heavy traffic usually happened in the mornings”*. This suggests that even when lecturers are willing to use AI tools, unstable or congested Internet access can limit their ability to access online platforms, AI applications, and digital teaching resources.

This finding supports Mantha and Krishna (2024), who highlighted the importance of reliable infrastructure, including Internet connectivity and access to digital tools, in facilitating technology adoption. It also aligns with

Ahmad Anuar et al. (2024), who explained that facilitating conditions such as technical infrastructure, support, resources, and institutional policies are essential for promoting AI adoption among academicians in higher education. These findings are also consistent with Saiful et al. (2024), who pointed out that inadequate institutional resources can restrict the adoption of educational technology.

Ahmad et al. (2025) similarly noted that limited training, infrastructure constraints, and varying levels of digital literacy may influence lecturers' adoption rates and attitudes toward AI. In the same vein, Said & Ismail (2026) emphasized that AI adoption is shaped not only by technological factors but also by leadership practices, institutional support, and lecturers' readiness. Malaysia's AI Nexus 2024 initiative also emphasizes the need to strengthen collaboration, infrastructure, and institutional capacity within higher education institutions.

Therefore, addressing institutional and resource constraints through better resource allocation, wider access to AI tools, reliable Internet infrastructure, flexible training schedules, and stronger institutional support is important for promoting more effective AI integration in Malaysian higher education.

Interpersonal Issues

Interpersonal issues represent the third challenge lecturers encounter in adopting AI in teaching practices. Many lecturers heavily rely on their colleagues for guidance and knowledge sharing about AI, which contributes to a lack of university support for their staff. Participant 3 highlighted that *"My exposure to AI is limited, and I learned about ChatGPT and other tools like Quill Bot through my friends, especially my junior lecturer colleagues. Otherwise, I would not have been aware of the existence of AI"*. Participant 1 also shared a similar experience by saying, *"I realized that my friends offered far more help than the institution. I rely on my friends to assist me in learning how to use certain AI tools."*

Another challenge is a reluctance to embrace AI, which affects the willingness of senior lecturers to adopt new technologies. Participant 1 shared, *"As I approach retirement, I've hesitated to pursue new learning opportunities, particularly because I initially believed that AI would be very complex"*. Similarly, Participant 3 expressed, *"I have noticed that an age difference can be a significant barrier. As I approach retirement, I've been hesitant to adopt new learning, especially because I initially thought that AI would be challenging to understand"*. This demonstrates that senior lecturers resist embracing AI due to their comfort in their familiar routines and their reluctance to learn new technologies that seem complex and irrelevant to their work. This reluctance results in slower AI adoption. Participant 5 stated, *"As long as we have a choice, I prefer traditional methods"*, which emphasizes she prefers a familiar approach over newer technologies.

These findings align with a study by Chan & Lee (2023), which indicates that older educators generally need collaborative environments to support building their confidence in using new technologies. Culp-Roche et al. (2020) highlight that perceived complexity can demoralize digital immigrants from adopting new technologies. Moreover, Sedigheh et al. (2023) highlight that gaps in technology proficiency across generations also contribute to resistance to adopting new technologies. Addressing these interpersonal issues through various hands-on training and collaborative teaching can help reduce the resistance among senior lecturers to promoting AI in teaching.

Recommendations for AI Integration

There are four practical recommendations to address the challenges encountered by Gen X lecturers when integrating AI into their teaching practices. Further discussions follow below.

Institutional and Infrastructure Support

The main recommendation proposed by the lecturers is to provide institutional and infrastructure support to tackle the challenges encountered by Gen X lecturers in practicing AI in their teaching. These include university support, ethical guidelines for AI usage, establishing an AI center, and financial support. University support plays a crucial role in promoting the adoption of AI in teaching among senior lecturers. Without proper support from the university, efforts to embrace AI among lecturers may fall behind. Participant 1 highlighted this by saying, *"I hope that the institution can play an important role in supporting the effort to enhance the use of AI among lecturers,*

especially those from Generation X.”

Financial support also contributes to the adoption of AI among senior lecturers in terms of establishing AI center and financial assistance for AI tools and training related to AI courses. Participant 1 stresses an issue related to the importance of resources by stating, *“The university should provide financial support to subscribe to Quill Bot, as it is a valuable resource for teaching and research”*. In addition to funding, lecturers also suggest establishing of AI center to provide access to guidance and expertise related to AI. A statement from Participant 2 supports this, *“I hope the university can establish an AI center where I can inquire about anything related to artificial intelligence”*. These initiatives aim to reduce dependence on colleagues and empower lecturers to explore and learn more about AI tools independently.

In addition, establishing clear ethical guidelines for AI usage is crucial for maintaining academic integrity. Participant 1 said, *“When discussing plagiarism, it is crucial to set specific guidelines and policies to tackle this concern”*. Similarly, Participant 2 also mentioned a similar concern about developing the necessary policies and guidelines to address the issue of plagiarism, stating, *“When we talk about plagiarism, it is important to establish certain restrictions and rules or policies to address this issue”*.

These guidelines related to AI usage should also tackle issues concerning the authenticity and originality of academic work. Participant 1 said, *“I hope that guidelines or policies will be established in the future to address this significant ethical challenge”*. Participant 2 reinforced this sentiment by saying, *“While AI can be beneficial, plagiarism is not acceptable for academics and students. Therefore, I hope that rules or policies will be developed in the future to solve this serious ethical problem”*.

Based on these findings, the recommendations highlight the need for stronger institutional and infrastructural support to facilitate AI integration among Gen X lecturers. Past literature has consistently emphasized that AI adoption in education depends not only on lecturers' willingness, but also on the availability of institutional resources, technical support, training opportunities, and clear implementation strategies. Mantha and Krishna (2024) highlighted that institutional support, including access to resources, funding, and expertise, is crucial for encouraging educators to embrace AI technologies. This is consistent with Ahmed et al. (2022), who found that educators require adequate resources, support, recognition, funding, and technological equipment to adopt AI-based pedagogical solutions effectively. Similarly, Liangyu et al. (2024) emphasized that facilitating conditions, such as technical infrastructure, institutional policies, and support systems, are important in shaping academicians' behavioral intention to use AI in higher education.

The MY AI Nexus 2024 initiative also underscores the need for universities to strengthen AI-related infrastructure and establish AI centers that can provide guidance, expertise, and practical support for educators. This recommendation is important because institutional barriers such as limited funding, poor resource allocation, lack of technical assistance, and limited access to AI tools may restrict lecturers' ability to engage with AI effectively (Saiful et al., 2024). Said & Ismail (2026) further showed that lecturers' use of AI applications is influenced by technology acceptance, self-efficacy, and instructional leadership, suggesting that institutional leaders play an important role in creating supportive environments for AI integration.

In addition to infrastructure and resource support, ethical guidance is equally important. Smith and Brown (2024) emphasized that clear ethical guidelines for AI usage are necessary to maintain academic integrity and reduce uncertainty among educators and students. This aligns with Sadiq et al. (2026), who noted that generative AI tools have raised concerns about authentic assessment, plagiarism, and the credibility of higher education outcomes. Therefore, universities should provide clear policies on acceptable AI use, academic integrity, AI-assisted writing, and assessment practices. A combination of ethical guidelines, structured training, reliable infrastructure, and strong institutional support is essential to help Gen X lecturers navigate the complexities of incorporating AI into their teaching practices.

Collaborative Teaching

Collaborative teaching is the second recommendation proposed by Gen X lecturers to address the challenges of adopting AI in educational practices. Promoting collaboration and knowledge sharing among lecturers can significantly influence the effective use of AI. Platforms such as Microsoft Teams and other similar platforms

provide valuable opportunities for fostering collaboration and hosting sharing sessions. As Participant 4 noted, *“Platforms like Microsoft Teams and other similar tools can be effective for fostering collaboration”*.

In addition, creating an inclusive culture that allows lecturers to share their knowledge and experiences with AI will promote a supportive learning environment among lecturers. Participant 2 expressed her opinion by highlighting the importance of seeking help from colleagues in learning AI, stating, *“I find it quite difficult to understand the interface of Consensus since I'm not very tech-savvy. I often seek help from my friends”*. Similarly, Participant 4 mentioned the institutional opportunities available for collaborative teaching, noting, *“The institution already provides ample opportunities and resources for collaborative teaching. Educators have access to modules, syllabus, and notes, which can be shared and developed collectively”*.

Based on these findings, collaborative teaching is important for promoting AI integration among lecturers in this study. Collaboration can create a supportive professional learning environment where lecturers exchange experiences, share effective AI practices, and address technological challenges together. Martzoukou et al. (2020) stressed that collaboration enables educators to learn from one another and develop confidence in navigating digital tools. This finding is consistent with participants' feedback, which emphasized the importance of knowledge sharing through platforms such as Microsoft Teams. Such platforms allow lecturers to ask questions, share resources, and learn practical ways of using AI tools in teaching.

Collaborative efforts are particularly relevant for Gen X lecturers, who may have less experience with AI technologies and may depend on colleagues for guidance when exploring new tools (Chan & Lee, 2023). This is also aligned with Anuar et al. (2024), who highlighted that social influence, including support from colleagues, administrators, and institutional policies, can shape academicians' attitudes and behavioral intention toward AI adoption. Similarly, Cabero-Almenara et al. (2024) emphasized that educators' beliefs and adoption of AI are influenced by professional experiences, interactions with colleagues, and the institutional environment in which they work.

Furthermore, collaborative teaching may help reduce resistance among senior lecturers when adopting new technologies (Saman et al., 2024). When lecturers are supported by peers and institutional networks, they may feel more confident in experimenting with AI tools and integrating them into their teaching practices. Said & Ismail (2026) also indicated that leadership and psychological readiness are important in supporting AI application usage among lecturers, suggesting that collaborative institutional environments can strengthen lecturers' confidence and willingness to adopt AI. Therefore, institutions should establish collaborative networks, peer mentoring systems, and shared digital learning spaces to support wider and more sustainable AI adoption in higher education.

Training

Training has been recognized as a crucial recommendation for improving AI integration among Gen X lecturers. Hands-on training is a top priority for these lecturers since they require more structured guidance to learn and utilize AI tools effectively. Participant 1 points out this importance by expressing, *“I hope that the university can allocate additional funds for training, particularly focused on AI”*. To meet these needs, the university should invite AI experts to conduct practical and interactive training sessions that are tailored to the needs of these lecturers. Conducting these trainings will help to improve the lecturer's confidence, knowledge, and skills in applying AI technologies in their teaching and research activities.

Participant 1 highlighted the significance of this method, expressing, *“I genuinely hope that the university will bring in AI specialists to lead training sessions for us”*. Similarly, Participant 2 expresses this sentiment, saying, *“I sincerely hope that the university can invite AI experts to conduct training sessions for us”*. On the other hand, webinars can also offer significant benefits to improve lecturers' knowledge and skills in AI by focusing on academic fields that are relevant to them. Participant 3 reflected on her experience, saying, *“I also gain knowledge from webinars held at the university”*.

Based on these findings, hands-on and structured training is essential to support AI integration among lecturers. Practical training can help lecturers move beyond basic awareness of AI tools by equipping them with the knowledge, skills, and confidence needed to apply AI meaningfully in teaching and learning. According to Saman

et al. (2024), customised and practical training conducted by AI specialists is crucial for preparing educators to embrace new technologies effectively. This need is particularly important for Gen X lecturers, who are often viewed as digital immigrants and may have had limited exposure to AI tools during the earlier stages of their academic careers (Mantha & Krishna, 2024).

Without proper training, many lecturers may depend on self-directed learning through online resources, peers, or informal webinars. Although these approaches can provide initial exposure, they may lead to inconsistent knowledge development and uneven confidence in using AI tools. This finding is consistent with Ayanwale et al. (2022), who emphasized that teachers' readiness and confidence are important for the successful implementation of AI in education. Similarly, Ahmad et al. (2025) highlighted the need for targeted professional development initiatives to strengthen lecturers' AI awareness, confidence, and adoption readiness, especially among educators with limited technical backgrounds.

Therefore, universities should provide comprehensive AI training that combines both face-to-face and online learning approaches, as suggested by Saiful et al. (2024). Such training should include practical demonstrations, prompt-writing skills, ethical AI use, assessment-related applications, and discipline-specific examples that lecturers can apply directly in their teaching. Ahmed et al. (2022) also noted that educators require adequate resources, support, and recognition to adopt AI-based pedagogical solutions effectively, while Sadiq et al. (2026) identified self-efficacy and facilitating conditions as important factors influencing lecturers' intention to adopt AI-based tools. The training programmes outlined in the MY AI Nexus 2024 policy further underscore the need to provide lecturers with practical AI skills that meet the evolving demands of technology in the higher education landscape.

Accessibility to AI tools

Improving the accessibility of AI tools is a crucial recommendation proposed by Gen X lecturers for promoting AI in higher education. Universities should invest in subscribing to a broader range of AI tools to guarantee that all lecturers have equitable access to AI tools. Participant 1 expressed this need by saying, *"I also wish for the university to subscribe to more AI resources related to research"*. Similarly, Participant 5 also expressed a similar need related to the importance of accessibility of AI tools by noting, *"Subscribing to additional AI tools would greatly assist me as a lecturer and researcher in achieving my KPIs"*.

Additionally, increasing the availability of resources such as QuillBot, Perplexity, and Consensus allows lecturers to improve their capabilities in teaching and research without insufficient subscriptions or high costs. Participant 5 mentioned, *"The technology provided is generally sufficient and works well. However, there could be further improvements, such as providing devices or advanced training to enhance AI integration"*. By providing a broader range of AI tools, universities can assist lecturers in overcoming access barriers that restrict the implementation of AI.

The university can also promote the adoption of personal AI tools among lecturers by providing financial assistance, such as subsidies that cover half of the AI fees. This assistance can motivate lecturers to self-explore AI tools independently. Participants 1 and 2 highlighted this motivation by stating, *"I'm willing to invest because I've realized that certain AIs, like ChatGPT, can significantly enhance my work"*. Offering both institutional and financial support will encourage lecturers to explore and learn AI tools independently, and this may assist other lecturers who need help in the future.

Based on these findings, the recommendation to improve access to AI tools is strongly supported by existing literature. Limited access to AI tools and resources can restrict lecturers' ability to explore, practise, and develop confidence in using emerging technologies. Saiful et al. (2024) pointed out that limited access to AI tools and resources may reduce lecturers' ability to engage effectively with these technologies, which can slow adoption and weaken the effectiveness of teaching and research. This is consistent with Ahmed et al. (2022), who emphasized that higher education institutions need to provide adequate resources, funding, technological equipment, and support to encourage educators to adopt AI-based pedagogical solutions.

Addressing barriers such as high subscription fees, limited institutional licences, and unequal access to AI platforms is important to ensure that AI integration does not benefit only a small group of lecturers. Sadiq et al.

(2026) highlighted that facilitating conditions, including access to resources, knowledge, compatibility with existing tools, and technical assistance, are important in supporting lecturers' adoption of AI-based tools. Similarly, Liangyu et al. (2024) explained that technical infrastructure, institutional policies, and support systems play an important role in shaping academicians' behavioral intention and actual use of AI in higher education.

The MY AI Nexus 2024 initiative also highlights the need for stronger institutional support and more equitable access to AI tools to promote innovation and technology integration in education. Saman et al. (2024) further emphasized the importance of financial support, such as subsidies, to allow lecturers to explore and experience AI tools independently. Such support can improve lecturers' competence, confidence, and willingness to incorporate AI into their teaching practices. Therefore, universities should consider providing wider institutional licences, subsidised access to AI platforms, reliable technical support, and equal opportunities for lecturers across disciplines to use AI tools for teaching, learning, assessment, and research.

CONCLUSION

This study highlights the need for a comprehensive and supportive approach to AI integration in Malaysian higher education, particularly for Generation X lecturers. Although AI offers significant opportunities to enhance teaching, learning, assessment, feedback, and academic productivity, its successful implementation depends greatly on lecturers' readiness, confidence, access to resources, and institutional support. The findings revealed that Gen X lecturers face four main challenges when integrating AI into their teaching practices: limited knowledge and exposure to AI, institutional and resource constraints, interpersonal issues, and ethical concerns.

First, limited knowledge and exposure to AI restricted lecturers' ability to explore and use a wider range of AI tools beyond commonly known platforms such as ChatGPT, Grammarly, and QuillBot. Some lecturers also struggled with prompt writing, which affected their ability to obtain useful and specific responses from AI tools. Second, institutional and resource constraints, including heavy workloads, time limitations, restricted access to AI subscriptions, and unstable Internet connectivity, limited their opportunities to participate in training and use AI consistently. Third, interpersonal issues showed that many lecturers relied on colleagues for guidance, while some remained hesitant due to uncertainty, lack of confidence, or perceived complexity of AI tools. Finally, ethical concerns related to plagiarism, academic integrity, originality, and unclear institutional guidelines created further uncertainty about the acceptable use of AI in teaching, assessment, and academic writing.

Based on these findings, four key recommendations were proposed. First, institutions should strengthen infrastructural and institutional support by establishing AI centers, improving technical assistance, providing financial support, and ensuring reliable access to AI-related resources. Second, collaborative teaching and peer-support networks should be encouraged, as platforms such as Microsoft Teams can help lecturers share knowledge, exchange practical strategies, and build confidence in using AI. Third, structured and hands-on training conducted by AI experts is needed to help lecturers develop practical skills, including prompt writing, ethical AI use, AI-assisted assessment, and discipline-specific applications. Fourth, universities should improve access to AI tools by providing wider institutional licenses, subsidies, and equitable access across departments and disciplines.

These recommendations align with Malaysia's broader AI-driven education agenda, including MY AI Nexus 2024, which emphasizes institutional readiness, talent development, infrastructure, and responsible AI adoption. For Gen X lecturers, AI integration should not be treated merely as a technical transition, but as a professional and pedagogical adjustment that requires time, guidance, confidence-building, and continuous support. By addressing these needs, higher education institutions can create a more inclusive AI adoption process that enables lecturers from different generations to participate meaningfully in digital transformation.

This study has several limitations. The findings are based on a small sample of five senior lecturers from a single institution, which limits the generalizability of the results. Future studies should involve a larger and more diverse sample across different universities, disciplines, and institutional settings to capture broader experiences of AI adoption among lecturers. Comparative studies involving Baby Boomer, Gen X, Millennial, and Gen Z lecturers may also provide useful insights into how generational background influences AI readiness, confidence, and adoption strategies. In addition, future research could examine motivational factors that encourage Gen X lecturers to embrace AI, as well as the effectiveness of institutional training, AI centers, and ethical guidelines in

supporting sustainable AI integration. Addressing these areas can contribute to a more inclusive, ethical, and innovative AI-driven higher education system in Malaysia.

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