The Ethical Use of AI Technology Applications among IPMA Students in Malaysia

Mohammad Khairuddin Majidillah [1], Mohd Erfino Johari [1], Adila Abdullah [1], Norfarahin Amat@Adnin [1], Saifuddin Mohtaram [1], Norazmi Anas [2], Amran Abdul Halim [3], and Anaztasia Natasha Muhamad Ramlan[4]

[1] Universiti Poly-Tech Malaysia (UPTM), Kuala Lumpur, Malaysia
khairuddin@uptm.edu.my; erfino@uptm.edu.my; adila_a@uptm.edu.my; norfarahin@uptm.edu.my; saifuddin@uptm.edu.my
[2] Universiti Teknologi MARA (UiTM), Perak Branch, Tapah Campus, Malaysia
norazmianas@uitm.edu.my
[3] Universiti Sains Islam Malaysia (USIM), Nilai, Negeri Sembilan, Malaysia
amranabdulhalim@usim.edu.my
[4] Universiti Teknologi MARA (UiTM), Melaka Branch, Alor Gajah Campus, Malaysia
anaztasia@uitm.edu.my

Abstract. The increasing use of artificial intelligence (AI) applications in education presents both benefits and ethical challenges. This study investigates the ethical use of AI among students in institutions under the Majlis Amanah Rakyat Education System (IPMA), including UPTM, UniKL, KPTM, and KPM. A quantitative survey of 438 students assessed four main constructs: AI Usage Intensity, Ethical Awareness, Ethical Risk Perception, and Ethical Framework Development. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the relationships among variables. Findings reveal widespread AI usage, particularly tools like ChatGPT and Grammarly, with students reporting high comfort and perceived learning benefits. However, concerns regarding data privacy and academic integrity are prominent. Ethical Awareness and Risk Perception were found to significantly mediate the relationship between AI Usage and support for an institutional ethical framework. The structural model explained 68.5% of the variance in framework support. These results highlight students' readiness for AI adoption, coupled with a strong desire for clear ethical guidance. The study recommends the development of inclusive and transparent AI governance frameworks within IPMA institutions, supported by awareness programs and ethical training. The findings contribute to the growing body of research on responsible AI use in Malaysian higher education.

Keywords: Ethical use, AI technology applications, IPMA students.

N. A. Ishak et al. (eds.), *Proceedings of the International Conference on Cross- Disciplinary Academic Research 2025 - Track 1 Advances in Computing, Electronics, Engineering, and Mathematics (ICAR-T1 2025)*, Advances in Engineering Research 296,
https://doi.org/10.2991/978-94-6239-636-4_20

1 Introduction

The integration of Artificial Intelligence (AI) into higher education is accelerating, offering transformative benefits such as personalized learning, instant feedback, and enhanced academic support. Applications like ChatGPT, Grammarly, and other AI-driven tools are widely used by students to assist with writing, research, and study tasks. While these technologies promote greater efficiency and accessibility, they also introduce complex ethical dilemmas surrounding academic integrity, data privacy, and authorship. Recent studies have highlighted growing concerns over how AI is reshaping student behavior, raising questions about accountability and transparency in digital learning environments (Khalil et al., 2023; Wang et al., 2022).

Within Malaysia's Majlis Amanah Rakyat (MARA) Education System—referred to as IPMA—students show high levels of AI adoption. However, this widespread use is not matched by adequate ethical guidance or policy frameworks. Despite a growing awareness among students about the potential risks associated with AI usage, many institutions lack clear protocols on what constitutes responsible use. This absence of structured ethical frameworks creates ambiguity, leaving students vulnerable to unintentional misconduct and data misuse (Brennen & Kreiss, 2022; Zhou et al., 2023). Thus, the central research problem this study addresses is the mismatch between increasing AI usage and the lack of institutional ethical guidelines, particularly in the IPMA context.

To explore this issue, the study investigates the relationships among four key constructs: AI Usage Intensity, Ethical Awareness, Ethical Risk Perception, and support for Ethical Framework Development. Using a quantitative, cross-sectional survey involving 438 students from four IPMA institutions—Universiti Poly-Tech Malaysia (UPTM), Universiti Kuala Lumpur (UniKL), Kolej Poly-Tech MARA (KPTM), and Kolej Profesional MARA (KPM)—the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the data. The findings provide empirical evidence that while students value AI for its educational benefits, they also express a strong need for formal ethical governance. This underscores the urgency for institutions to develop inclusive, transparent, and student-informed AI usage policies. By foregrounding student perceptions, this study positions empirical evidence as a critical input for policy formulation, ensuring that future AI governance frameworks within IPMA are responsive to actual student experiences, ethical concerns, and expectations.

2 Literature Review

Numerous studies confirm the growing use of AI tools in academia for personalized learning, intelligent tutoring systems, and automated grading (Chen et al., 2020; Holmes et al., 2021). For instance, Luckin et al. (2016) emphasize the pedagogical potential of AI in fostering adaptive learning environments. In Malaysia, studies (Zawawi et al., 2023; Nordin et al., 2022) have shown that students widely accept AI applications for academic assistance, driven by their user-friendly interfaces and immediate feedback capabilities.

Ethical awareness involves the recognition of moral issues in AI deployment—data collection, user consent, and institutional accountability. Floridi et al. (2018) propose a framework of AI ethics that includes principles such as fairness, transparency, and explainability. In educational contexts, Williamson and Eynon (2020) argue that students often lack clear guidance on what constitutes ethical vs. unethical AI usage.

Furthermore, Sison and Shim (2020) highlight the concept of "moral agency" in educational technology use, stressing that students must be empowered to make value-based judgments when engaging with AI tools. Similarly, Long and Magerko (2020) emphasize the need for digital literacy frameworks that include ethical dimensions, preparing learners to critically evaluate AI-generated content.

In the uploaded study, 80.6% of IPMA students agreed that AI tools must comply with ethical guidelines, yet only 63.9% believed they were adequately briefed on such matters. This gap suggests that while ethical awareness exists, institutional efforts remain insufficient.

Concerns around personal data leakage and academic dishonesty dominate the literature (Selwyn, 2019; Binns et al., 2018). Tools like ChatGPT can generate complete assignments, raising fears of plagiarism and dependency. A study by Cotton et al. (2023) found that students often blur the lines between legitimate AI-assisted writing and academic misconduct, underscoring the need for clearer institutional policies. Moreover, generative AI tools also raise questions about authorship and intellectual ownership (Kasneci et al., 2023).

In this context, 67.4% of IPMA students expressed concern over personal data risks, and 69.8% cited academic integrity issues, reflecting alignment with global concerns. The Fornell-Larcker criterion from the uploaded study validates that Ethical Risk Perception strongly correlates with Ethical Awareness ($r = 0.771$), implying a direct influence on students' ethical stance.

The concept of an ethical AI governance framework in education has gained traction globally (UNESCO, 2021; IEEE, 2022). Such frameworks promote co-regulation among stakeholders—students, lecturers, and administrators. Fjeld et al. (2020) reviewed over 80 AI ethics guidelines and identified common themes, such as privacy, accountability, and fairness, which are essential in educational contexts. However, Cowls and Floridi (2022) argue that implementation remains a challenge due to institutional inertia and lack of localized adaptation.

The study finds over 73% of IPMA students support such a framework, and over 80% demand inclusion of data protection and user-friendly ethical guidelines.

Noteworthy Models:

- **IEEE's Ethically Aligned Design** (2019): Advocates participatory ethics in tech development.
- **UNESCO AI Ethics Recommendations** (2021): Calls for AI governance emphasizing inclusion, accountability, and human rights.
- **OECD Principles on AI** (2019): Suggest transparency, robustness, and accountability as foundational ethical pillars.

Yet, Malaysia lacks a unified AI ethics policy tailored to educational contexts—a critical gap the current study addresses. National policy frameworks must reflect student realities and local cultural values while aligning with international AI ethics norms.

In response to these concerns, the literature has increasingly emphasized the need for participatory and transparent AI governance frameworks. Such frameworks should not only outline ethical guidelines but also engage stakeholders including students, faculty, and administrators in the policymaking process. Participatory ethics has been shown to enhance compliance, legitimacy, and user trust (Renz et al., 2022). For example, universities that implemented co-created AI policies reported greater adherence among students and faculty, alongside increased confidence in institutional accountability.

In the Southeast Asian context, and specifically in Malaysia, literature remains limited despite the growing adoption of AI in education. The unique structure of Malaysia's polytechnic and IPMA institutions necessitates localized research that accounts for cultural, technological, and regulatory nuances. Prior studies suggest that ethical awareness and risk perception vary significantly across educational systems and must be examined through culturally relevant lenses (Wang et al., 2022). This reinforces the value of the present study, which seeks to empirically validate the relationships among AI Usage Intensity, Ethical Awareness, Ethical Risk Perception, and Ethical Framework Development within the Malaysian tertiary education context.

In the Malaysian context, the ethical use of artificial intelligence in education aligns closely with national policy directions such as the *Malaysia Artificial Intelligence Roadmap 2021–2025* and the *National Digital Policy (MyDIGITAL)*, which emphasise responsible, inclusive, and ethical adoption of AI technologies in public and educational sectors.

Although international ethical frameworks such as UNESCO's AI Ethics Recommendations (2021), IEEE's Ethically Aligned Design (2019), and the OECD AI Principles (2019) offer comprehensive normative guidance, their direct application within Malaysia's IPMA context requires careful contextualization. These frameworks are predominantly developed within Western educational and regulatory environments that emphasize individual autonomy, decentralized governance, and high digital literacy. In contrast, IPMA institutions operate within a more centralized administrative structure and a culturally collectivist educational context, where ethical practices are strongly influenced by institutional directives and communal norms. As such, global ethical principles must be adapted to align with local governance structures, cultural expectations, and students' reliance on institutional guidance.

In summary, the body of literature underscores the interplay between technological innovation and ethical preparedness in AI-enhanced education. It advocates for a shift from reactive regulation to proactive ethical design, emphasizing the co-development of adaptive, inclusive, and enforceable ethical frameworks that are responsive to student perceptions and local educational contexts. The current study contributes to this growing field by addressing existing research gaps and offering empirical insights into the ethical dimensions of AI usage among IPMA students in Malaysia.

3 Methodology

The study employed a quantitative research design using a survey method to examine the ethical use of artificial intelligence (AI) in teaching and learning among students from institutions under the IPMA system. A stratified convenience sampling strategy was employed to enhance institutional representativeness while maintaining practical feasibility. The sample was stratified by institution to ensure participation from major IPMA higher education institutions, namely Universiti Poly-Tech Malaysia (UPTM), Universiti Kuala Lumpur (UniKL), Kolej Poly-Tech MARA (KPTM), and Kolej Profesional MARA (KPM). Within each institution, respondents were selected using convenience sampling through online survey distribution. Although probability-based random sampling was not feasible due to logistical constraints, the inclusion of multiple institutions, combined with clearly defined inclusion criteria and a sufficient sample size ($n = 438$), helped mitigate potential selection bias and supported the generalisability of the findings within the IPMA context. A total of 438 responses were obtained, providing a diverse demographic representation by institution, age, semester, and AI usage experience. The survey instrument was designed to measure four key constructs: AI Usage Intensity, Ethical Awareness, Ethical Risk Perception, and Ethical Framework Development. These constructs were operationalised using multiple items, and the internal consistency reliability was confirmed through Cronbach's alpha, all exceeding the threshold of 0.70. Validity assessments included convergent validity, using Average Variance Extracted (AVE) and Composite Reliability (CR), and discriminant validity using the Fornell-Larcker criterion. The structural model was evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM), with bootstrapping of 5,000 resamples to test the study's hypotheses. The model's explanatory power was assessed using R-squared values for each dependent variable. This rigorous methodological approach ensured the reliability and validity of the measurement model while enabling robust analysis of the relationships among AI usage, ethical awareness, risk perception, and support for ethical framework development in educational settings.

4 Results and Discussion

The results are strongly aligned with the study's stated objectives and conceptual framework, with all hypothesised relationships achieving statistical significance ($p < 0.001$). Beyond statistical significance, the magnitude of the effects indicates meaningful practical implications for ethical AI governance within IPMA institutions. Following Hair et al. (2021), standardized path coefficients around 0.10 indicate small effects, values around 0.30 represent moderate effects, and coefficients of 0.50 or higher reflect large effects.

In this study, several relationships demonstrate moderate to large practical significance. Notably, Ethical Risk Perception exerts a strong effect on Ethical Awareness ($\beta = 0.666$), suggesting that heightened awareness of risks such as data privacy and academic integrity substantially enhances students' ethical consciousness. Similarly, Ethical Awareness shows a moderate-to-strong effect on support for Ethical Framework

Development (β = 0.423), indicating that increases in ethical understanding translate into meaningful institutional expectations.
The structural model explains a substantial proportion of variance in Ethical Framework Development (R^2 = 0.685), highlighting the practical relevance of AI usage behaviour, ethical awareness, and risk perception in shaping students' support for formal ethical governance. These findings suggest that interventions focusing on ethical risk communication and awareness-building are not only statistically justified but also practically impactful in strengthening responsible AI adoption within the IPMA context.

4.1 Demographic Information

The demographic profile of the respondents in this study reflects a diverse representation of students from various institutions under the IPMA system. Most respondents were from Universiti Poly-Tech Malaysia (UPTM), accounting for 61.6% (n=270), followed by Universiti Kuala Lumpur (UniKL) at 31.5% (n=138), while smaller proportions were from Kolej Poly-Tech MARA (KPTM) and Kolej Profesional MARA (KPM), comprising 4.3% (n=19) and 2.5% (n=11) respectively. In terms of age distribution, more than half of the participants (55%, n=241) were aged between 22 to 23 years, indicating that most respondents were at a critical stage of their tertiary education. Participants aged 20–21 years made up 18.5% (n=81), those aged 18–19 years constituted 10.7% (n=47), while 15.8% (n=69) were older than 24 years. Regarding experience with AI usage, the majority of respondents (50.7%, n=222) reported having between one and three years of experience using AI applications. Notably, 25.1% (n=110) had more than three years of experience, suggesting a significant proportion of students are already familiar and comfortable with AI tools, while 24.2% (n=106) had less than one year of exposure. This demographic landscape provides a solid foundation for understanding the perspectives and attitudes of IPMA students toward the ethical use of AI in teaching and learning, which is crucial for informing the development of an ethics framework tailored to this context.

Table 1. Respondent's Profile

Demographic Information		Frequency	Percentage (%)
Institution	Universiti Poly-Tech Malaysia (UPTM)	270	61.6
	Kolej Poly-Tech MARA (KPTM)	19	4.3
	Universiti Kuala Lumpur (UniKL)	138	31.5
	Kolej Profesional MARA (KPM)	11	2.5
Age	18–19 years old	47	10.7
	20–21 years old	81	18.5
	22–23 years old	241	55
	More than 24 years old	69	15.8
AI Usage Experience	0–1 year	106	24.2
	1–3 years	222	50.7

	More than 3 years	110	25.1
Semester	Semester 1	27	6.2
	Semester 2	73	16.7
	Semester 3	54	12.3
	Semester 4	47	10.7
	Semester 5	100	22.8
	Semester 6	19	4.3
	Semester 7	118	26.9

Descriptive Analysis. This section presents the descriptive analysis of the key constructs examined in this study. Among the constructs are AI Usage Intensity, Ethical Awareness, Ethical Risk Perception, and Ethical Framework Development. The descriptive statistics provide a foundational understanding of students' general attitudes, perceptions, and behaviours regarding AI usage in teaching and learning contexts. By summarising the frequency and distribution of responses, this section helps contextualise the subsequent inferential analyses and highlights prevailing trends and sentiments among IPMA students concerning the ethical use of AI.

AI Usage Intensity. As shown in Table 2, the results reveal that the most of respondents generally have a positive orientation toward using AI applications in their teaching and learning activities. Specifically, 71.3% of respondents agreed or strongly agreed that they often utilise AI applications for educational purposes, reflecting substantial integration of AI tools into students' routines. The popularity of AI platforms such as Grammarly, ChatGPT, and Duolingo is particularly notable, with 87% of respondents expressing agreement or strong agreement regarding their widespread use at IPMA. Furthermore, 82.4% of respondents indicated that AI applications help improve their understanding of subject matter, suggesting that students perceive AI as an effective aid to learning. However, lecturer encouragement for AI usage was more moderate, with 54.1% agreeing or strongly agreeing that their lecturers encourage AI in the classroom, while 38.8% remained neutral. AI applications are also perceived as valuable tools for assignments, with 77.1% of respondents acknowledging their use for research and homework tasks. In terms of comfort, 78.1% reported feeling comfortable using AI applications in their daily learning activities. Overall, these findings underscore a strong and growing acceptance of AI tools among IPMA students.

Table 2. Summary of AI Usage Intensity

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I often utilise AI applications in teaching and learning.	3 (0.7%)	7 (1.6%)	116 (26.5%)	154 (35.2%)	158 (36.1%)
AI applications, such as Grammarly,	0 (0.0%)	2 (0.5%)	55 (12.6%)	120 (27.4%)	261 (59.6%)

ChatGPT, or Duolingo, are popular among students and staff at IPMA.					
AI applications help improve the understanding of subjects being taught or learned.	0 (0.0%)	4 (0.9%)	73 (16.7%)	146 (33.3%)	215 (49.1%)
Lecturers at IPMA encourage the use of AI applications in class.	3 (0.7%)	28 (6.4%)	170 (38.8%)	138 (31.5%)	99 (22.6%)
AI applications are widely used for research assignments and homework.	1 (0.2%)	8 (1.8%)	91 (20.8%)	164 (37.4%)	174 (39.7%)
I believe that AI applications add value to the teaching and learning process.	1 (0.2%)	7 (1.6%)	82 (18.7%)	157 (35.8%)	191 (43.6%)
I feel comfortable using AI applications in my daily teaching and learning activities.	2 (0.5%)	10 (2.3%)	84 (19.2%)	158 (36.1%)	184 (42.0%)

Ethical Awareness. Table 3 presents findings on ethical awareness regarding AI usage. Most of the respondents (80.6%) agreed or strongly agreed that AI applications must comply with clear ethical guidelines, indicating an acknowledgement of the importance of ethical standards. However, awareness initiatives appear less prominent: only 63.9% agreed or strongly agreed that students and staff are briefed on ethical issues before using AI, while a considerable proportion (26%) remained neutral. Similarly, while 65.1% agreed or strongly agreed that AI applications should be institutionally approved, a notable segment (27.2%) was neutral. Encouragingly, 74.6% of respondents recognised the need to increase ethical awareness related to AI usage at IPMA, suggesting that while awareness exists, it could benefit from reinforcement through institutional initiatives.

Table 3. Summary of the Ethical Awareness

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The use of AI applications must comply with clear ethical guidelines.	1 (0.2%)	4 (0.9%)	80 (18.3%)	122 (27.9%)	231 (52.7%)

Students and staff are briefed on ethical issues before using AI applications.	11 (2.5%)	33 (7.5%)	114 (26.0%)	135 (30.8%)	145 (33.1%)
AI applications used must first be approved by the institution.	13 (3.0%)	21 (4.8%)	119 (27.2%)	116 (26.5%)	169 (38.6%)
There is a need to increase awareness of the ethics of using AI applications at IPMA.	3 (0.7%)	9 (2.1%)	99 (22.6%)	131 (29.9%)	196 (44.7%)

Ethical Risk Perception. The analysis in Table 4 highlights respondents' perceptions of ethical risks associated with AI use. Concern about personal data leakage was prominent, with 67.4% expressing agreement or strong agreement, indicating a clear awareness of privacy risks. Similarly, 69.8% of respondents agreed or strongly agreed that academic integrity is a significant issue when using AI, reflecting apprehension about potential misuse in academic contexts such as plagiarism or unauthorized assistance. Moreover, 79.3% agreed or strongly agreed that AI usage must be closely monitored to prevent misuse, suggesting strong support for oversight mechanisms to ensure responsible AI use in academic environments.

Table 4. Summary of the Ethical Risk Perception

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am concerned about the leakage of personal data when using AI applications.	7 (1.6%)	22 (5.0%)	114 (26.0%)	108 (24.7%)	187 (42.7%)
Academic integrity is a significant issue in the use of AI applications.	5 (1.1%)	8 (1.8%)	119 (27.2%)	135 (30.8%)	171 (39.0%)
The use of AI applications must be closely monitored to prevent their misuse.	3 (0.7%)	12 (2.7%)	76 (17.4%)	122 (27.9%)	225 (51.4%)

Ethical Framework Development. Findings presented in Table 5 show overwhelming support for the development of an institutional ethical framework governing AI usage at IPMA. Specifically, 73.3% of respondents agreed or strongly agreed that such a framework should be established. A slightly higher proportion (78.3%) believed that this framework should involve contributions from students, lecturers, and administrators, reflecting a participatory approach to policy development. Clarity and accessibility of ethical guidelines were also emphasised, with 83.1% agreeing or strongly agreeing that guidelines should be easy to understand. Protection of personal data was a key concern, with 80.8% supporting its inclusion in the framework. Notably, 81.9% agreed or strongly agreed that a balance should be maintained between technology use and human values, highlighting a holistic perspective. Regular monitoring and enforcement were supported by 77.2% of respondents, and 70.5% agreed or strongly agreed that training and workshops on AI ethics should be mandatory for all IPMA members. Collectively, these results demonstrate strong student support for a comprehensive, inclusive, and practical ethical framework to guide the use of AI in teaching and learning.

Table 5. Summary of the Ethical Framework Development

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
An ethical framework for the use of AI applications needs to be developed at IPMA.	1 (0.2%)	7 (1.6%)	109 (24.9%)	167 (38.1%)	154 (35.2%)
This ethical framework should involve input from students, lecturers, and administrators.	2 (0.5%)	6 (1.4%)	87 (19.9%)	164 (37.4%)	179 (40.9%)
Ethical guidelines should be provided in a format that is easy for users to understand.	0 (0.0%)	7 (1.6%)	67 (15.3%)	156 (35.6%)	208 (47.5%)
This framework should include protection of users' personal data when using AI applications.	1 (0.2%)	4 (0.9%)	79 (18.0%)	138 (31.5%)	216 (49.3%)
The ethical framework should ensure a balance between technological use and human values.	0 (0.0%)	4 (0.9%)	75 (17.1%)	150 (34.2%)	209 (47.7%)
Monitoring and enforcement of the ethical framework should be carried out regularly.	0 (0.0%)	6 (1.4%)	94 (21.5%)	148 (33.8%)	190 (43.4%)
Training and workshops on the ethics of AI application usage should be mandatory for all IPMA members.	1 (0.2%)	10 (2.3%)	118 (26.9%)	132 (30.1%)	177 (40.4%)

Measurement Model Evaluation. The measurement model evaluation in this study ensures that the constructs used to assess the ethics of AI usage in teaching and learning among IPMA students meet the required standards of reliability and validity. Three key aspects were examined: reliability, convergent validity, and discriminant validity. As summarised in Table 6, all constructs demonstrated satisfactory internal consistency reliability, as indicated by Cronbach's alpha values exceeding the threshold of 0.70 (Hair et al., 2021). The construct AI Usage Intensity (AIU) achieved an alpha of 0.905, reflecting excellent reliability. Ethical Awareness (EA) showed a Cronbach's alpha of 0.807, indicating good reliability, while Ethical Framework Development (EFD) reported a very high alpha of 0.939, suggesting excellent internal consistency among its items. Finally, Ethical Risk Perception (ERP) recorded a Cronbach's alpha of 0.781, also meeting the acceptable standard. These results collectively suggest that the items within each construct reliably measure their respective latent variables.

Table 6. Reliability test (Cronbach's alpha)

Constructs	Measurement items	Cronbach's α	Number of items
AI Usage Intensity (AIU)	AIU1, AIU2, AIU3, AIU5, AIU6, AIU7	0.905	6
Ethical Awareness (EA)	EA1, EA2, EA4, EA7	0.807	4
Ethical Framework Development (EFD)	EFD1, EFD2, EFD3, EFD4, EFD5, EFD6, EFD7	0.939	7
Ethical Risk Perception (ERP)	ERP3, ERP5, ERP6	0.781	3

Convergent validity was assessed through Average Variance Extracted (AVE), Composite Reliability (CR), and factor loadings, as shown in Table 7. The AVE values for all constructs exceeded the recommended threshold of 0.50 (Sarstedt et al., 2017), confirming that more than half of the variance of the indicators was captured by their respective latent constructs, indicating satisfactory convergent validity. Specifically, AI Usage Intensity achieved an AVE of 0.679, Ethical Awareness an AVE of 0.632, Ethical Framework Development an AVE of 0.731, and Ethical Risk Perception an AVE of 0.694.

In addition, Composite Reliability (CR) was examined to assess the internal consistency reliability as part of convergent validity. All constructs reported CR values above the threshold of 0.70 recommended by (Hair et al., 2021), indicating satisfactory reliability. Specifically, CR values ranged from 0.871 to 0.950, confirming that the constructs exhibit a high level of internal consistency without redundancy. Furthermore, individual item loadings for all constructs were well above 0.70 (Hair et al., 2021), providing additional evidence of convergent validity. Figure 1 illustrates these strong factor loadings, reinforcing the conclusion that the observed indicators appropriately represent their underlying constructs.

Table 7. Convergent validity of measurement model

Constructs	Items	Loadings	AVE	CR
AI Usage Intensity (AIU)	AIU1	0.822	0.679	0.927
	AIU2	0.759		
	AIU3	0.8		
	AIU5	0.813		
	AIU6	0.863		
	AIU7	0.882		
Ethical Awareness (EA)	EA1	0.806	0.632	0.873
	EA2	0.726		
	EA4	0.82		
	EA7	0.824		
Ethical Framework Development (EFD)	EFD1	0.85	0.731	0.95
	EFD2	0.846		
	EFD3	0.871		
	EFD4	0.829		
	EFD5	0.902		
	EFD6	0.868		
	EFD7	0.817		
Ethical Risk Perception (ERP)	ERP3	0.757	0.694	0.871
	ERP5	0.873		
	ERP6	0.864		

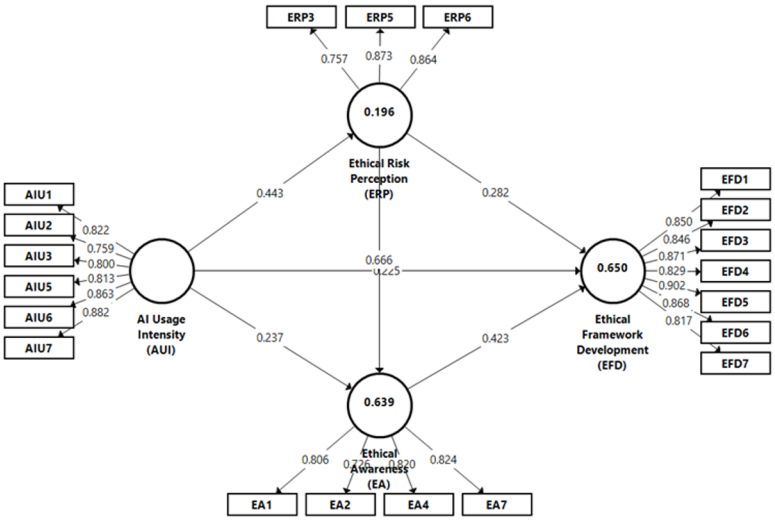

Fig. 1. Measurement Model Evaluation Diagram

Discriminant validity was evaluated using the Fornell-Larcker criterion, as reported in Table 8. The square roots of AVE for all constructs (shown diagonally in the table) were higher than the correlations with other constructs, confirming that each construct shares more variance with its indicators than with other constructs. According to Hair et al., (2021), the square root of AVE for a construct should be greater than its correlations with other constructs to establish discriminant validity. For instance, the square root of AVE for AI Usage Intensity was 0.824, which exceeds its correlations with Ethical Awareness (0.532), Ethical Framework Development (0.575), and Ethical Risk Perception (0.443). Similarly, all other constructs met this criterion, establishing satisfactory discriminant validity. These results indicate that the constructs are empirically distinct from one another and that multicollinearity is not a concern within the measurement model.

Table 8. Discriminant validity of measurement model

Constructs	AUI	EA	EFD	ERP
AI Usage Intensity (AUI)	**0.824**			
Ethical Awareness (EA)	0.532	**0.795**		
Ethical Framework Development (EFD)	0.575	0.76	**0.855**	
Ethical Risk Perception (ERP)	0.443	0.771	0.707	**0.833**

Structural Model Evaluation. The structural model was evaluated to examine the hypothesised relationships among AI Usage Intensity (AUI), Ethical Awareness (EA), Ethical Risk Perception (ERP), and Ethical Framework Development (EFD) using bootstrapping procedures with 5,000 resamples. Table 9 presents the path coefficients, t-values, and p-values for each hypothesis.

Table 9. Path coefficient and hypothesis testing

Hypothesis	Relationship	Coefficient	t-value (p-value)	Decision
H1	AI Usage Intensity (AUI) → Ethical Awareness (EA)	0.237	5.629 (0.000)	Supported
H2	AI Usage Intensity (AUI) → Ethical Framework Development (EFD)	0.225	5.215 (0.000)	Supported
H3	AI Usage Intensity (AUI) → Ethical Risk Perception (ERP)	0.443	9.760 (0.000)	Supported
H4	Ethical Awareness (EA) → Ethical Framework Development (EFD)	0.423	7.964 (0.000)	Supported
H5	Ethical Risk Perception (ERP) → Ethical Awareness (EA)	0.666	17.777 (0.000)	Supported
H6	Ethical Risk Perception (ERP) → Ethical Framework Development (EFD)	0.282	5.168 (0.000)	Supported
H7	AUI → EA → EFD	0.1	4.454 (0.000)	Supported
H8	AUI → ERP → EA	0.295	8.213 (0.000)	Supported

H9	ERP → EA → EFD	0.282	7.384 (0.000)	Supported
H10	AUI → ERP → EFD	0.125	4.271 (0.000)	Supported

H1: AI Usage Intensity → Ethical Awareness

The relationship between AI Usage Intensity and Ethical Awareness was significant ($\beta = 0.237, t = 5.629, p < 0.001$), supporting H1. This suggests that students who report a higher intensity of AI usage also tend to exhibit greater awareness of the ethical considerations related to AI use in teaching and learning.

H2: AI Usage Intensity → Ethical Framework Development

H2 was supported with a significant path coefficient ($\beta = 0.225, t = 5.215, p < 0.001$), suggesting that frequent users of AI are more likely to support the development of an ethical framework for AI usage at IPMA.

H3: AI Usage Intensity → Ethical Risk Perception

The results also support H3, with a substantial positive effect ($\beta = 0.443, t = 9.760, p < 0.001$). This finding suggests that greater AI usage intensity is associated with heightened perceptions of potential ethical risks, such as privacy concerns and threats to academic integrity.

H4: Ethical Awareness → Ethical Framework Development

H4 was strongly supported ($\beta = 0.423, t = 7.964, p < 0.001$), indicating that students who are more aware of ethical issues are more inclined to endorse the need for an institutional ethical framework for AI usage.

H5: Ethical Risk Perception → Ethical Awareness

The results revealed a large and significant positive relationship ($\beta = 0.666, t = 17.777, p < 0.001$), supporting H5. This suggests that students who perceive higher ethical risks from AI usage tend to be more ethically aware, reflecting a reinforcing relationship between risk perception and awareness.

H6: Ethical Risk Perception → Ethical Framework Development

H6 was also supported ($\beta = 0.282, t = 5.168, p < 0.001$), indicating that greater concern over ethical risks positively predicts students' support for the development of an ethical framework.

H7: AI Usage Intensity → Ethical Awareness → Ethical Framework Development (Indirect Effect)

The mediation analysis confirmed a significant indirect effect ($\beta = 0.100, t = 4.454, p < 0.001$), supporting H7. This suggests that ethical awareness mediates the

relationship between AI Usage Intensity and support for Ethical Framework Development, highlighting the importance of fostering awareness as a mechanism linking AI usage and ethical policy support.

H8: AI Usage Intensity → Ethical Risk Perception → Ethical Awareness (Indirect Effect)

H8 was supported ($\beta = 0.295, t = 8.213, p < 0.001$), indicating that Ethical Risk Perception mediates the effect of AI Usage Intensity on Ethical Awareness. This underscores the role of perceived risks in shaping ethical consciousness among students who frequently use AI.

H9: Ethical Risk Perception → Ethical Awareness → Ethical Framework Development (Indirect Effect)

The results support H9, with a significant indirect effect ($\beta = 0.282, t = 7.384, p < 0.001$). This finding reveals that Ethical Awareness mediates the relationship between Ethical Risk Perception and Ethical Framework Development, suggesting that awareness is a key pathway through which risk perception influences support for an ethical framework.

H10: AI Usage Intensity → Ethical Risk Perception → Ethical Framework Development (Indirect Effect)

Finally, H10 was supported ($\beta = 0.125, t = 4.271, p < 0.001$), indicating that Ethical Risk Perception mediates the relationship between AI Usage Intensity and Ethical Framework Development. This highlights the central role of risk perception as a mechanism linking students' AI usage behaviour to their endorsement of ethical governance measures.

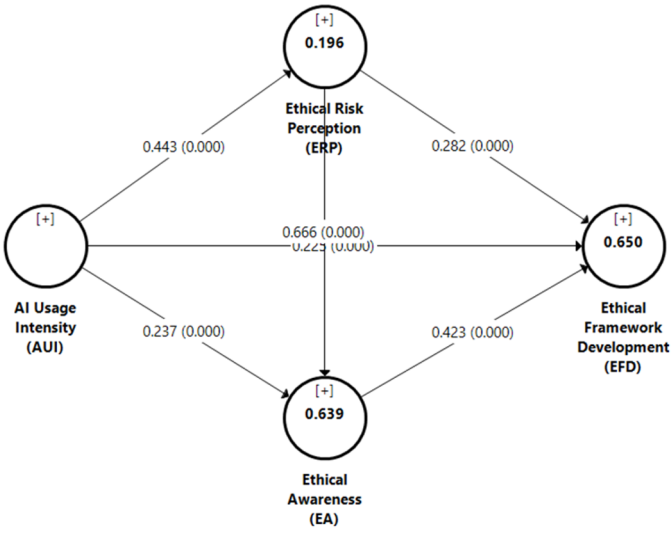

Fig. 2. Result of Path Analysis

Overall, all ten hypotheses were statistically significant ($p < 0.001$), providing strong support for the proposed structural model. The results demonstrate that AI Usage Intensity exerts both direct and indirect effects on Ethical Awareness, Ethical Risk Perception, and ultimately on students' support for Ethical Framework Development at IPMA. The model explains a substantial proportion of variance in key endogenous constructs, as indicated by the R-squared values reported in Figure 2, which are Ethical Awareness ($R^2 = 0.455$), Ethical Risk Perception ($R^2 = 0.196$), and Ethical Framework Development ($R^2 = 0.685$). These R-squared values suggest that the structural model has moderate to substantial explanatory power (Hair et al., 2021), with particularly strong predictive relevance for Ethical Framework Development. Collectively, these findings highlight the critical role of AI usage behaviour, awareness, and risk perception in shaping students' endorsement of ethical governance measures in the academic context. Beyond statistical significance, the magnitude of the path coefficients indicates meaningful practical effects. According to Hair et al. (2021), standardized path coefficients around 0.10 represent small effects, 0.30 moderate effects, and 0.50 or above large effects. In this study, several relationships demonstrate moderate to large practical significance, particularly the effect of Ethical Risk Perception on Ethical Awareness ($\beta = 0.666$), which represents a strong effect. This suggests that increases in students' perception of ethical risks are associated with substantial improvements in ethical awareness, highlighting the importance of risk communication in ethical AI governance.

Discussion

This study aimed to investigate the ethical use of artificial intelligence (AI) in teaching and learning among IPMA students, with the primary objective of informing the development of a robust ethical framework to guide AI adoption in educational settings. The findings, derived from both descriptive and inferential analyses, offer valuable insights into how students perceive, experience, and respond to AI usage in their academic environment. The descriptive analysis revealed widespread and enthusiastic adoption of AI applications among IPMA students. The majority reported using AI tools such as ChatGPT, Grammarly, and Duolingo frequently and comfortably, with 71.3% agreeing that they regularly utilise AI in their learning activities. Moreover, 87% acknowledged the popularity of AI applications, and over 82% agreed that AI helps improve their understanding of academic content. These results suggest that AI has become an integral and valued part of students' learning processes, positioning it as an indispensable educational tool at IPMA.

At the same time, the descriptive results highlighted that while students embrace AI, there are significant concerns and expectations around its ethical use. A considerable proportion (80.6%) agreed that AI applications must comply with clear ethical guidelines, and 74.6% recognised the need to increase ethical awareness on campus. Ethical risks were also salient, with 67.4% concerned about personal data privacy and 69.8% identifying academic integrity as a significant issue. Strong support for institutional action emerged, with over 73% favouring the development of an ethical framework, and more than 80% agreeing that this framework should strike a balance between technological advances and human values, protect user data, and be communicated.

The structural model analysis strengthened and extended these descriptive insights by providing empirical evidence of how key constructs interact. The analysis confirmed that AI Usage Intensity significantly predicts both Ethical Awareness and Ethical Risk Perception, and these, in turn, influence support for Ethical Framework Development. Notably, Ethical Risk Perception had a strong positive relationship with Ethical Awareness, indicating that risk sensitivity enhances ethical consciousness among students. Furthermore, both Ethical Awareness and Ethical Risk Perception mediated the relationships between AI Usage Intensity and support for Ethical Framework Development, underscoring their critical role as psychological mechanisms shaping ethical attitudes.

Notably, the structural model achieved moderate to substantial explanatory power, explaining 45.5% of the variance in Ethical Awareness, 19.6% in Ethical Risk Perception, and an impressive 68.5% in support for Ethical Framework Development. These results suggest that students' patterns of AI usage, combined with their awareness and perceptions of risk, are key factors influencing their support for ethical governance. Taken together, these findings offer clear and actionable implications. While students at IPMA are active and willing users of AI, their concerns about privacy, academic integrity, and institutional oversight point to an urgent need for a formal ethical framework. Such a framework should be inclusive and participatory, reflecting input from students, staff, and administrators. It should focus on clear guidelines, data protection, and promoting ethical awareness through training and workshops. The strong predictive influence of both Ethical Awareness and Ethical Risk Perception also suggests that initiatives aimed at raising awareness and clarifying risks will not only safeguard ethical standards but also enhance student confidence and acceptance of institutional policies.

In summary, this study confirms that the ethical governance of AI in higher education must extend beyond mere regulation; it must also address the perceptions and attitudes of its users. The development of a well-structured, transparent, and inclusive ethical framework for AI usage at IPMA is not only timely but also essential to ensure that AI contributes positively and responsibly to the teaching and learning process.

5 Conclusion

This study concludes that the integration of artificial intelligence (AI) in teaching and learning among IPMA students is both widespread and positively received, with students demonstrating high levels of usage intensity and comfort with AI tools such as ChatGPT, Grammarly, and Duolingo. However, this enthusiasm is tempered by significant ethical concerns, particularly regarding data privacy, academic integrity, and the need for institutional oversight. The structural model analysis revealed that AI usage intensity significantly influences ethical awareness and risk perception, both of which play pivotal roles in shaping students' support for the development of an ethical framework. With 73% of students supporting such a framework and over 80% emphasizing the importance of ethical clarity, data protection, and balanced technology use, there is a clear mandate for action.

Therefore, it is recommended that IPMA institutions urgently establish a formal, inclusive, and transparent ethical framework for AI usage in education. This framework should be co-developed with input from students, lecturers, and administrators and

should include clear guidelines, mechanisms for regular monitoring, and training programs to enhance ethical literacy. By addressing these concerns proactively, institutions can foster responsible AI integration that aligns with academic values and safeguards student welfare.

Acknowledgements. The study was funded by the Universiti Poly-Tech Malaysia (UPTM) under UPTM Research Grant (URG) with reference code UPTM.DVCRI.RMC. 15 (132).

References

Binns, R., Veale, M., Van Kleek, M., & Shadbolt, N. (2018). *"It's reducing a human being to a percentage": Perceptions of justice in algorithmic decisions*. Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, 1–14. https://doi.org/10.1145/3173574.3173951

Brennen, S., & Kreiss, D. (2022). Power in the platform: The moral politics of social media design. *New Media & Society, 24*(2), 314–331. https://doi.org/10.1177/14614448221086165

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access, 8*, 75264–75278. https://doi.org/10.1109/ACCESS.2020.2988510

Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*, 1–12. https://doi.org/10.1080/14703297.2023.2186117

Cowls, J., & Floridi, L. (2022). A unified framework of five principles for AI in society. *Harvard Data Science Review, 4*(1). https://doi.org/10.1162/99608f92.fec1bfd2

Fjeld, J., Achten, N., Hilligoss, H., Nagy, A., & Srikumar, M. (2020). *Principled artificial intelligence: Mapping consensus in ethical and rights-based approaches to principles for AI*. Berkman Klein Center for Internet & Society. https://cyber.harvard.edu/publication/2020/principled-artificial-intelligence

Floridi, L., Cowls, J., Beltrametti, M., Chiarello, F., Chatila, R., Dignum, V., … Vayena, E. (2018). AI4People—An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. *Minds and Machines, 28*(4), 689–707. https://doi.org/10.1007/s11023-018-9482-5

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R*. Springer. https://doi.org/10.1007/978-3-030-80519-7

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Holmes, W., Bialik, M., & Fadel, C. (2021). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.

IEEE. (2019). *Ethically aligned design: A vision for prioritizing human well-being with autonomous and intelligent systems* (1st ed.). IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems.

Kasneci, E., Sessler, K., Betsch, T., et al. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences, 103*, 102274. https://doi.org/10.1016/j.lindif.2023.102274

Khalil, M., Prinsloo, P., & Slade, S. (2023). AI ethics in education: A framework for ethical decision-making in learning analytics. *British Journal of Educational Technology, 54*(1), 1–20. https://doi.org/10.1111/bjet.13272

Long, D., & Magerko, B. (2020). What is AI literacy? Competencies and design considerations. Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, 1–16. https://doi.org/10.1145/3313831.3376727

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson Education.
Ministry of Digital, Malaysia. (2024). *Artificial intelligence governance and ethics (AIGE) guidelines*. Government of Malaysia. https://www.digital.gov.my
Ministry of Digital, Malaysia. (2025). *AI technology action plan 2021–2025*. Government of Malaysia.
MyDIGITAL Corporation. (2021). *Malaysia digital economy blueprint (MyDIGITAL)*. Government of Malaysia. https://www.mydigital.gov.my
Nordin, N., Yusof, S. A. M., & Alias, A. (2022). Exploring student acceptance of AI-based applications in higher education. *Malaysian Journal of Learning and Instruction, 19*(2), 125–146. https://doi.org/10.32890/mjli2022.19.2.6
Renz, A., Krishnaraja, S., & Gronau, N. (2022). Ethical AI governance in higher education: A participatory design approach. *AI & Society, 37*, 1283–1299. https://doi.org/10.1007/s00146-021-01170-y
Sarstedt, M., Ringle, C. M., & Hair, J. F. (2017). Partial least squares structural equation modeling. In *Handbook of market research* (pp. 1–40). Springer. https://doi.org/10.1007/978-3-319-05542-8_15-1
Selwyn, N. (2019). *Should robots replace teachers? AI and the future of education*. Polity Press.
Sison, A. J. G., & Shim, S. J. (2020). Artificial intelligence and moral agency: The need for moral competency in education. *AI & Society, 35*(1), 1–11. https://doi.org/10.1007/s00146-019-00878-y
UNESCO. (2021). *Recommendation on the ethics of artificial intelligence*. United Nations Educational, Scientific and Cultural Organization.