

## A STUDY ON THE AWARENESS OF ARTIFICIAL INTELLIGENCE AS AN ESSENTIAL RESEARCH TOOLS AMONG IIUM POSTGRADUATE

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**Abstract:** *This study examined awareness and use of artificial intelligence (AI) in academic research among postgraduate students at the International Islamic University Malaysia (IIUM). Using a cross-sectional survey and purposive sampling, data from 203 respondents were analysed in SPSS within a knowledge, attitude, and practice (KAP) framework. Overall AI awareness was moderate ( $M = 3.63$ ,  $SD = 0.44$ ). Respondents reported the greatest concern about data privacy and security ( $M = 3.97$ ), followed by unclear plagiarism guidelines ( $M = 3.64$ ) and budget constraints ( $M = 3.63$ ). The most strongly endorsed strategies were library-provided access to AI tools ( $M = 4.56$ ), clear guidance on AI use and plagiarism ( $M = 4.54$ ), and AI tutorials and ethics-focused workshops ( $M = 4.47$ ). ChatGPT was the most commonly used tool (92.6%). The findings indicate that universities and academic libraries should combine access, training, ethical guidance, and data-governance support to promote responsible and effective AI use in postgraduate research.*

**Keywords:** *Artificial Intelligence (AI), AI Awareness, Postgraduate Students, Academic Research, KAP Model (Knowledge, Attitude and Practice), AI Adoption Challenges*

## Introduction

Malaysia ranked 44th among 62 countries in the Global AI Index, indicating a gap in AI capacity relative to countries such as Singapore, which ranked among the top three because of its strong infrastructure and talent development (Yeoh, 2023). Although Malaysia recorded progress in government strategy, further development of AI talent and practical integration into research remains necessary (Yeoh, 2023).

In response, the Malaysian government has called for collaboration among researchers, developers, and policymakers to position the country among the world's 20 most AI-advanced nations (Bernama, 2024). The AI untuk Rakyat initiative supports this ambition by promoting national AI literacy as part of Malaysia's digital transformation agenda (Hoek, 2023). Although the initiative targets the general public, postgraduate researchers require more specialised AI literacy that addresses scholarly practices, methodological rigour, and research ethics (Hornberger et al., 2023).

Previous studies have identified several benefits of AI tools such as ChatGPT for research. These tools can support academic writing (Jeyaraj et al., 2020; Li, 2023; Khalifa & Albadawy, 2024), accelerate literature reviews and data analysis (Burger et al., 2023), and promote student autonomy during research supervision (Cowling et al., 2023). They may also strengthen research skills, productivity, and aspects of research quality (Aguirre-Aguilar et al., 2024). Nevertheless, barriers to effective adoption remain, including limited structured resources, insufficient institutional support, and unclear ethical guidelines (Holmes et al., 2021; Dai et al., 2023; Cowling et al., 2023). Awareness is an important precursor to access and adoption (Lai et al., 2023), and previous work suggests that it is associated with the use of AI-enabled technologies (Lee et al., 2021; Dai et al., 2020).

This study responds to the need to strengthen AI awareness among IIUM postgraduate students in support of Malaysia's digital ambitions. Examining students' knowledge, attitudes, and practices (KAP) can identify gaps and challenges, guide institutional and library support, and complement national initiatives such as AI untuk Rakyat. The study also contributes to Sustainable Development Goal 9 by considering how responsible AI adoption may support innovation and research infrastructure in higher education.

This study addresses the following research questions:

1. What is the level of AI awareness among IIUM postgraduate students in relation to research activities?
  - 1.1 What is the level of AI knowledge among IIUM postgraduate students in relation to research?
  - 1.2 What are IIUM postgraduate students' attitudes towards using AI in research?
  - 1.3 What is the level of AI practice among IIUM postgraduate students in relation to research?
2. What challenges do IIUM postgraduate students encounter when using AI in their research activities?
  - 2.1 What strategies can academic libraries adopt to enhance postgraduate students' use of AI in research?

## Literature Review

### AI Awareness in Libraries

AI applications are increasingly embedded in education and research. Von Garrel and Mayer (2023) reported that almost two-thirds (63.4%) of surveyed students had used AI-based tools in their studies. Similarly, Hamilton (2024) reported that 55% of 500 teachers surveyed by Forbes Advisor believed that AI had positively affected teaching and learning. Together, these findings indicate growing exposure to AI in education, alongside considerable interest in its potential benefits.

Owolabi et al. (2022) examined Nigerian polytechnic students' awareness and readiness to adopt AI in libraries. They emphasised the importance of assessing users' readiness before implementing new technologies to avoid inefficient resource allocation. Many respondents first encountered AI applications through library-orientation and library-use courses and recognised potential benefits such as improved user experience, greater operational efficiency, and enhanced student productivity. Unstable electricity supply was identified as a major anticipated constraint. The authors recommended extending research beyond library operations to wider higher-education contexts.

Alam et al. (2024) reported encouraging levels of AI literacy among Zambian librarians, although insufficient expertise and resistance to technological change hindered integration. They recommended further investigation of user engagement with AI-driven library services to assess usability and effectiveness and, ultimately, improve students' educational experiences.

Lund et al. (2020) and Oname and Alex-Nmecha (2020) described an expanding role for AI in libraries and generally positive expectations among librarians. AI may enhance information discovery, research support, and teaching and learning. However, concerns remain about job displacement, the technical maturity of library applications, and data privacy and security. Both studies argued that AI is more likely to augment library services and preserve the human relationship between librarians and users than to render librarians obsolete.

Gyang (2020) argued that libraries must adapt to rapid technological change to address users' evolving information needs. AI-enabled reference services may provide tailored recommendations, strengthen information literacy, and improve knowledge dissemination. For example, systems that recommend resources on the basis of user preferences and behaviour may create a more personalised and efficient library experience.

Ali et al. (2020) found a reasonable level of AI awareness among chief university librarians in Pakistan, although awareness varied by technology. Respondents were more familiar with natural language processing, pattern recognition, and text mining than with robotics and chatbots. The authors proposed collaboration with computer science departments, including the establishment of AI laboratories, to strengthen expertise and adoption in academic libraries and library and information science education.

Hervieux and Wheatley (2021) found that only 20% of surveyed librarians believed their patrons were interested in AI, although perceived interest was higher at larger institutions. Few libraries offered AI workshops, despite 43% of respondents recognising AI's potential to enhance library services. In addition, 36% expressed concern that AI could replace aspects of their work.

These varying levels of awareness, interest, and concern demonstrate the need for user-centred research on AI in academic-library settings. By focusing on IIUM postgraduate students' awareness and research practices, the present study addresses this need and may help libraries and universities design support that is better aligned with postgraduate researchers' requirements.

### AI Application in Research

Xu et al. (2021) reviewed the broad application of AI across scientific disciplines, including mathematics, medicine, physics, and materials science. They described contributions to algorithm development, materials discovery, nuclear physics, medical imaging, biomarker identification, and drug development. The authors also identified challenges, including the mismatch between rapidly evolving algorithms and more slowly updated software libraries, limited computational resources, and trade-offs between accuracy and efficiency in fields such as computational chemistry.

Xu et al. (2021) argued that integrating AI into scientific practice can advance research and benefit society. In geoscience, AI can support object characterisation, variable estimation, forecasting, and sustainable resource management. In mathematics and machine learning, it may improve model interpretation, parameter optimisation, and generalisation. These examples illustrate AI's potential to strengthen data analysis and decision-making across disciplines.

AI-powered literature-mapping tools can recommend related publications, monitor emerging literature, and help researchers identify influential sources and concepts (Pence, 2022, p. 3). Such functions may improve research efficiency and help postgraduate students remain current in their fields.

AI can also support citation analysis, identify related papers, and help researchers assess scholarly influence through alternative metrics (Pence, 2022, p. 8). AI agents may further provide continuous user support through computers and mobile devices (Pence, 2022, p. 3).

Within libraries, AI can support the analysis of resource-use patterns, budget allocation, database selection, and search optimisation (Pence, 2022, p. 5). These applications may help libraries respond more effectively to the continuing digitalisation of collections and users' changing information needs.

Wahle et al. (2023) examined the responsible use of generative AI in scientific research, focusing on accuracy, attribution, and integrity, particularly in high-stakes domains such as healthcare and law. They proposed a framework centred on transparency, integrity, and accountability and introduced AI Usage Cards as a mechanism for standardising the disclosure of AI use in research. This approach emphasises that researchers remain responsible for verifying and appropriately reporting AI-generated content.

Christou (2023) reviewed applications of AI in qualitative research, including literature and systematic reviews, conceptualisation, thematic analysis, and content analysis. Although AI may assist with data analysis and content generation, unreliable outputs, bias, and ethical concerns require active researcher oversight. Recommended safeguards include precise prompting, cross-checking information across sources, and ensuring that researchers remain familiar with the data, patterns, and themes generated during analysis.

Burger et al. (2023) discussed the potential of AI to reduce some forms of human error and increase consistency in research processes. Tools such as GPT-3 and ChatGPT may support data analysis, literature reviewing, and repetitive tasks. In systematic reviews, for example, AI can assist with identifying potentially relevant studies and screening full texts. These applications may save time, but researchers must retain responsibility for methodological decisions, verification, and synthesis.

Vargas-Murillo et al. (2023) examined the challenges and opportunities associated with AI-assisted learning, particularly ChatGPT in higher education. They highlighted risks to academic integrity, originality, and critical thinking when AI tools are misused or their outputs are accepted without verification. The authors recommended clear institutional policies, appropriate controls, and training that helps students integrate AI responsibly while maintaining critical judgement.

Overall, AI offers substantial opportunities to support scientific research, but its benefits must be balanced against ethical, technical, and academic-integrity risks. Responsible integration therefore requires clear governance, methodological transparency, appropriate training, and sustained human oversight.

## Methodology

This section describes the research design, sampling strategy, data-collection procedures, and analytical methods. The study used a quantitative approach informed by the knowledge, attitude, and practice (KAP) framework to assess AI awareness, adoption challenges, and preferred support strategies among postgraduate students.

### Research Design

A cross-sectional descriptive survey design was used to assess AI awareness among IIUM postgraduate students. The minimum target sample was 196 students; a total of 203 valid responses was ultimately analysed.

### Research Approach

The study adopted a quantitative approach and used a structured online questionnaire to assess AI knowledge, attitudes, and practices among IIUM postgraduate students. Fixed-response and Likert-scale items generated numerical data for statistical analysis. The KAP framework was selected to organise the assessment of students' understanding of AI, their attitudes towards it, and their reported use of AI in academic research. This framework also supported the identification of knowledge gaps, barriers to adoption, and areas requiring institutional intervention.

### Population and Sample

The target population comprised approximately 400 postgraduate students enrolled at the International Islamic University Malaysia (IIUM). The sampling frame consisted of official enrolment list for active postgraduate students. Based on the Krejcie and Morgan (1970) sample-size table, a minimum sample of 196 respondents was required. The Google Forms questionnaire was disseminated online, and a total of 203 responses were received. Duplicate submissions were prevented through the form settings, which restricted respondents from submitting the questionnaire more than once using the same email address. All 203 responses met the eligibility criteria and were retained for analysis. The final analytical sample therefore exceeded the planned minimum sample by seven respondents and included postgraduate

students from diverse academic backgrounds. Fixed-response Likert-scale items were used to assess respondents' AI knowledge, attitudes, practices, perceived challenges, and preferred support strategies.

### Sampling Method

A non-probability, purposive-convenience sampling strategy was used to recruit postgraduate students who were currently enrolled at the International Islamic University Malaysia (IIUM). Purposive sampling was appropriate because participation was restricted to respondents who met the study's predefined eligibility criteria and possessed direct experience relevant to the investigation of AI awareness and research-related challenges (Etikan et al., 2016). Recruitment invitations containing the study information and online questionnaire link were distributed through official postgraduate mailing lists. Potential respondents voluntarily accessed the questionnaire, confirmed that they met the eligibility criteria, and provided informed consent before participating.

Although participants were purposively targeted according to their postgraduate enrolment status, distributing the questionnaire through accessible online channels also introduced elements of convenience and voluntary-response sampling. Accordingly, the approach is more accurately described as purposive-convenience sampling with voluntary participation. This method provided efficient access to eligible postgraduate students across diverse academic disciplines; however, students who were more accessible, more interested in AI, or more willing to participate may have been disproportionately represented. Therefore, the possibility of selection and self-selection biases should be considered when interpreting and generalising the findings.

The inclusion criteria were as follows:

1. IIUM postgraduate students. Participants were required to be enrolled in a postgraduate programme at the International Islamic University Malaysia (IIUM), ensuring alignment with the study's target population.
2. Currently active students. Only students actively pursuing their studies during the data-collection period were eligible. Alumni and students with deferred status were excluded so that the findings reflected current academic experiences and AI-literacy challenges.

### Data Collection

Following the finalisation and contextualisation of the questionnaire, data were collected over three weeks, from 11 November 2024 to 1 December 2024. (Figure 1). The questionnaire items were adapted from previously published and validated measures to ensure adequate coverage of the study constructs (Alam et al., 2024; Ali et al., 2020; Carolus et al., 2023; Chatterjee & Bhattacharjee, 2020; Owolabi et al., 2022; Pence, 2022; Swed et al., 2022). The wording and contextual references were modified, where necessary, to ensure their relevance to IIUM postgraduate students.

The final online questionnaire, titled *A Study on the Awareness of Artificial Intelligence as an Essential Research Tool among IIUM Postgraduates*, was disseminated through institutional email lists and postgraduate student groups, with assistance from IIUM Centre for Postgraduate Studies and Kulliyyah' postgraduate offices. The recruitment message included information about the study's purpose, eligibility criteria, voluntary nature of participation, confidentiality measures, and questionnaire link. Respondents were required to provide informed consent before accessing the questionnaire.

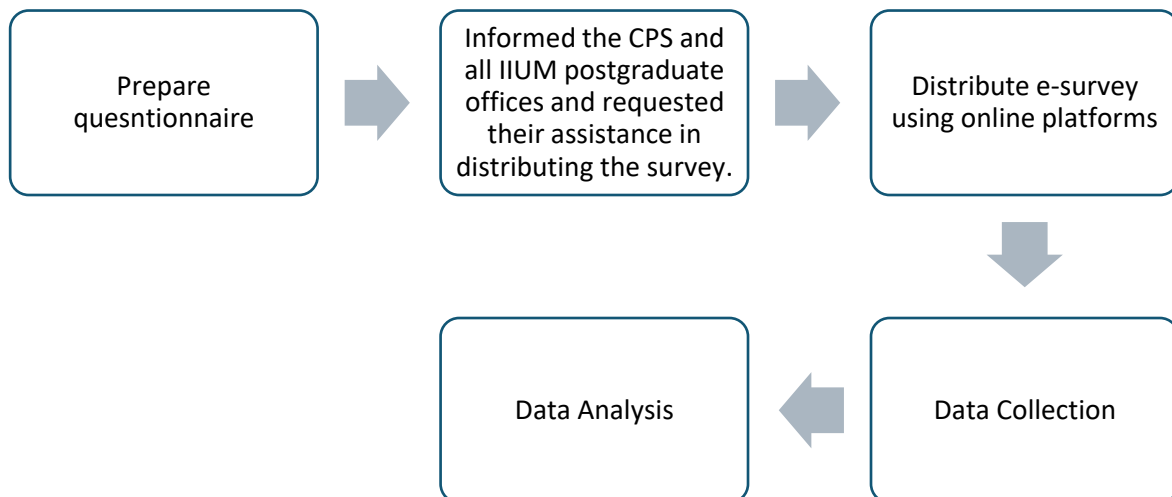


**Figure 1: Data Collection Flow**

Email addresses were collected solely to verify unique participation, and the online form was configured to accept only one submission from each respondent. The email addresses were treated as confidential identifiers, restricted to the research team, and separated from the analytical dataset before analysis. At the end of the data-collection period, a total of 203 responses had been submitted. All responses met the eligibility criteria and were retained for analysis, with duplicate submissions prevented through the Google Forms settings.

### Questionnaire Adaptation and Validation

The questionnaire was developed by adapting relevant items from previously validated instruments (Alam et al., 2024; Ali et al., 2020; Carolus et al., 2023; Chatterjee & Bhattacharjee, 2020; Owolabi et al., 2022; Pence, 2022; Swed et al., 2022). The adaptation process involved mapping the original items to the study constructs – AI knowledge, attitudes, practices, challenges, and preferred support strategies – and revising their wording to reflect the academic and research context of IIUM postgraduate students. Items that were repetitive, unsuitable for the institutional context, or outside the scope of the study were removed or modified. The response options and terminology were also standardised across the questionnaire.

### Expert review

The initial adapted questionnaire was reviewed by two experts with expertise in artificial intelligence, research methodology, educational technology, and questionnaire design. The experts assessed the items for relevance, clarity, comprehensiveness, appropriateness of language, and alignment with the operational definitions of the constructs. Based on their feedback, 6 items were revised, 4 were removed, and 2 new items were added.

### **Ethical Concern**

Formal ethical approval was not sought before data collection because the study consisted of a non-interventional online questionnaire involving adult postgraduate students and was considered by the researchers to involve limited risk. However, no formal exemption determination was obtained from an institutional ethics committee. Participation was voluntary, informed consent was obtained electronically, and confidentiality and data-protection measures were implemented. The absence of a formal institutional determination is acknowledged as a limitation of the study.

Email addresses were collected solely to restrict participation to one submission per respondent and to identify possible duplicate submissions. Consequently, responses were treated as confidential rather than anonymous. Before data analysis, email addresses were removed from the analytical dataset and stored separately in a password-protected file. Access to identifiable information was restricted to the principal investigator and authorised members of the research team. The findings were analysed and reported in aggregate form, without identifying individual participants.

### **Data Analysis**

Data were analysed using the Statistical Package for the Social Sciences (SPSS). Frequencies and percentages were used to describe respondent characteristics, while descriptive statistics addressed the study's research questions (Pallant, 2020). Crosstabulations were used to examine patterns between categorised KAP dimensions and overall AI awareness.

### **Frequency Analysis for Demographic Questions**

Frequencies and percentages were calculated for demographic variables, including age, gender, academic programme, year of study, nationality, and faculty, to describe the respondent profile.

### **Descriptive Statistics for Individual Questions**

Means, medians, and standard deviations were calculated for the knowledge, attitude, and practice items and scale scores. These statistics summarised the central tendency and dispersion of participants' responses.

### **Aggregate Mean Calculation for Sections**

A mean score was calculated for each KAP dimension. An aggregate variable was then created in SPSS to represent overall AI awareness and facilitate comparisons among the dimensions.

### **Operationalisation of Overall AI Awareness**

After reverse-coding negatively worded items, a mean score was calculated separately for the knowledge, attitude, and practice dimensions. Each dimension score ranged from 1 to 5, with higher scores indicating greater knowledge, more favourable attitudes, or stronger AI-related practices. A dimension score was computed only when a respondent had answered at least 80% of the items within that dimension.

An overall KAP index was subsequently calculated using the following formula:

$$\text{Overall KAP Index} = \frac{\text{Knowledge Mean} + \text{Attitude Mean} + \text{Practice Mean}}{3}$$

This method assigned equal weight to the three dimensions and produced an overall score ranging from 1 to 5. The composite is referred to as an overall KAP index, rather than overall AI awareness, because knowledge, attitudes, and practices represent related but conceptually distinct aspects of respondents' engagement with AI.

The overall KAP index was used only as a descriptive summary and for comparisons across independent respondent groups, such as academic discipline or study level. It was not correlated with, regressed on, or statistically compared against its constituent dimensions because such analyses would involve part-whole mathematical overlap and could produce inflated or substantively uninformative relationships. Comparisons among knowledge, attitude, and practice scores were instead conducted directly using a repeated-measures analysis of variance, as the same respondents provided scores for all three dimensions.

### Ranking Challenges and Solutions by Mean Scores

Challenge and strategy items were ranked by their mean scores. Higher means represented stronger agreement that an item was a challenge or a preferred support strategy.

### Crosstabulation Analysis

Mean scores for AI knowledge, attitude, practice, and overall awareness were categorised as low, moderate, or high. Crosstabulations were then used to examine distributional patterns among these categories.

## Results And Discussion

The analysis describes respondents' demographic characteristics, levels of AI knowledge, attitudes, practices, and overall awareness, as well as perceived challenges and preferred support strategies. Frequencies and descriptive statistics are presented first, followed by crosstabulations of the KAP dimensions and overall awareness.

### Demographics Information

**Table 1: Current Academic Program**

| Academic Program | Frequency | Percent (%) |
|------------------|-----------|-------------|
| Master           | 133       | 65.5        |
| PhD              | 70        | 34.5        |
| Total            | 203       | 100.0       |

As shown in Table 1, 133 respondents (65.5%) were master's students and 70 (34.5%) were doctoral students, giving a total sample of 203.

**Table 2: Year of Study**

| Year of Study    | Frequency | Percent (%) |
|------------------|-----------|-------------|
| Year 1           | 99        | 48.8        |
| Year 2           | 74        | 36.5        |
| Year 3           | 19        | 9.4         |
| Year 4 and above | 11        | 5.4         |
| Total            | 203       | 100.0       |

First-year students formed the largest group ( $n = 99$ , 48.8%), followed by second-year students ( $n = 74$ , 36.5%), third-year students ( $n = 19$ , 9.4%), and those in Year 4 or above ( $n = 11$ , 5.4%). In total, 85.3% of respondents were in their first or second year of postgraduate study.

**Table 3: Gender**

| Gender | Frequency | Percent (%) |
|--------|-----------|-------------|
| Female | 137       | 67.5        |
| Male   | 66        | 32.5        |
| Total  | 203       | 100.0       |

Most respondents were women ( $n = 137$ , 67.5%), while 66 (32.5%) were men.

**Table 4: Age**

| Age   | Frequency | Percent (%) |
|-------|-----------|-------------|
| 20-30 | 120       | 59.1        |
| 31-40 | 59        | 29.1        |
| 41-50 | 18        | 8.9         |
| 51-60 | 6         | 3.0         |
| Total | 203       | 100.0       |

The largest age group was 20-30 years ( $n = 120$ , 59.1%), followed by 31-40 years ( $n = 59$ , 29.1%), 41-50 years ( $n = 18$ , 8.9%), and 51-60 years ( $n = 6$ , 3.0%). Thus, 88.2% of respondents were younger than 41 years.

**Table 5: Nationality**

| Nationality   | Frequency | Percent (%) |
|---------------|-----------|-------------|
| International | 57        | 28.1        |
| Malaysian     | 146       | 71.9        |
| Total         | 203       | 100.0       |

Malaysian students comprised 71.9% of the sample ( $n = 146$ ), while international students accounted for 28.1% ( $n = 57$ ). The findings therefore predominantly reflect the perspectives of Malaysian students.

**Table 6: Faculties**

| Faculties                                                  | Frequency | Percent (%) |
|------------------------------------------------------------|-----------|-------------|
| Kulliyyah of Islamic Revealed Knowledge and Human Sciences | 44        | 21.7        |
| Kulliyyah of Education                                     | 33        | 16.3        |
| Kulliyyah of Economics and Management Sciences             | 25        | 12.3        |
| Institute of Islamic Banking and Finance (IiBF)            | 15        | 7.4         |
| Kulliyyah of Information and Communication Technology      | 14        | 6.9         |
| Kulliyyah of Allied Health Sciences                        | 12        | 5.9         |
| Kulliyyah of Medicine                                      | 11        | 5.4         |
| Kulliyyah of Engineering                                   | 10        | 4.9         |
| Kulliyyah of Law (Ahmad Ibrahim Kulliyyah of Laws)         | 8         | 3.9         |
| ISTAC                                                      | 6         | 3.0         |
| Kulliyyah of Architecture and Environmental Design         | 6         | 3.0         |

|                                                                  |     |       |
|------------------------------------------------------------------|-----|-------|
| International Institute for Halal Research and Training (INHART) | 5   | 2.5   |
| Kulliyyah of Dentistry                                           | 4   | 2.0   |
| Kulliyyah of Languages and Management (Pagoh Campus)             | 3   | 1.5   |
| Kulliyyah of Nursing                                             | 3   | 1.5   |
| Kulliyyah of Pharmacy                                            | 2   | 1.0   |
| Kulliyyah of Science                                             | 2   | 1.0   |
| Total                                                            | 203 | 100.0 |

The highest participation comes from IRKHS (21.7%), Education (16.3%), and Economics (12.3%), totaling 50.3%, showing a focus on humanities and social sciences. ICT (6.9%) and Allied Health (5.9%) show moderate representation. Pharmacy, Science, and Pagoh-based faculties have the lowest (1%–1.5%).

**Table 7: Prior Experience with AI**

| Prior experience with AI technology | Frequency | Percent (%) |
|-------------------------------------|-----------|-------------|
| Yes                                 | 186       | 91.6        |
| No                                  | 17        | 8.4         |
| Total                               | 203       | 100.0       |

Most respondents reported prior experience with AI technology ( $n = 186$ , 91.6%), whereas 17 (8.4%) reported no previous experience. The sample was predominantly female, younger than 41 years, and in the early stages of postgraduate study. The comparatively small numbers of older and STEM respondents should be considered when interpreting the generalisability of the findings.

## AI Awareness among IIUM Postgraduate Students in Research

### AI Knowledge in Research

Table 8 presents the AI-knowledge items. The highest means were recorded for assessing the advantages of AI ( $M = 4.01$ ) and imagining its future uses ( $M = 4.00$ ). Respondents also reported understanding what AI is ( $M = 3.86$ ), recognising its disadvantages ( $M = 3.84$ ), knowing how it is used in research ( $M = 3.76$ ), distinguishing interaction with AI from interaction with a person ( $M = 3.71$ ), and explaining AI to others ( $M = 3.65$ ). Lower means were recorded for recognising AI-generated outputs ( $M = 3.50$ ), understanding machine learning ( $M = 3.40$ ), receiving formal AI instruction at university ( $M = 3.06$ ), and understanding natural language processing ( $M = 2.87$ ). Overall, respondents demonstrated moderate AI knowledge, with weaker self-reported understanding of technical concepts.

**Table 8: Knowledge towards AI**

| Questions                                                               | Mean | Std. Deviation |
|-------------------------------------------------------------------------|------|----------------|
| I can assess the advantages of the use of an artificial intelligence    | 4.01 | .829           |
| I can imagine possible future uses of AI                                | 4.00 | .931           |
| I have a good understanding of what AI is                               | 3.86 | .817           |
| I can assess the disadvantages of the use of an artificial intelligence | 3.84 | .904           |
| I know how AI is being used in research                                 | 3.76 | .882           |
| I can distinguish if I interact with an AI or a 'real human'            | 3.71 | 1.061          |

|                                                                                    |      |       |
|------------------------------------------------------------------------------------|------|-------|
| I am confident that I can explain AI to my friend                                  | 3.65 | .923  |
| I can tell if the application I'm using is based on artificial intelligence output | 3.50 | 1.045 |
| I know what machine learning is                                                    | 3.40 | 1.092 |
| I have been taught about AI in university                                          | 3.06 | 1.286 |
| I know what natural language processing is                                         | 2.87 | 1.078 |

The mean AI-knowledge score was 3.61 (SD = 0.62), indicating a moderate and relatively consistent level of knowledge among respondents. Although participants reported general familiarity with AI, their understanding of machine learning and natural language processing was weaker. This pattern is consistent with findings among medical and health-profession students (Swed et al., 2022; Alghamdi & Alashban, 2023; Al-Qerem et al., 2023; Hasan et al., 2024). Unlike those studies, however, the present sample included substantial representation from the social sciences, which may have influenced respondents' exposure to technical AI concepts. The relatively low mean for the statement "I have been taught about AI in university" (M = 3.06) further suggests limited formal instruction and supports the integration of AI-focused modules or workshops into postgraduate education.

**Table 9: Overall Mean Score of Knowledge towards AI**

|                        | <b>Total students</b> | <b>Range</b> | <b>Minimum</b> | <b>Maximum</b> | <b>Mean</b> | <b>Std. Deviation</b> |
|------------------------|-----------------------|--------------|----------------|----------------|-------------|-----------------------|
| <b>Knowledge_Score</b> | 203                   | 3.64         | 1.36           | 5.00           | 3.6068      | .61924                |

#### **Attitude towards AI**

Respondents expressed a strong willingness to learn more about AI and its research applications (M = 4.56) and believed that AI could improve their research skills (M = 4.52). They also reported considering ethics when using AI (M = 4.42) and wanting to learn more about AI's ethical implications (M = 4.52). Responses to negatively worded items indicated concerns about reduced human interaction, accuracy, critical thinking, and malicious use. Because these items were reverse-coded for the composite scale, their item-level means should be interpreted in accordance with the coding procedure. Overall, the composite results indicate a generally positive but cautious attitude towards AI in research.

**Table 10: Attitude towards AI**

| <b>Questions</b>                                                                                            | <b>Mean</b> | <b>Std. Deviation</b> |
|-------------------------------------------------------------------------------------------------------------|-------------|-----------------------|
| I am willing to learn more about AI and its potential application in research                               | 4.56        | .690                  |
| I believe that AI has potential to improve my research skills                                               | 4.52        | .706                  |
| I am interested in learning more about the ethical implications of AI                                       | 4.52        | .692                  |
| I consider ethics when deciding whether to use data from an AI                                              | 4.42        | .763                  |
| I believe that AI will bring new challenges in conducting research                                          | 4.39        | .803                  |
| I am optimistic about the future of AI in research                                                          | 4.33        | .871                  |
| I understand the consequences of using AI for society                                                       | 4.27        | .763                  |
| I know AI-based applications for their ethical implications                                                 | 3.89        | 1.004                 |
| I feel that AI tools are not directly beneficial or necessary for my specific research area (Reversed code) | 3.64        | 1.069                 |

|                                                                                                                                |      |       |
|--------------------------------------------------------------------------------------------------------------------------------|------|-------|
| I am concerned that using AI tools might reduce valuable human interaction and feedback from supervisors (Reversed code)       | 2.51 | 1.287 |
| I am sceptical about the accuracy and reliability of AI tools in producing research insights (Reversed code)                   | 2.42 | 1.093 |
| I worry that using AI tools might reduce my critical thinking or hinder the development of my research skills. (Reversed code) | 2.24 | 1.221 |
| I am concerned about the risk of AI to be used for malicious purposes (Reversed code)                                          | 1.60 | .779  |

**Table 11: Overall Mean Score of Attitude towards AI**

|                | Total students | Range | Minimum | Maximum | Mean   | Std. Deviation |
|----------------|----------------|-------|---------|---------|--------|----------------|
| Attitude_Score | 203            | 2.31  | 2.38    | 4.69    | 3.6393 | .43195         |

The mean attitude score was 3.64 (SD = 0.43; range = 2.31), indicating a generally positive and relatively consistent orientation towards AI. This finding aligns with studies reporting favourable attitudes among students and professionals (Swed et al., 2022; Hasan et al., 2024; Al-Qerem et al., 2023; Alghamdi & Alashban, 2023). Nevertheless, concerns about human interaction, accuracy, critical thinking, and malicious use demonstrate the importance of practical training, ethical awareness, and institutional support for responsible AI use.

### AI Practices

**Table 12: Practice towards AI**

| Questions                                                                                                      | Mean | Std. Deviation |
|----------------------------------------------------------------------------------------------------------------|------|----------------|
| Do you think AI should be included in the curriculum for postgraduate students in IIUM?                        | 4.17 | .924           |
| Do you believe AI is essential in conducting research                                                          | 3.85 | .960           |
| I will use AI applications to make my everyday life easier                                                     | 3.82 | .922           |
| Do you think there should be a budget for subscribing AI for research?                                         | 3.78 | 1.179          |
| Do you use AI to search articles for your research?                                                            | 3.71 | 1.218          |
| Do you believe AI would be a burden for researcher? (reversed code)                                            | 3.55 | 1.118          |
| I prefer using AI applications in everyday life                                                                | 3.48 | 1.040          |
| Do you believe the usage of AI in research will lose the researcher credibility and integrity? (reversed code) | 2.88 | 1.210          |

The practice-related items produced a mixed pattern. Respondents strongly endorsed including AI in the postgraduate curriculum (M = 4.17), considered AI important for research (M = 3.85), and reported using AI in everyday life (M = 3.82). They also supported institutional budgets for AI subscriptions (M = 3.78) and reported using AI to search for research articles (M = 3.71). Responses to the reverse-coded items suggest continuing concern about the possible effects of AI on researchers' credibility and integrity.

**Table 13: Overall Mean Score of Practice towards AI**

|                | N   | Range | Minimum | Maximum | Mean   | Std. Deviation |
|----------------|-----|-------|---------|---------|--------|----------------|
| Practice_Score | 203 | 3.00  | 2.00    | 5.00    | 3.6539 | .64041         |

The mean practice score was 3.65 (SD = 0.64), indicating moderate AI use with greater variation than observed for attitudes. Differences in access, training, and research needs may contribute to this variation (Ahmed et al., 2022; Al-Qerem et al., 2023). Universities can support more consistent and responsible use through access to appropriate resources, practical training, and mentoring. Concerns about originality, credibility, and ethical practice should be addressed explicitly in such initiatives.

Mean scores were classified into three categories to interpret respondents' levels of AI knowledge, attitudes, practices, and overall awareness (Table 14).

**Table 14: Category of Mean Score**

| Mean Score | Category |
|------------|----------|
| 1.00-2.33  | Low      |
| 2.34 -3.67 | Medium   |
| 3.68-5.00  | High     |

**Table 15: Overall Awareness Mean Score**

| Awareness Score |                   |
|-----------------|-------------------|
| Mean            | 3.6333            |
| Median          | 3.6200            |
| Mode            | 3.31 <sup>a</sup> |
| Std. Deviation  | .43534            |
| Range           | 2.20              |

The mean overall AI-awareness score was 3.63 (SD = 0.44; range = 2.20), which falls within the study's moderate category. The relatively small standard deviation indicates that respondents' scores were fairly consistent. These results suggest a promising foundation, while also indicating scope to strengthen AI knowledge, practices, and responsible adoption.

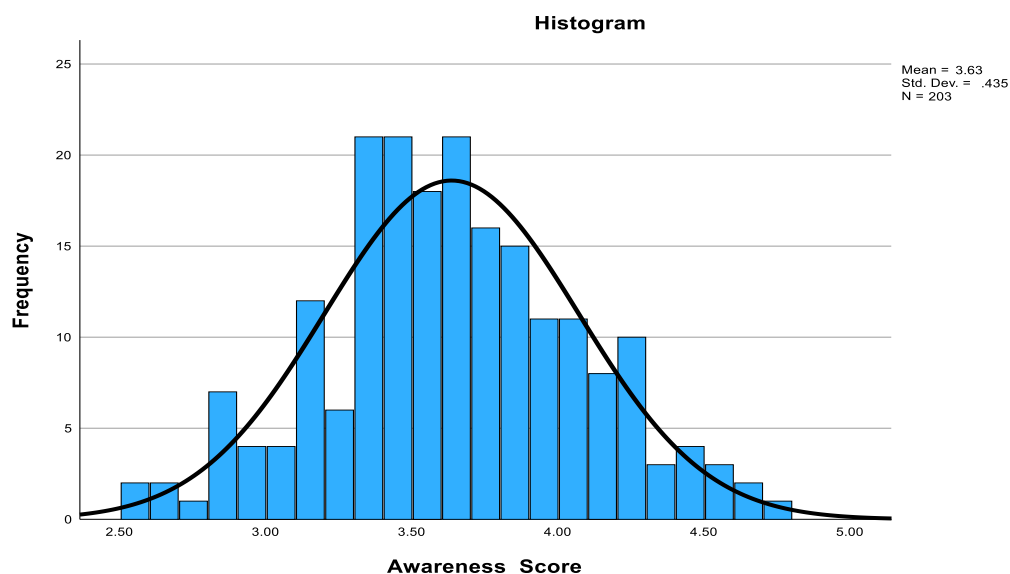


**Figure 2: Histogram of Overall Awareness Score**

Figure 2 shows an approximately normal distribution of overall AI-awareness scores ( $M = 3.63$ ,  $SD = 0.44$ ). Scores were concentrated around the middle-to-upper portion of the scale, with relatively few observations at the extremes. Inferential conclusions about relationships between the KAP dimensions and awareness require complete statistical tests and assumption checks.

### Crosstabulation Results

**Table 16: Crosstab Knowledge and Awareness**

| Knowledge Towards AI | AI Awareness Level in Research |            |          | Total Students |
|----------------------|--------------------------------|------------|----------|----------------|
|                      | Low (1)                        | Medium (2) | High (3) |                |
| Basic (1)            | 0                              | 7          | 1        | 8              |
| Moderate (2)         | 0                              | 62         | 37       | 99             |
| Advance (3)          | 0                              | 12         | 84       | 96             |
| Total students       | 0                              | 81         | 122      | 203            |

Table 16 indicates a clear descriptive pattern between AI-knowledge level and overall awareness. Among respondents with basic AI knowledge, 1 of 8 (12.5%) had high awareness. The corresponding proportions were 37 of 99 (37.4%) among those with moderate knowledge and 84 of 96 (87.5%) among those with advanced knowledge. This showed that postgraduate students with higher levels of AI knowledge have higher levels of AI awareness in research.

**Table 17: Crosstab Attitude and Awareness**

| Attitude Towards AI | AI Awareness Level in Research |            |          | Total Students |
|---------------------|--------------------------------|------------|----------|----------------|
|                     | Low (1)                        | Medium (2) | High (3) |                |
| Negative (1)        | 0                              | 0          | 0        | 0              |
| Neutral (2)         | 0                              | 70         | 38       | 108            |
| Positive (3)        | 0                              | 11         | 84       | 95             |
| Total students      | 0                              | 81         | 122      | 203            |

Table 17 shows that 38 of 108 respondents with a neutral attitude (35.2%) had high AI awareness, compared with 84 of 95 respondents with a positive attitude (88.4%). No respondents were classified as having a negative attitude. The observed pattern showed that the postgraduate students with more positive attitudes towards AI have higher levels of AI awareness in research.

**Table 18: Crosstab Practice and Awareness**

| Practice Towards AI | AI Awareness Level in Research |            |          | Total Students |
|---------------------|--------------------------------|------------|----------|----------------|
|                     | Low (1)                        | Medium (2) | High (3) |                |
| Rarely (1)          | 0                              | 6          | 0        | 6              |
| Occasionally (2)    | 0                              | 63         | 36       | 99             |
| Frequently (3)      | 0                              | 12         | 86       | 98             |
| Total students      | 0                              | 81         | 122      | 203            |

Table 18 shows that all six respondents who rarely used AI had moderate awareness; none had high awareness.

Among respondents who used AI occasionally, 36 of 99 (36.4%) had high awareness, compared with 86 of 98 (87.8%) of those who used AI frequently. This descriptive pattern depicted that

postgraduate students who use AI more frequently have higher levels of AI awareness in research. Across the three crosstabulations, higher knowledge, more positive attitudes, and more frequent AI use corresponded descriptively with higher overall awareness. Similar patterns have been reported in studies of medical students, university students, and nurses (Atalla et al., 2024; Kharroubi et al., 2024; Qin et al., 2024).

### Challenges Encountered by Postgraduate Students When Using AI in Research

**Table 19: Perceived Challenges**

| Questions                                                                                                                    | Mean | Std. Deviation |
|------------------------------------------------------------------------------------------------------------------------------|------|----------------|
| I am concerned about the privacy and security of my data when using AI tools in research                                     | 3.97 | 1.017          |
| I find it challenging to use AI tools in research due to unclear guidelines about plagiarism                                 | 3.64 | 1.150          |
| Budget constraints are a significant barrier to adopting AI tools for my research                                            | 3.63 | 1.159          |
| I face challenges in accessing essential AI tools for research due to insufficient fund                                      | 3.43 | 1.226          |
| I find it hard to find free AI tools that is available for research.                                                         | 3.34 | 1.210          |
| I feel that my limited technical knowledge makes it challenging to use AI tools effectively in my research                   | 3.27 | 1.155          |
| I face challenges in using AI tools effectively for research due to limited training or guidance.                            | 3.22 | 1.213          |
| I struggle to find AI resources that align with my specific research needs                                                   | 3.22 | 1.140          |
| I am hesitant to use AI tools due to unclear guidelines around ethics and plagiarism                                         | 3.20 | 1.204          |
| I lack awareness of how to use AI tools ethically in my research                                                             | 3.01 | 1.274          |
| I face difficulties using AI tools in my research due to a lack of institutional training                                    | 2.84 | 1.177          |
| I face difficulties using AI tools in my research due to a lack of institutional funding for subscription of AI applications | 2.52 | 1.204          |
| I am not aware of the available AI tools for research                                                                        | 2.35 | 1.219          |

Privacy and data security received the highest mean ( $M = 3.97$ ), followed by unclear plagiarism guidelines ( $M = 3.64$ ) and budget constraints ( $M = 3.63$ ). Other concerns included insufficient access to essential tools ( $M = 3.43$ ), limited technical knowledge ( $M = 3.27$ ), inadequate training or guidance ( $M = 3.22$ ), and difficulty finding resources suited to specific research needs ( $M = 3.22$ ). The lowest mean concerned awareness of available AI tools ( $M = 2.35$ ), suggesting that respondents perceived governance, access, and capability as greater barriers than basic awareness.

## Potential Library Strategies for Enhancing Postgraduate Students' Use of AI in Research

**Table 20: Preferred Support Strategies**

| Questions                                                                                                                                                                                                                                                       | Mean | Std. Deviation |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------|
| Do you think the library should provide free access to AI tools and software for research purposes?                                                                                                                                                             | 4.56 | .704           |
| Having clear guidelines on AI usage and how it relates to plagiarism would help me use AI tools more confidently in my research.                                                                                                                                | 4.54 | .677           |
| Online tutorials and resources about AI should be made available from library website"                                                                                                                                                                          | 4.47 | .810           |
| Workshops on AI literacy and ethical use of AI in research would address my concerns about using AI responsibly.                                                                                                                                                | 4.47 | .740           |
| Librarians should educate themselves on AI tools and applications to provide effective learning opportunities for students                                                                                                                                      | 4.46 | .654           |
| Strengthening university policies on data privacy and security for AI use in research would make me feel more comfortable in using AI tools                                                                                                                     | 4.45 | .732           |
| In general, do you think the university subscription to certain AI applications such as Chatgpt, Bing Copilot, Quilbot, Consensus, Elicit, Scite.ai, Research Rabbit, ChatPDF, Scholarcy etc, contribute to the IIUM postgraduate students to conduct their res | 4.44 | .814           |
| Integrating AI literacy and usage skills into the research curriculum would improve my ability to use AI effectively in my research                                                                                                                             | 4.44 | .745           |
| Providing free or discounted access to essential AI tools would increase my interest to use AI in my research.                                                                                                                                                  | 4.42 | .795           |
| University partnerships with AI tool providers, offering better access or training, would improve my AI adoption in research.                                                                                                                                   | 4.36 | .805           |
| I think the university should encourage postgraduate students to collaborate on AI projects to build confidence and practical skills                                                                                                                            | 4.36 | .805           |
| Do you think university should integrate AI in Research Methods Courses?                                                                                                                                                                                        | 4.35 | .828           |
| Funding opportunities specifically for research using AI tools would encourage me to adopt AI in my research                                                                                                                                                    | 4.34 | .744           |
| I believe that regular training programs specifically focused on AI tools for research would support my effective use of AI in research.                                                                                                                        | 4.30 | .720           |

Respondents most strongly supported library-provided access to AI tools ( $M = 4.56$ ), clear guidance on AI use and plagiarism ( $M = 4.54$ ), online tutorials ( $M = 4.47$ ), and workshops on AI literacy and ethics ( $M = 4.47$ ). They also endorsed AI-literate librarians ( $M = 4.46$ ), stronger data-privacy policies ( $M = 4.45$ ), integration of AI literacy into research curricula ( $M = 4.44$ ), collaboration with AI-tool providers ( $M = 4.36$ ), collaborative AI projects ( $M = 4.36$ ), and funding opportunities for AI-enabled research ( $M = 4.34$ ). Collectively, the findings favour a comprehensive support model combining access, training, ethical guidance, policy, and funding.

Which AI tool(s) is commonly used for your research? You may select more than ONE options.  
203 responses

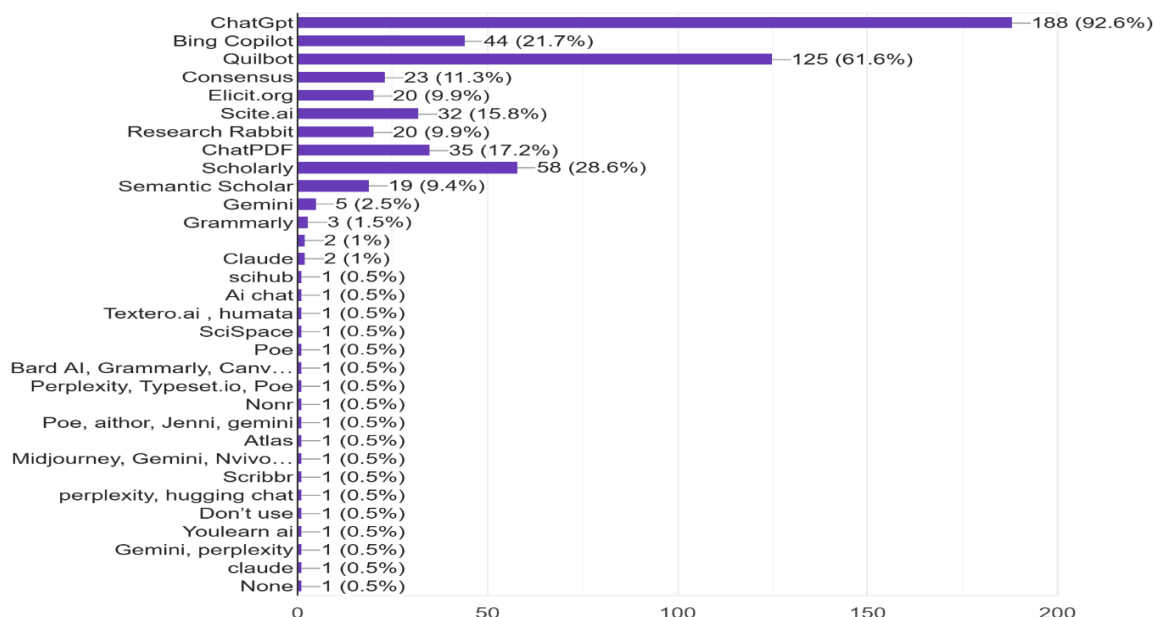


**Figure 3: AI Tools Commonly used for Research**

ChatGPT was the most frequently reported research tool ( $n = 188$ , 92.6%), followed by QuillBot ( $n = 125$ , 61.6%), Scholarcy ( $n = 58$ , 28.6%), Bing Copilot ( $n = 44$ , 21.7%), and ChatPDF ( $n = 35$ , 17.2%). Scite.ai (15.8%), Consensus (11.3%), Elicit (9.9%), ResearchRabbit (9.9%), and Semantic Scholar (9.4%) were less widely used. Gemini (2.5%), Grammarly (1.5%), and Claude (1.0%) also had limited reported use. The dominance of general-purpose, user-friendly tools suggests a need for libraries and universities to introduce students to specialised research tools and provide guidance on their appropriate use.

## Conclusion

A limitation of this study is that construct-level reliability analysis was not conducted for the questionnaire. Although the instrument was adapted from previously validated measures, reviewed by experts, and pilot-tested for clarity and functionality, these procedures do not establish the internal consistency of the adapted items within the present study context. Adaptation and contextualisation may alter how respondents interpret particular items and how consistently the items measure their intended constructs. Consequently, the internal consistency of the knowledge, attitude, practice, challenges, and preferred support-strategy dimensions could not be empirically confirmed. This limits confidence in the precision of the construct scores and requires the findings, particularly comparisons based on composite mean scores, to be interpreted cautiously. Nevertheless, the results may provide preliminary evidence regarding AI awareness among IIUM postgraduate students. Future studies should assess the reliability of each construct separately using Cronbach's alpha or an appropriate alternative, such as McDonald's omega, together with corrected item-total correlations. Construct validity should also be examined using exploratory or confirmatory factor analysis before the instrument is applied to a broader population.

Strengthening AI knowledge and responsible adoption in academic research can support Malaysia's ambition to become a leading AI-enabled nation. This study found a moderate level of AI awareness among IIUM postgraduate students. Descriptive patterns indicated that higher

knowledge, more positive attitudes, and more frequent use were associated with higher awareness, although complete inferential statistics are required before statistical significance can be claimed. The principal challenges concerned data privacy and security, unclear guidance on AI use and plagiarism, and budget constraints. ChatGPT was the most commonly used tool. Academic libraries and universities can respond through access to appropriate AI tools, targeted training, explicit ethical and plagiarism guidance, and robust data-governance policies. The study is limited by its single-institution, cross-sectional design, purposive sample, limited disciplinary representation, and reliance on self-reported data. This study also is yet to explore the reasons for tool preferences or evaluate existing institutional initiatives. Future research should include multiple institutions and disciplines, incorporate qualitative methods, and assess the effectiveness of specific AI-literacy interventions.

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