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Artificial Intelligence in Enhancing Digital Literacy Competencies Among JTMK Students

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Abstract. The rapid advancement of digital technologies and the emergence of the Fourth Industrial Revolution (IR4.0) have significantly transformed higher education, emphasizing the need for digital literacy as a core competency. Artificial Intelligence (AI) has become a critical enabler in enhancing digital literacy through applications that support personalized learning, automated assessments and adaptive feedback. This study examines students' perceptions of AI integration in education, focusing on three key areas: AI usage in assessment, AI's role in comprehension and concerns regarding ethical and academic integrity. A quantitative research design was adopted, utilizing an online questionnaire distributed via CIDOS and WhatsApp to 221 students from the Department of Information Technology at Politeknik Muadzam Shah. Data were analyzed using descriptive statistics (frequencies, percentages, means and standard deviations) and inferential analysis via one sample T-tests. Findings indicate generally positive perceptions of AI in assessment (M = 3.93, SD = 0.692) and comprehension (M = 3.96, SD = 0.691), highlighting AI's potential to improve learning efficiency and understanding. However, perceptions related to ethical and academic integrity (M = 3.77, SD = 0.697) underscore concerns about responsible AI usage, plagiarism risks and over-reliance. The results suggest that while AI adoption is widely accepted and beneficial for learning and evaluation, its integration must be accompanied by clear institutional policies to ensure ethical practices and academic fairness. These findings provide insights for higher education stakeholders in designing strategies that balance technological innovation with ethical considerations in AI-enhanced learning environments.

Keywords: Artificial Intelligence (AI), Digital Literacy, Students' Perceptions, Higher Education, Ethical Considerations

1. INTRODUCTION

The rapid advancement of digital technologies has transformed the landscape of higher education globally, including in Malaysia. The emergence of the Fourth Industrial Revolution (IR4.0) has accelerated the integration of digital tools into academic and professional contexts, making digital literacy a fundamental competency for students in higher education. Digital literacy is no longer limited to basic technical skills but extends to information management, critical evaluation, ethical online behavior and the ability to adapt to evolving digital environments [1], [2]. In Malaysia, strengthening digital literacy among higher education students is essential to ensure graduates are well-prepared for a knowledge-driven and technology-oriented society [3].

Artificial Intelligence (AI) has emerged as a powerful enabler in advancing digital literacy competencies. AI-powered technologies such as intelligent tutoring systems, adaptive learning platforms, automated assessment tools and personalized recommendation engines have begun reshaping learning and teaching in higher education [4]. By offering real-time support, customizing learning pathways and encouraging self-directed learning, AI supports the development of critical digital skills. Additionally, AI-driven learning analytics provide educators with insights into students' digital behaviors, enabling targeted interventions to address competency gaps [5].

In Malaysia, the integration of AI into education aligns with national strategic initiatives such as the Malaysia Education Blueprint (Higher Education) 2015–2025 and the Malaysia Digital Economy Blueprint (MyDIGITAL), both of which emphasize digital fluency, innovation and lifelong learning [3], [6]. Leveraging AI to enhance digital literacy not only supports Malaysia's vision of producing globally competitive graduates but also addresses the growing demand for digitally skilled talent in the workforce. However, challenges remain, including issues of equitable access, ethical implications of AI use and the readiness of educators and learners to embrace AI-enhanced education [7].

This study therefore examines the role of Artificial Intelligence in enhancing digital literacy competencies among Department of Information Technology, Politeknik Muadzam Shah, highlighting three major aspect of AI which are AI usage in student's assessment, AI usage in student's comprehension and ethical and also academic integrity perception on AI.

2. LITERATURE REVIEW

Artificial Intelligence (AI) tools have rapidly become essential in higher education, particularly in supporting students with assessment-related tasks. The increasing availability of AI applications such as ChatGPT, Grammarly, and Turnitin reflects a shift towards technology-enhanced learning environments where students use digital tools not only to acquire knowledge but also to complete assessments more effectively.

One of the biggest advantages of AI in education is that it can help students brainstorm and build on ideas for their assignments. Generative AI models, such as ChatGPT, assist students in brainstorming, outlining and developing new perspectives on given topics [8]. This process helps reduce writer's block and enables students to engage in critical thinking while refining their own arguments [9]. By serving as a cognitive partner, AI supports the early stages of the writing process, which helps students come up with more creative and diverse work.

AI-powered language tools, such as Grammarly and automated essay evaluators, are widely used to enhance academic writing quality. These tools provide grammar correction, style suggestions and coherence improvements in real-time, enabling students to refine their drafts before submission [10]. AI tools do not just correct grammar and spelling but they can also give feedback on meaning and structure, helping students shape their writing to meet academic standards [11]. By going through this process step by step, students are encouraged to learn on their own and gradually improve, resulting in assignments that are clearer and more polished.

AI tools also play a crucial role in supporting time management, helping students meet deadlines and reduce academic stress. Automated scheduling tools, summarization features and content generation functions allow students to complete tasks more efficiently [12]. However, recent studies also raise concerns about over-dependence, as students may increasingly rely on AI to expedite assignment completion rather than developing independent problem-solving skills [13]. While this dependence highlights ethical and pedagogical concerns, it also emphasizes the centrality of AI in modern assessment practices.

Artificial Intelligence (AI) is now a valuable tool in education, helping students overcome learning challenges, gain confidence and put theory into practice. Recent research shows that AI-powered tools like ChatGPT, Grammarly and smart tutoring systems are changing the way students approach tough topics, understand new ideas and manage their own learning. However, alongside these benefits, there are also concerns that relying too heavily on AI could limit students' critical thinking and independence.

The immediate feedback and guided practice offered by AI applications improve students' confidence in their subject knowledge. For instance, AI-driven formative assessments allow learners to test their understanding and receive corrective suggestions without the fear of being graded [14]. Studies indicate that this kind of non-judgmental support system fosters self-efficacy and encourages students to take greater responsibility for their own learning [15].

Despite its advantages, AI's growing role in education raises concerns about over-dependence. Students who rely heavily on AI for answers may bypass critical thinking and problem-solving processes, which are essential for higher-order learning [16]. Over-reliance also risks reducing creativity and original thought, making it imperative for educators to promote balanced AI usage [17].

The integration of Artificial Intelligence (AI) tools in higher education has sparked significant debate about ethics, integrity and social influence in academic contexts. Students' perceptions of AI vary depending on institutional policies, disciplinary practices and peer behaviors. The following sections highlight key research findings that align with the main themes of the student questionnaire.

Clear communication from lecturers significantly influences student behavior regarding AI. Research highlights that when educators explicitly outline permissible and impermissible uses of AI, students demonstrate greater confidence in using such tools ethically [18]. Conversely, vague or inconsistent policies across courses contribute to uncertainty and potential misuse [19]. Good practice recommendations include: requiring students to declare AI use, designing assessments that emphasize process over product and providing examples of acceptable applications [20].

Even with its advantages, many students feel anxious that using AI might break academic integrity rules. Early studies show that students see AI as both helpful and risky. It can make work more efficient, but it also raises worries about plagiarism and unfair advantages [21]. Higher education institutions caution against depending too much on AI detection tools, since they are not always reliable and instead recommend clear policies and updated assessment methods [22]. To use AI ethically, it is important to find a balance between embracing innovation and maintaining academic honesty

Peers strongly influence how students view AI. Many feel pressured to use it because so many others already do, worrying they will fall behind if they do not use it [23]. This shows the need to build a culture where AI is used responsibly, giving all learners a fair chance. Students are generally open to using AI when there are clear policies, proper citation and guidelines for responsible use. Still, issues of integrity and peer pressure make it important for higher education institution to create frameworks that support ethical and balanced adoption. By addressing these concerns, higher education can make the most of AI tools while protecting academic standards.

3. RESEARCH METHODOLOGY

This study adopted a quantitative research design, which is widely recognized as a systematic approach to collecting and analyzing numerical data for the purpose of identifying patterns, testing hypotheses and generalizing findings to larger populations [24]. The selection of the quantitative method was considered appropriate, as the study aimed to measure respondents' perceptions towards artificial intelligence (AI) integration in education using structured survey instruments. Quantitative research is particularly effective in providing measurable evidence, allowing for comparability across respondents and ensuring objectivity in data interpretation [25].

Demographic information was collected to describe the background of respondents and to provide contextual insights into their perceptions. The demographic data in this study comprised two variables, namely the students' current semester and their prior experience with AI-based applications. These variables were included to provide contextual insights into the background of respondents and to examine whether differences in academic progression or exposure to AI technology may influence their perceptions towards the integration of AI in education. The demographic data were analyzed using descriptive statistics, specifically frequencies and percentages, to present an overview of the sample profile clearly and systematically.

The survey instrument consisted of items measured using a five-point Likert scale, ranging from 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree and 5 - Strongly Agree. The Likert scale was chosen because it enables the measurement of attitudes and perceptions along a continuum, thus providing richer insights into respondents' level of agreement with each statement [26].

Prior to the main data collection, a pilot study was conducted with a smaller group of respondents who shared similar characteristics with the target population. The purpose of the pilot study was to test the clarity, comprehensibility and reliability of the instrument. In this study, a pilot study was conducted to evaluate the reliability and clarity of the survey instrument before moving to the main data collection phase. Existing literature suggests that a pilot sample size equivalent to 10% of the full-scale projected sample is acceptable [27]. Feedback obtained from the pilot allowed necessary modifications to be made, ensuring the validity and suitability of the instrument for the actual study.

The internal consistency of the instrument was examined using Cronbach's Alpha coefficient, which is one of the most widely used measures of reliability in survey-based research. A Cronbach's Alpha value of 0.70 or higher is generally considered acceptable, indicating that the items within each construct are sufficiently correlated and measure the same underlying dimension [28]. The pilot study results showed that all constructs achieved Cronbach's Alpha values above the recommended threshold, thus confirming that the instrument was reliable for the main data collection.

The collected data was obtained through an online questionnaire distributed via a shared link, which was disseminated through CIDOS and WhatsApp to the targeted respondents. This approach facilitated easy access and quick participation, ensuring that respondents could complete the survey at their convenience. By leveraging these platforms, the distribution process reached a broader audience effectively, resulting in comprehensive data collection to support the research objectives.

The analytical techniques employed in this study included the use of descriptive statistics such as frequencies, percentages, mean, and standard deviation to summarize the demographic characteristics and to evaluate respondents' perceptions. These measures provided an overview of the sample distribution and central tendencies. Furthermore, a one-sample T-test was utilized to evaluate respondents' perceptions and to determine whether the sample mean significantly differed from a predetermined reference value. This combination of descriptive and inferential analyses ensured a comprehensive interpretation of the data in alignment with the research objectives [29].

4. RESULTS

In this study, the selected sample consists of 221 students from Semester 1 to Semester 5 of the Diploma in Information Technology (Digital Technology - DDT) and Diploma in Information Technology (DIT) programs at JTMK, PMS for the Session 1 2025/2026. The sampling method employed in this research is random sampling. According to research in [30], random sampling refers to the method of defining a precise population and obtaining a sample from it through random selection techniques. An approach commonly applied in quantitative studies, in which subjects are randomly drawn from a defined group or population [31].

This research instrument consists of two sections: the first section is a questionnaire that gathers students' demographic data, while the second section contains questions related to students' knowledge and experience in using AI applications as tools to assist in completing assignments. In Section A, the researcher analyzed the collected data using descriptive statistics by examining the mean scores and percentages. Additionally, the data were transformed into appropriate tables and graphs. For all data and information in Section B, the researcher employed descriptive statistics based on mean scores and standard deviations. For Likert scales, items should ideally have similar means and standard deviations [32].

A pilot study was conducted on 10 students from JTMK, PMS, who are enrolled in the Diploma in Information Technology (Digital Technology - DDT) program. The reliability level of the study was determined using the interpretation of the Cronbach's Alpha value, which ranges from 0.00 to 1.0. A value approaching 1.0 indicates a good, high and effective level of reliability, whereas a value closer to 0.00 reflects a low level of reliability [33]. The findings from the pilot study analysis revealed that the reliability value, represented by the Cronbach's Alpha coefficient, was 0.948, as shown in Table 1. This indicates that the instrument is in excellent and highly effective condition with a high level of consistency, making it suitable for use in the actual research [28]. Overall, the reliability of this questionnaire is satisfactory, with a Cronbach's Alpha value of 0.948.

Table 1. Cronbach's Alpha value.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.944	0.948	19

The demographic data encompassed two key questions. The first pertained to the respondents' current semester during Session 1 2025/2026 and the second concerned their utilization of AI tools in academic studies. Table 2, titled *Students' Semester*, illustrates the distribution of respondents according to their respective semesters. Findings indicate that 7.2% (n=16) of the respondents were enrolled in the first semester, 14.0% (n=31) in the second semester and a

majority of 52.5% (n=116) in the third semester. Furthermore, 7.7% (n=17) of the respondents were in the fourth semester, 18.1% (n=40) in the fifth semester, while only 0.5% (n=1) were in the sixth semester.

Table 2. Frequency and percentage for students' semester

Semester	Frequency	Percentage
Semester 1	16	7.2
Semester 2	31	14.0
Semester 3	116	52.2
Semester 4	17	7.7
Semester 5	40	18.1
Semester 6	1	0.5

Table 3 presents the data collected in response to the question, *"Have you used any AI tools in your studies?"* The analysis revealed that a significant majority of respondents, comprising 98.6% (n=218), reported having used AI tools in their studies, whereas only 1.4% (n=3) indicated that they had not utilized such tools.

Table 3. Frequency and percentage for question: Have you used any AI tools in your studies?

Used any AI Tools	Frequency	Percentage
Yes	218	98.6
No	3	1.4

The second section of the research instrument comprised a questionnaire designed to examine the utilization of AI applications as an aid or facilitator in completing assignments assigned by lecturers. A five-point Likert Scale was employed, ranging from (1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree and 5 - Strongly Agree). This section focused on three key factors, which are AI usage in assessment**,** AI and comprehension and ethical and academic integrity perception**.**

Table 4. Mean Score and Standard Deviation for AI Usage in Assessment

Item	AI Usage in Assessment	Mean	S.D
Q1	AI tools help me generate ideas for my assignments.	4.72	0.744
Q2	I use AI tools (e.g. ChatGPT, Grammarly) to improve my written assessments.	4.14	0.876
Q3	AI has improved the quality of my assignment submissions.	4.10	0.839
Q4	AI tools help me better understand the expectations of assessment rubrics.	4.19	0.775
Q5	I depend on AI to complete my assessments on time.	3.40	1.122
Q6	Using AI gives me an unfair advantage in assessments.	3.57	1.001
Q7	My grades have improved since I started using AI tools in my academic work.	3.82	0.885
	Overall mean and standard deviation	3.93	0.692

Table 4 presents the factor of AI Usage in Assessment, which recorded an overall mean score of 3.93 with a standard deviation of 0.692. The mean value, which is relatively high, suggests that respondents generally perceived the integration of artificial intelligence in assessment practices positively, indicating a favorable level of acceptance and applicability in the academic context. Furthermore, the moderate standard deviation value reflects that the distribution of responses was fairly consistent, implying that there was no extreme divergence of opinions among participants. This finding may be interpreted as evidence that the adoption of AI-based tools in assessment is not only well-received but also widely accepted, thus strengthening the argument for their potential role in enhancing efficiency, objectivity and reliability in educational evaluation processes.

Table 5. Mean Score and Standard Deviation for AI and Comprehension

Item	AI and Comprehension	Mean	S.D
Q8	AI tools help me understand difficult course materials better.	4.24	0.684
Q9	I feel more confident about my understanding of the subject after using AI tools.	4.07	0.806
Q10	AI explanations are more helpful than textbook content in some cases.	3.95	0.921
Q11	I use AI to clarify topics I do not understand in class.	4.15	0.820
Q12	AI usage promotes deeper learning and comprehension.	4.09	0.835
Q13	I rely too much on AI and it affects my independent thinking.	3.25	1.235
Q14	AI tools have helped me connect theoretical knowledge with practical application.	3.98	0.876
	Overall mean and standard deviation	3.96	0.691

Table 5 presents the factor of AI and Comprehension, which recorded an overall mean score of 3.96 with a standard deviation of 0.691. The relatively high mean value indicates that respondents generally agreed on the positive role of artificial intelligence in supporting comprehension, particularly in enhancing students' understanding of learning content. Meanwhile, the moderate standard deviation demonstrates that the responses were fairly consistent, suggesting that the participants shared a similar perception with minimal variability in their opinions. This result implies that the integration of AI applications has the potential to improve learners' comprehension processes, making educational experiences more effective, personalized and accessible.

Table 6. Mean Score and Standard Deviation for Ethical and Academic Integrity Perception

Item	Ethical and Academic Integrity Perception	Mean	S.D
Q15	I believe using AI tools in assignments is ethically acceptable	3.86	0.877
Q16	I always cite AI-generated content in my assessments.	3.57	0.973
Q17	My lecturers clearly explain the do's and don'ts of using AI in completing my assessment.	4.18	0.781
Q18	I worry that AI usage may violate academic integrity rules.	3.93	0.936
Q19	I feel more pressure to use AI tools because other students are using them.	3.33	1.145
	Overall mean and standard deviation	3.77	0.697

Table 6 presents the factor of Ethical and Academic Integrity Perception, which recorded an overall mean score of 3.77 with a standard deviation of 0.697. The mean score, which is moderately high, suggests that respondents generally acknowledged the importance of ethical considerations and academic integrity in relation to the use of artificial intelligence. The standard deviation value indicates that the responses were relatively consistent, with only minor variations among participants' perceptions. This finding implies that while there is a favorable level of awareness and agreement regarding ethical and integrity-related issues, continuous emphasis on responsible AI usage in academic contexts remains essential to strengthen trust, fairness and accountability within the learning and assessment environment

5. DISCUSSION

The findings from Tables 4, 5 and 6 provide valuable insights into the perceptions of respondents regarding the integration of artificial intelligence (AI) in educational contexts, specifically in assessment, comprehension and ethical considerations.

Firstly, the results on AI Usage in Assessment (M = 3.93, SD = 0.692) indicate a generally positive reception of AI tools in the evaluation process. The relatively high mean value suggests that respondents recognize the potential of AI to enhance the efficiency, objectivity and reliability of assessment practices. This finding resonates with AI-based assessment tools can provide timely feedback, reduce grading bias and improve overall transparency in evaluation [34]. The consistency of responses in this study further strengthens the view that acceptance of AI in assessment is widely shared, which aligns with the growing trend of leveraging automated evaluation systems in higher education [35].

Secondly, the factor of AI and Comprehension (M = 3.96, SD = 0.691) highlights the positive role of AI in facilitating learners' understanding of academic content. The high mean score reflects respondents' acknowledgment that AI applications, such as adaptive learning platforms and intelligent tutoring systems, significantly contribute to enhancing comprehension and engagement. Prior studies have shown that AI-powered learning technologies can personalize content delivery, thus improving learners' retention and comprehension [36]. With consistent responses observed in this study, it can be inferred that participants perceive AI as an effective tool for supporting individualized learning needs, adaptive AI systems help bridge knowledge gaps and provide tailored learning pathways [37].

Thirdly, the results concerning Ethical and Academic Integrity Perception (M = 3.77, SD = 0.697) reveal that respondents are also aware of the ethical implications associated with AI adoption in education. Although the mean value is slightly lower than the other factors, it still reflects a moderately high level of agreement, suggesting that participants place importance on ensuring responsible and ethical AI usage. This concern is consistent with the argument that the rapid emergence of AI tools, such as ChatGPT, has raised critical issues related to plagiarism, academic dishonesty and the risk of over-reliance on automated content generation [38]. Emphasized the importance of embedding ethical frameworks and accountability mechanisms in AI integration to ensure fairness and transparency in academic contexts [49]. The relatively consistent responses in this study further reinforce the notion that academic integrity is a shared priority, underscoring the need for continued dialogue, policies and guidelines to regulate AI use responsibly.

Taken together, these findings suggest that while AI is broadly accepted as a valuable tool for enhancing assessment and comprehension, ethical considerations must remain central to its integration. The positive perceptions indicate readiness for AI adoption, but the emphasis on academic integrity underscores the necessity of balanced implementation one that maximizes pedagogical benefits while safeguarding ethical standards, fairness and accountability in education.

6. CONCLUSION

This study highlights three key factors concerning the integration of artificial intelligence (AI) in education: assessment, comprehension and ethical perceptions. The findings show that respondents generally hold positive views towards the use of AI in assessment, acknowledging its role in improving efficiency, objectivity and transparency in evaluation. Similarly, AI was perceived as highly beneficial for comprehension, particularly in enhancing students' understanding, engagement and access to personalized learning experiences.

In contrast, the factor of ethical and academic integrity perception reflects a slightly lower, yet still moderately high, level of agreement. Respondents emphasized the importance of ensuring responsible and ethical AI use, particularly in addressing issues related to plagiarism, over-reliance and data privacy.

Overall, the findings suggest that AI integration is widely accepted as a valuable tool to support teaching, learning, and evaluation. However, its sustainable application requires a balance between technological advancement and ethical safeguards. This underlines the need for educational institutions to establish clear policies and guidelines, ensuring that AI adoption not only enhances learning outcomes but also preserves academic integrity, fairness and accountability.

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