Perceptions and Usage of AI-Based Applications among Plantation Students in Malaysian Higher Education

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ABSTRACT

The integration of artificial intelligence (AI) applications in higher education has transformed traditional academic practices offer new opportunities for enhanced learning. However, limited attention has been given to how students in agriculture and plantation-related fields perceive and engaged with AI in their academic activities. This study examines the perceptions, usage patterns and acceptance of AI-based applications among plantation students in MARA University of Technology (Melaka Branch, Jasin Campus). A total of 150 students across diploma, bachelor, and master's programs participated in the study. Data were collected using a structured questionnaire covering five dimensions: types of AI application used, role of AI in learning, perceived benefits and limitations, impact on academic tasks, and ethical considerations. Descriptive statistical analyses revealed that AI applications particularly ChatGPT, QuillBot and Copy.ai were frequently used for assignments, paraphrasing, and academic research. Students largely perceived AI as useful, with noted benefits in writing improvement and time efficiency. Nonetheless, concerns about content reliability, overdependence and ethical implications were reported. Approximately half of the respondents expressed willingness to continue using AI applications and recommending them to others. The study concludes that while AI applications are generally well-received, there remains a critical need for guided integration and plantation disciplines to support responsible and effective use in academic and future professional contexts. The findings offer insights for educators, developers, and policymakers in shaping AI-based education strategies.

INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force across multiple sectors, including higher education, due to its ability to simulate human intelligence (Korteling et al., 2021). AI technologies enhance efficiency, personalize learning experiences and improve access

to information, thereby reshaping traditional teaching and learning processes (Alotaibi, 2024). Higher education institutions worldwide are increasingly adopting AI-based applications to support student engagement, facilitate independent study and create adaptive learning environments (Alawneeh et al., 2024).

In Malaysia, the plantation sector, a cornerstone of the economy through agricultural exports like palm oil and rubber, is undergoing a significant digital transformation (Malaysia Palm Oil Board, 2024). Higher education programs in plantation studies are tasked with preparing students to integrate conventional agricultural knowledge with emerging technologies, such as AI and the Internet of Things (IoT) (Holzinger et al., 2024). Despite this need, plantation students often face persistent challenges, including outdated curricula, limited access to digital tools and inadequate exposure to technology-driven agricultural practices (Bampasidou et al., 2024). Many students also come from rural backgrounds where poor internet connectivity and digital literacy gaps further constrain their readiness to engage with AI applications remains limited.

Globally, AI adoption in agriculture education is gaining traction, with institutions in countries like the United States and Australia using AI-based application, such as crop monitoring systems and predictive analytics and intelligent tutoring to foster data-driven decision-making (Lengyel et al., 2024). Yet, research on how plantation students in developing nations, particularly in Malaysia, engage with AI applications remains limited.

This gap highlights the importance of investigating whether AI serves as a supportive tool that bridges educational and technological gaps for plantation students or as an added complexity in their already challenging academic environment (Rahman et al., 2025). Therefore, the objective of this study is to examine plantation students's awareness, perceived benefits, concerns and readiness to adopt AI applications in Malaysia higher education, aiming to inform strategies for responsible AI integration in agriculture-focused academic programs.

Classification of Recent AI Application

AI applications have rapidly expanded in higher education, supporting various aspects of teaching, learning and research. Recent studies highlight that AI application can be grouped into functional categories based on their primary purpose, ranging from conversational assistance to content generation and visualization. Such classifications provide a structured understanding of how different AI applications are being integrated into academic activities and allow for targeted analysis of their adoption among students.

Table 1: Classification of AI Application by Function

Category	Examples of AI Applications
Conversational AI	ChatGPT, Google Bard, Claude, Bing AI, ChatSonic
Content Writing & Editing	QuillBot, Rytr, Copy.ai, Jasper, Wordtune
Presentation & Visualization	Tome.app, Beautiful AI, Gamma, Synthesia

As shown in Table 1, conversational AI applications such as ChatGPT and Google Bard are primarily used to generate responses, explain concepts and support independent learning. Content writing and editing applications such as QuillBot and Jasper assist students in paraphrasing, grammar checking and

drafting academic texts. Meanwhile, presentation and visualization applications like Tome.app and Synthesia enhance creativity by enabling students to produce professional slides, videos and visual explanations. This classification demonstrates the diversity of AI applications currently accessible to higher education students and provides the basis for examining how plantation students specifically adopt and utilize these tools in their academic work.

METHODOLOGY

Sample Size

The study involved a total of 150 respondents enrolled in agriculture and plantation-related diploma, bachelor, and master's programs at MARA University of Technology (Melaka Branch, Jasin Campus) . Participants were selected from various academic programs to capture a diverse range of perspectives on the use of AI applications in higher education. The chosen sample size is considered adequate, as methodological guidelines suggest (Roscoe, 1975).

Sampling Method

A purposive sampling method was employed in this study. This approach was chosen to ensure that participants possessed relevant academic backgrounds and were directly exposed to the integration of AI applications in their studie**s.**

Research Instrument

A structured five-point Likert scale was developed for data collection. The scale ranged from; 1= strongly disagree; 2= disagree; 3= neutral; 4= agree; 5= strongly agree. The five-point format was selected because it is widely adopted and offering a balance between reliability, simplicity and respondent ease without causing scale fatigues (Joshi et al., 2025). The instrument was designed to assess five key dimensions: (i) types of AI application used for academic purposes, (ii) the role of AI in the learning process, (iii) perceived benefits and limitations, (iv) the impact of AI application usage, and (v) ethical considerations. The items were formulated based on a review of relevant literature and adapted to suit the local academic context.

Pilot Test

A pilot study was conducted with 30 respondents to evaluate the reliability of the questionnaire items. Cronbach's alpha was used to evaluate the internal consistency of the instrument. It alpha remains the most widely used, ensuring comparability across research contexts (Adamson and Prion, 2013). A reliability coefficient of 0.799 was obtained for the 32 items, indicating acceptable internal consistency.

Collected data were analyzed using IBM Statistical Package for the Social Sciences (SPSS Version 29.0). Descriptive statistics, correlation analysis and one-way Analysis of Variance (ANOVA) were conducted at a significance level of $p < 0.05$.

RESULT AND DISCUSSION

Socio-demographic

The demographic profile of the respondents presented in Table 2. 57.3% were male and 42.7% were female, indicating a slightly higher representation of male students. The majority of respondents were between 18 to 21 years old. For academic programs, diploma students constituted the majority (76%), followed by bachelor's (16.7%) and master's students (7.3%). The sample included students from various academic programs related to agriculture and plantation management.

Table 2: Demographic profile of respondents.

Variable	Dimension	Frequency	Percentage (%)
Gender	Male	86	57.3
	Female	64	42.7
Age (years)	18-21	115	76.7
	22-25	35	23.3
Academic program	Diploma	114	76.0
	Bachelor's Degree	25	16.7
	Master's Degree	11	7.3
Course	AT110	92	61.3
	AT112	3	2.0
	AT117	19	12.7
	AT220	11	7.3
	AT222	2	1.3
	AT223	8	5.3
	AT226	4	2.7
	AT732	2	1.3
	AT733	2	1.3
	AT734	3	2.0
	AT736	1	0.7
	AT750	1	0.7
	AT770	2	1.3

The higher proportion of male students (57.3%) aligns with findings from previous studies, which suggest that male students tend to exhibit higher usage frequencies of AI applications. Møgelvang et al. (2024) stated that male students engage more frequently with generative AI applications. Similarly, Sublime and Renna (2024) found that male students demonstrate increased engagement with AI applications. Given that the majority of respondents in this study are male and within the 18–21 age range, it is plausible that this group may show a higher propensity for utilizing AI applications. Conversely, female students comprised 42.7% of the sample, may adopt a more thoughtful and selective approach to AI engagement. Previous research by Rajki et al. (2025) indicates that female students are supportive of using AI for learning purposes but express a need to develop skills to effectively use and trust these applications. This suggests that female students in this study may prioritize understanding the practical and ethical implications of AI in their academic work.

Diploma programs are likely to incorporate AI in introductory (Caetano, 2025). Bachelor's students are likely exposed to AI through adaptive learning systems that personalize educational experiences (Alkan, 2024). The foundational AI knowledge provided in bachelor's programs prepares students for industry roles, aligning with the broader goal of fostering a competitive workforce in knowledge-intensive economies (Meulen et al., 2018).Master's students, though a smaller group at 7.3%, are likely to engage with AI at a more advanced level. Shahid and Mishra (2024) emphasize that master's programs focus on competencies such as data analytics, machine learning and AI ethics. In the context of plantation management, master's students may explore advanced AI applications.

Table 3: t-Test Results for Gender Differences in Perception of AI Usefulness

Dimensions	Gender	N	Mean	SD	SED	t	P value
Academic usage	Male Female	86 64	2.61 2.54	0.688 0.669	0.112	0.644	0.520
Benefits and limitations	Male Female	86 64	3.05 3.14	0.417 0.401	0.677	-1.328	0.186
Factors of acceptance	Male Female	86 64	3.20 3.41	0.976 1.071	0.168	-0.218	0.225
Ethical concerns	Male Female	86 64	3.18 3.38	1.121 1.116	0.185	-1.090	0.278
Overall perception	Male Female	86 64	12.04 12.47	0.272 0.340	0.500	-2.116	0.036

The results indicate that there is a significant difference between the mean scores of male and female students at the 0.05 level, t (1) = -2.116, p = 0.036. Specifically, the average perception score of male students (M = 12.04, SD = 0.272) was significantly lower than that of female students (M = 12.47, SD= 0.340). Hence, the hypothesis is supported. These findings suggest that while there is a general gender-based difference in overall perceptions of AI application usage, the detailed dimensions of AI application usage do not significantly vary between male and female students.

Table 4: ANOVA Results of Plantation Student's Perspectives on AI-Application Usage by Academic Program.

Sources	SS	df	MS	F	P
Between Groups	2.204	2	1.102	7.043	<0.001
Within Groups	22.995	147	0.156		
Total	25.199	149			

A one-way ANOVA was conducted to compare the perspectives of plantation students regarding the usage of AI-based applications across different academic programs.. The results show a statistically significant difference in student perspectives among these groups (F (2, 147)

= 7.043, p < 0.005). Given that the p-value is less than 0.05, it indicates that the difference in perspectives among the academic programs is highly significant. This result suggests that the academic qualification level of the students may influence their perceptions of the usefulness and application of AI-based tools in plantation- related fields.

AI-Application Frequency Used by Students

Table 5: Frequency AI application used by students.

AI-based application	Frequency	Percentage
ChatGPT	82	54.5%
Cici ai	70	46.7%
Copy.ai	70	46.7%
QuillBot	65	43.3%
Perplexity	62	41/3%
Pop ai	56	37.3%
Phind ai	49	32.7%
Rytr	30	20%
Gemini ai	1	0.7%

The most frequently used AI applications were ChatGPT (54.5%) and Cici AI (46.7%). It aligns with prior research (Magruder et al., 2023). Its widespread use likely stems from its ability to generate human-like responses, making it effective for tasks like essay writing and idea generation. The high usage of Cici AI and Copy.ai suggest that students value application tailored for content creation and reformulationt. QuillBot's usage further supports this, as its strength in paraphrasing aligns with academic writing needs (Pham, 2024). Perplexity AI has strength in generating reliable, domain-specific content (Özduran et al., 2025). The lower usage of Phind AI may indicate its niche application, possibly in technical or coding-related tasks within plantation studies. Gemini AI's absence from the results contrasts with its reported accuracy in other studies (Tiara & Pamuji, 2024). These findings indicate growing familiarity with AI applications among plantation students. However, the variation in usage suggests that tool selection depends on specific features and ease of use (Jain, 2024).

Patterns and Perception of AI Usage in Academic Contexts

AI applications were widely adopted, with 57% using them weekly and 27% daily. Usage duration varied, with 32% reporting 1–3 months and 26% over one year. Primary applications included assignment completion (84%), research (52.7%) and text summarization (49.3%). Notably, 39% relied on AI as their main academic information source. Students rated AI as "very useful" (38%) or "somewhat useful" (43%), with 52% feeling "somewhat comfortable" and 31% "very comfortable" using these applications. AI was perceived to creative problem-solving (66%). However, 38% spent over one hour daily on AI, 61% questioned its reliability, and 50% found it ineffective for complex topics. Concerns included overdependence (56%), potential hindrance to

critical thinking (37%) and unclear learning outcomes (41%), though 63% disagreed that AI promotes academic misconduct.

The frequent use of AI among plantation aligns with prior studies highlighting AI's role in personalized learning and task optimization (Mallillin, 2024). These applications are critical for agriculture-related coursework (Gjermeni & Prodani, 2024). The perception of AI as "very useful" corroborate AI's enhancement of learning experiences (Zhao, 2025). However, concerns about reliability and ineffectiveness for complex topics echo challenges such as algorithmic limitations (Singh et al., 2024). The 38% spending over one hour daily and 56% acknowledging overdependence risks suggest potential time mismanagement, particularly among the 39% using AI as a primary source. Mixed views on critical thinking and unclear learning outcomes highlight ethical concerns about reduced cognitive engagement (Balogh, 2024). Despite 63% dismissing academic misconduct risks, these findings underscore the need for digital literacy training to ensure responsible AI use in plantation education.

Perceived Benefits and Limitations of AI Applications

51.3% agreed or strongly agreed that AI applications save time in assignment completion, while 49% found them convenient for accessing learning materials. Regarding academic comprehension, 52% reported enhanced understanding of complex concepts, 66% noted improved creative problem-solving and 58.4% observed better writing skills. However, 61% questioned the credibility of AI-generated content. Additionally, 50% found AI ineffective for deeper academic understanding, 37% believed it impedes critical thinking (36% disagreed), and 56% acknowledged risks of overreliance. Notably, 63% disagreed that AI promotes academic misconduct.

The study aligns with research on AI's efficiency in automating tasks like text generation (Balat et al., 2024). The 49% who found AI convenient for accessing resources reflect its role in providing flexible access to materials (Amsal & Sagita, 2024), though there are disagreement suggests variability in digital proficiency or content quality (Nga, 2024). Enhanced comprehension, creative problem-solving and writing skills proved AI's ability to support personalized learning and skill development, particularly in agriculture-related contexts (Sunitha et al., 2023). However, concerns about credibility and ineffectiveness for deeper understanding reflect prior findings on AI's limitations in delivering reliable, context-specific content (Hutapea et al., 2024). The divided views on critical thinking and overreliance risks underscore ethical concerns about diminished cognitive engagement (Malik et al., 2023). Despite 63% dismissing academic misconduct risks, the potential for overdependence highlights the need for responsible AI integration.

Table 6: Perceived Benefits of AI Application for Academic Purposes.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Saves time	14.0	18.7	16.0	40.0	11.3
More convenient	17.3	18.7	15.3	24.7	24.0

Improves understanding	11.3	22.0	14.7	32.0	20.0
Supports creative solutions	12.7	21.3	14.0	29.3	22.7
Improves writing skills	13.3	16.7	16.7	30.7	22.7
Helps complete academic tasks	16.7	20.7	14.7	28.0	20.0

Factor Influenced AI Application Acceptance among Students

The study examined factors influencing the acceptance of AI-based applications among plantation students. It reveals varied perceptions and usage patterns. Regarding ease of use, 48% of respondents agreed or strongly agreed that AI tools are user-friendly, while 38.6% expressed difficulty in navigating these applications. Cost-effectiveness was also a consideration, with 52.2% affirming that AI applications are affordable, although 32.1% disagreed. Moreover, 51.45% of participants intended to continue using AI for academic purposes, reflecting a positive trend in adoption. However, 33.3% expressed reservations about long-term use.

In terms of peer recommendations, 58.7% of students were willing to recommend AI applications, yet 29.5% refrained, suggesting room for improvement in reliability. Trust in the accuracy and reliability of AI tools was noted among 50.7% of respondents, while 36% remained skeptical, highlighting the critical need to address trust- related barriers. Additionally, 53.4% agreed that AI enhanced their learning experiences, while 32% disagreed. Similarly, 53.4% believed AI improved their language skills, but 34% found no significant impact.

Table 7: Factors of Acceptance of AI-based application

Statements	Responses (%)				
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Easy to use	17.3%	21.3%	13.3%	20.0%	28.0%
	26	32	20	30	42
Cost effective to use	12.7%	19.3%	16.0%	22.7%	29.3%
	19	29	24	34	44
Intended to continue using	15.3%	18.0%	15.3%	36.75%	14.7%
	23	27	23	55	22
Recommend to peers	10.7%	18.7%	12.0%	40.0%	18.7%
Trusting the accuracy	16.0%	20.0%	13.3%	36.0%	14.7%
	24	30	20	54	22
Enhances learning experiences	16.0%	16.7%	16.0%	25.3%	26.0%
	24	25	24	38	39
Improve language skills of	11.3%	22.7%	12.7%	26.7%	26.7%
	17	34	19	40	40

Ethical Issue in Using AI Applications among Plantation Students

The study identified several ethical issues linked to the use of AI-based applications. A notable concern was the potential for plagiarism, with 58% of respondents agree and strongly agree. Concerns regarding fairness and accuracy in academic assessments were reported by 52% agree and strongly agree. Another issue raised was dependency on AI-based application for academic tasks, which 56% believed could lead to addiction, though 29.9% did not consider this a risk. This suggest that many students recognize the ethical challenges associated with AI-based application, particularly in terms of academic honesty and over-reliance, there is a considerable proportion of students who remain unconcerned about these issues. This highlights the need for targeted education and guidelines to address ethical concerns and ensure responsible usage of AI in academic settings.

Table 8: Ethical Concerns in Using AI-based application for Academic Purpose

Statements	Responses (%)				
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Concerned about the potential for plagiarism when using AI-based applications	20.7% 31	10.7% 16	10.7% 16	42.0% 63	16.0% 24
Raises concerns in academic assessments about fairness and accuracy	7.3% 11	24.0% 36	16.7% 25	38.0% 57	14.0% 21
Too much dependency for academic task could lead to addiction	6.7% 10	23.2% 35	14.0% 21	38.0% 57	18.0% 27

CONCLUSION

In conclusion, the findings indicate a high level of engagement with AI application, particularly for tasks such as assignment completion, paraphrasing and information retrieval. Students perceived these technologies as useful and time-efficient. However, it also revealed the concerns regarding overreliance on AI. While many students expressed willingness to continue using AI application and recommend them to peers, a significant portion remained uncertain about their trustworthiness and long-term educational value. Educational institutions should promote responsible usage while supporting students in critically evaluating AI outputs. Future research should investigate longitudinal effects of AI use on academic performance and explore disciplinary differences in perception across agriculture and other technical fields.

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