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Attitudinal assessment on ai-driven tools in agricultural education: A student perspective

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Abstract

The rapid advancement of Artificial Intelligence (AI) under the Fourth Industrial Revolution has reshaped educational landscapes, with significant implications for agricultural education. This study assessed the attitudes of B.Sc. (Hons.) Agriculture students at Vignan Institute of Agriculture and Technology, Andhra Pradesh, towards AI-driven tools, focusing on perceived academics, learning, and personality development. Using a proportionate stratified random sample of 180 students from a population of 443, data were collected via a teacher-made, five-point Likert scale. Results indicated that 41.11% of respondents exhibited high attitudes towards AI tools, 38.33% showed medium attitudes, and 20.55% reported low attitudes (Mean = 3.07, SD = 0.25), reflecting a generally favourable disposition with low variability. High Z-scores were observed for self-directed learning, real-time advisory capabilities, and diagnostic functions, highlighting AI's potential to enhance engagement, independent learning, and field-based competencies. Conversely, concerns emerged regarding overreliance on AI, reduced human interaction, and potential creativity decline, indicating the need for a balanced, human-centric integration strategy. The findings underscore AI's promise as a complementary pedagogical tool in agricultural education, while emphasising targeted training, blended learning approaches, and capacity building to maximise benefits and mitigate limitations.

Keywords: Artificial intelligence, agricultural education, attitude, learning

Introduction

The Fourth Industrial Revolution has brought Artificial Intelligence (AI) to the forefront of technological innovation across sectors, including agriculture and education. Globally, AI-driven tools are transforming conventional teaching-learning models by fostering personalized, adaptive, and immersive learning experiences. In agricultural education, these tools are increasingly employed to improve learning outcomes, support decision-making, and prepare students for agri-tech-driven ecosystems. According to the World Economic Forum (2023), AI in education is projected to grow at a compound annual growth rate (CAGR) of 45% between 2023 and 2030, with applications in automated content delivery, intelligent tutoring systems, performance analytics, and chatbot-assisted learning.

In the context of agricultural sciences, AI offers a paradigm shift not only in research and extension but also in pedagogy. Intelligent systems that simulate field scenarios, visualize data from precision farming, or analyse agronomic patterns are being integrated into classrooms and virtual platforms. A study by UNESCO (2022) reported that AI-enhanced learning systems improved conceptual understanding and knowledge retention in agricultural and life sciences by over 30% when compared to traditional lecture-based teaching. Parma *et al* (2022), suggested that

predictor variables namely extracurricular activities, information collection interpersonal communication and professional zeal have significant influence on attitude towards application of mobile technology in agricultural extension of the postgraduate scholars.

The Indian higher education system, including agricultural education, is rapidly adapting to this transformation. The Indian Council of Agricultural Research (ICAR), through its National Agricultural Education Policy (NAEP 2020), emphasizes the integration of digital technologies including AI, machine learning, and data analytics to build the capacities of future agricultural professionals. As per ICAR's 2023 report, over 70% of agricultural universities in India have initiated steps toward digital learning platforms and smart classroom initiatives, many of which involve AI-enabled components such as automated assessments, virtual practical's, and adaptive learning platforms.

India's National Education Policy (NEP 2020) also underscores the use of emerging technologies, including AI, to improve quality, inclusivity, and student-centric learning. The Ministry of Education's AI for All campaign (2021) promotes AI literacy among students, including those from non-engineering backgrounds like agriculture. In a nationwide survey conducted by NITI Aayog and CBSE (2022), nearly 64% of students expressed willingness to engage with AI tools in their education if proper training

and infrastructure were provided. However, the study also highlighted disparities in access and a general lack of awareness among rural students and those from non-technical disciplines.

Despite the institutional push and technological readiness, the success of AI integration in agricultural education ultimately depends on the attitudinal disposition of students their acceptance, adaptability, perceived usefulness, and concerns regarding these tools. Literature indicates that technology adoption in education is significantly influenced by user attitude and digital confidence (Davis, 1989; Venkatesh and Bala, 2008) ^[1, 10]. In the Indian context, agricultural students often come from rural or semi-urban backgrounds, where digital exposure varies significantly, and their receptiveness to AI tools may be influenced by various socio-educational factors. Jaya *et al* (2021) ^[3] found that strongly agree to agree of the students opined that “social media can be used effectively for learning” and at the same time students felt that social media may be misused to spread rumours

Recent studies point to both enthusiasm and apprehension among agricultural students. For instance, Kumar and Bansal (2023) ^[6] found that while 58% of students from three agricultural universities in North India viewed AI tools as useful for understanding complex agronomic concepts, nearly 30% reported challenges in accessing or using such tools effectively. Similarly, Patil *et al.* (2022) noted that students' confidence in using AI tools increased with prior exposure to ICT-based learning environments, highlighting the role of digital readiness.

The use of AI in agricultural education is still in a nascent stage in India, and there is limited empirical evidence on how students perceive and interact with these technologies. While most studies focus on teacher preparedness or institutional infrastructure, student-centric attitudinal assessments remain underexplored. Understanding students' perspectives is essential for designing need-based AI interventions, ensuring equitable access, and minimizing resistance to digital change. Therefore, this study was undertaken with following objective.

Objective

1. To measure Attitudes of students toward AI-driven tools in agricultural education

The study mainly focus on dimensions such as perceived ease of use, perceived usefulness, digital confidence, and concerns related to technological substitution or data privacy. The findings are expected to provide actionable insights for policymakers, curriculum developers, and educational technologists in designing AI-integrated learning environments that are pedagogically effective and contextually relevant to Indian agricultural students.

Material and Methods

The present study adopted a descriptive research design through a survey method to assess the attitudes of agricultural students toward the use of AI-driven tools in education. This design was suitable as it allowed the systematic collection of standardized data to analyze students' perceptions and opinions on technological innovations in learning. The study followed a positivist

philosophy, emphasizing objectivity, quantifiable data, and empirical validation. A deductive approach was employed, deriving hypotheses from existing theories on technology adoption and testing them using field data. The research strategy involved an online survey (Google Form), enabling wide participation. The study adopted a cross-sectional time horizon, collecting data once during the 2024–25 academic year.

The research was conducted at the Vignan Institute of Agriculture and Technology (VIAT), affiliated with VFSTR University, Vadlamudi, Guntur District, Andhra Pradesh. The total population consisted of 443 B.Sc. (Hons.) Agriculture students across all four years. A proportionate stratified random sampling technique was used to ensure representation from each class and section, resulting in a final sample size of 180 students.

A teacher-made attitude scale consisting of 21 statements (both positive and negative) was used to measure students' attitudes toward AI tools in education. Responses were recorded on a five-point Likert continuum ranging from “strongly agree” to “strongly disagree.” Positive statements were scored 5 to 1, while negative ones were scored inversely. The total attitude score for each respondent was computed, and based on the mean and standard deviation, respondents were categorized as having less favourable, moderately favourable and highly favourable attitudes. The score ranged from 105 (maximum) to 21 (minimum).

Nature of the statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Positive statements	5	4	3	2	1
Negative statements	1	2	3	4	5

Data Collection and Analysis

Data for the present study were collected through a structured questionnaire designed to assess students' attitudes toward the use of AI-driven tools in agricultural education. The questionnaire consisted of two sections: the first section captured demographic and background information of the respondents, while the second section comprised 20 attitude statements (both positive and negative) developed on a five-point Likert scale ranging from *strongly agree* to *strongly disagree*. The instrument was pre-tested for reliability and validity before final administration. Data were collected personally from the respondents using the Online survey method, ensuring uniformity and accuracy of responses.

Data Analysis

After collection, the data were carefully coded, tabulated, and entered into Microsoft Excel 2021 for initial organization and cleaning. Subsequently, statistical analyses were performed using SPSS (Statistical Package for the Social Sciences) Version 26.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to describe the respondents' profile and attitude levels. Furthermore, correlation analysis was employed to determine the relationship between students' attitude scores and selected independent variables.

Result and Discussion

Table 1: Distribution of respondents according to attitude towards AI tools in agriculture education

Particulars	Frequency	Percentage
Low: ≤ 2.67	37	20.55
Medium: 2.68 – 3.33	69	38.33
High: ≥ 3.34	74	41.11
Mean = 3.07 SD = 0.25	180	100.00

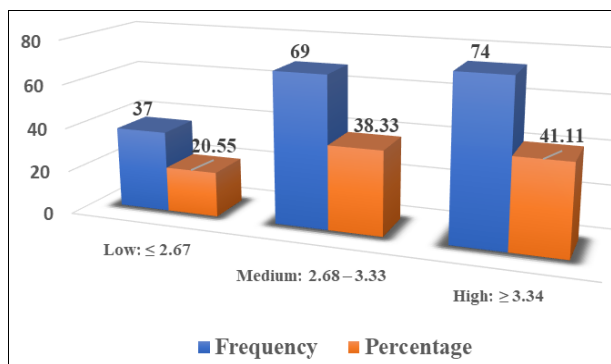


Plate 1: Distribution of respondents according to attitude towards AI tools in agriculture education

Table 1 and Plate1 presents the distribution of respondents based on their overall attitude towards the use of AI tools in agricultural education. Out of 180 students, the largest proportion (41.11%) fell into the *high attitude* category (≥ 3.34), indicating strong positivity towards AI adoption. A further 38.33% were in the *medium* range (2.68–3.33), while

only 20.55% recorded a *low attitude* (≤ 2.67). The overall mean score was 3.07, which falls within the medium attitude range, and the standard deviation was 0.25, signifying low dispersion and suggesting that respondents' attitudes are relatively consistent. The results reveal a generally favourable perception of AI tools among students, with nearly four in five respondents (79.44%) displaying medium to high attitudes. The predominance of high scores reflects a growing recognition of AI's potential to enhance learning efficiency, practical skills, and access to agricultural knowledge. The moderate mean score (3.07) suggests that while acceptance is well-established, there is scope to further strengthen positive perceptions through structured exposure, training, and hands-on integration of AI into coursework and field activities.

The relatively small proportion of respondents with low attitudes (20.55%) points to a minority who may harbour reservations, possibly due to limited digital literacy, apprehensions about reduced human interaction, or concerns regarding overreliance on technology. Addressing these issues through sensitisation programmes, peer demonstrations, and blended learning models could help shift this group towards more favourable perceptions.

The narrow standard deviation (0.25) underscores the homogeneity of attitudes across the sample, indicating a shared baseline of acceptance that can be leveraged for department-wide AI integration strategies. Overall, the findings highlight a strong foundation for expanding AI-enabled pedagogical practices in agricultural education, while emphasising the need to address the specific concerns of the minority holding less favourable views.

Table 3: Student's Attitudinal Assessment of AI-Driven Tools in Agricultural Education

S. No.	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean Score	Z values
I Perceived academics								
1.	AI tools help me understand complex agricultural topics more effectively.	37 (20.55)	83 (46.11)	26 (14.44)	2 (1.11)	32 (17.78)	3.51	0.18
2.	I rely on AI tools to enhance the quality of my academic work.	31 (17.22)	84 (46.67)	36 (20.00)	19 (10.56)	10 (5.56)	3.59	0.35
3.	AI learning platforms help me prepare for exams.	67 (37.22)	48 (26.67)	36 (20.00)	21 (11.67)	8 (4.44)	3.81	0.76
4.	I worry that AI could reduce the need for human expertise in agriculture.	95 (52.78)	42 (23.33)	19 (10.56)	14 (7.78)	10 (5.56)	1.90	-2.90
5.	AI makes it easier for me to learn about and understand laboratory experiments.	29 (16.11)	87 (48.33)	47 (26.11)	15 (8.33)	2 (1.11)	3.70	0.55
6.	I believe traditional learning methods are better than those that use AI.	26 (14.44)	76 (42.22)	52 (28.89)	22 (12.22)	4 (2.22)	2.46	-1.84
7.	AI-based mobile apps help with crop identification, disease diagnostics, and fertilizer recommendations.	41 (22.78)	65 (36.11)	37 (20.56)	21 (11.67)	16 (8.89)	3.52	0.21
8.	Learning with AI feels impersonal and mechanical to me.	51 (28.33)	64 (35.56)	35 (19.44)	16 (8.89)	14 (7.78)	2.32	-2.09
II Perceived Learning								
9.	I use AI tools to solve queries in the agriculture courses	54 (30.00)	79 (43.89)	25 (13.89)	15 (8.33)	7 (3.89)	3.88	0.90
10.	AI helps to diagnose the pest and diseases of major crops	45 (25.00)	81 (45.00)	41 (22.78)	10 (5.56)	3 (1.67)	3.86	0.86
11.	AI makes learning more enjoyable and helps me learn on my own	86 (47.78)	61 (33.89)	20 (11.11)	8 (4.44)	5 (2.78)	4.19	1.50
12.	AI reduces my reliance on traditional classroom teaching.	21 (11.67)	35 (19.44)	17 (9.44)	61 (33.89)	46 (25.56)	3.42	0.02
13.	Using AI in my coursework makes me feel anxious or overwhelmed	24 (13.33)	29 (16.11)	34 (18.89)	70 (38.89)	23 (12.78)	3.22	-0.37
14.	I find that AI tools encourage my active participation in	72	45	32	21	10	3.82	0.79

	learning.	(40.00)	(25.00)	(17.78)	(11.67)	(5.56)		
15.	I feel that AI tools lead to greater participation and interaction from me during classes	35 (19.44)	41 (22.78)	65 (36.11)	21 (11.67)	18 (10.00)	3.30	-0.21
16.	I believe AI tools can give real-time advice to the farmers during RAWEP.	68 (37.78)	59 (32.78)	32 (17.78)	13 (7.22)	8 (4.44)	3.92	0.98
III	Perceived Personality Development							
17.	AI tools have helped me become more confident in expressing my ideas in academic and professional settings	52 (28.89)	61 (33.89)	28 (15.56)	25 (13.89)	14 (7.78)	3.62	0.41
18.	Using AI tools has improved my communication and presentation skills	22 (12.22)	71 (39.44)	50 (27.78)	19 (10.56)	18 (10.00)	3.33	-0.15
19.	AI tools has enhanced my creativity in problem-solving and innovation	40 (22.22)	46 (25.56)	68 (37.78)	15 (8.33)	11 (6.11)	3.49	0.16
20.	AI tools encourage me to think critically and take responsibility for my learning	46 (22.22)	51 (28.33)	46 (25.56)	21 (11.67)	16 (8.89)	3.5	0.17
21.	AI tools helps to gain knowledge on current trends in agriculture	25 (13.89)	75 (41.67)	39 (21.67)	28 (15.56)	13 (7.22)	3.39	-0.03
22.	AI tools reduces the creativity of students due to overuse	24 (13.33)	38 (21.11)	45 (25.00)	51 (28.33)	22 (12.22)	3.05	-0.69
23.	My Mental strength is improved by using AI tools	16 (8.89)	27 (15.00)	41 (22.78)	75 (41.67)	21 (11.67)	3.32	-0.17
24.	I feel more competent and capable when I use AI tools to support my learning and field work	62 (34.44)	51 (28.33)	35 (19.44)	21 (11.67)	11 (6.11)	3.73	0.62

The results for the *Perceived Academics* dimension indicate varying attitudes towards the use of AI in agricultural education. The highest mean score was observed for *Item 3* – “AI learning platforms help me prepare for exams” (Mean = 3.81, $Z = 0.76$), reflecting a positive perception and suggesting students find AI highly useful in examination preparation. *Item 5* (Mean = 3.70, $Z = 0.55$) also falls in the positive range, indicating that AI is valued for understanding laboratory experiments. Moderate acceptance was seen in *Items 1* (Mean = 3.51, $Z = 0.18$), *2* (Mean = 3.59, $Z = 0.35$), and *7* (Mean = 3.52, $Z = 0.21$), which lie in the mild positive range, showing that students generally acknowledge AI’s role in improving academic quality, understanding concepts, and aiding in crop diagnosis.

Negative perceptions emerged strongly in *Item 4* (“I worry that AI could reduce the need for human expertise in agriculture”, Mean = 1.90, $Z = -2.90$) and *Item 8* (“Learning with AI feels impersonal and mechanical to me”, Mean = 2.32, $Z = -2.09$), reflecting strong concerns about AI replacing human knowledge and reducing personal engagement. *Item 6* (“I believe traditional learning methods are better than those that use AI”, Mean = 2.46, $Z = -1.84$) also shows a strong negative Z score, highlighting a preference for conventional approaches among some students.

The findings reveal that students recognize AI’s academic benefits, particularly in exam preparation and practical learning contexts. This aligns with global studies indicating AI’s strength in delivering structured, personalized, and accessible learning resources. However, the significant negative Z scores for *Items 4*, *6*, and *8* suggest underlying resistance, likely rooted in fears of dehumanization of learning and displacement of expert-led instruction. These concerns indicate the need for a balanced integration of AI with human mentorship, ensuring that technology complements rather than replaces traditional expertise.

The mild to moderate positive scores for most items imply that while students are open to using AI, they may not yet fully exploit its capabilities possibly due to limited training or exposure. Addressing apprehensions through awareness programs, demonstrations, and hybrid teaching models

could increase acceptance. In conclusion, AI is perceived as a supportive academic tool, but its adoption in agricultural education should be guided by strategies that preserve the human element in learning.

The *Perceived Learning* dimension demonstrates predominantly positive perceptions of AI’s role in enhancing learning in agricultural education. The highest mean score was observed for *Item 3* (“AI makes learning more enjoyable and helps me learn on my own”) with Mean = 4.19, $Z = 1.50$, indicating a very strong positive perception. Similarly, *Item 8* (“AI tools can give real-time advice to farmers during RAWEP”, Mean = 3.92, $Z = 0.98$) and *Item 1* (“AI tools to solve queries in agriculture courses”, Mean = 3.88, $Z = 0.90$) reflect strong acceptance of AI as a practical and effective tool. *Items 2* (Mean = 3.86, $Z = 0.86$) and *6* (Mean = 3.82, $Z = 0.79$) also fall into the positive perception range, highlighting AI’s utility in diagnostics and promoting active participation.

Moderate scores were recorded for *Item 4* (Mean = 3.42, $Z = 0.02$) and *Item 7* (Mean = 3.30, $Z = -0.21$), showing mild or slightly below-average perceptions regarding AI reducing reliance on traditional teaching and increasing in-class interaction. The lowest score was for *Item 5* (“AI makes me anxious or overwhelmed”) with Mean = 3.22, $Z = -0.37$, indicating a mild negative sentiment, possibly due to unfamiliarity or overreliance concerns.

The results suggest that students perceive AI as a powerful facilitator for independent and engaging learning, aligning with the findings of global educational technology studies. The very high score for self-directed learning (*Item 3*) shows AI’s potential to foster autonomy, adaptability, and motivation essential qualities for agricultural graduates in a rapidly changing sector. Positive ratings for diagnostics (*Item 2*) and query-solving (*Item 1*) indicate that AI effectively supports problem-solving and knowledge application in agriculture-specific contexts.

However, the slight hesitation in *Items 4* and *7* reflects that AI has not yet fully replaced or matched the value of traditional, human-led classroom interaction. The mild anxiety reflected in *Item 5* suggests a need for capacity building, training, and scaffolding to help students integrate

AI confidently without feeling overwhelmed. Overall, the data demonstrate that AI integration in agricultural learning enhances student engagement, practical application skills, and self-directed learning, but must be complemented with strategies to maintain interpersonal interaction and reduce apprehension. This supports a blended learning model, where AI augments rather than replaces traditional teaching.

The *Perceived Personality Development* construct reveals a generally favourable orientation towards AI’s role in enhancing students’ personal and professional competencies, though with variability across specific skills. The highest score was recorded for *Item 8* (“I feel more competent and capable when I use AI tools to support my learning and field work”) with Mean = 3.73, Z = 0.62, indicating a solid positive perception. *Item 1* (“AI tools have helped me become more confident in expressing my ideas”, Mean = 3.62, Z = 0.41) also lies in the mild positive range, highlighting AI’s contribution to confidence building. The above results are inline with Puja *et al* (2025)

Moderate positive perceptions were evident in *Items 3* (Mean = 3.49, Z = 0.16) and *4* (Mean = 3.50, Z = 0.17), suggesting AI supports creativity, problem-solving, and critical thinking. *Item 5* (“Helps to gain knowledge on current trends in agriculture”) scored slightly below the average line (Mean = 3.39, Z = -0.03), implying that while useful, AI is not perceived as the primary source for industry updates.

Negative tendencies appeared in *Items 2* (Mean = 3.33, Z = -0.15) and *7* (Mean = 3.32, Z = -0.17), reflecting relatively lower endorsement of AI’s impact on communication skills and mental strength. The strongest negative Z was for *Item 6* (“AI tools reduce creativity due to overuse”), with Mean = 3.05, Z = -0.69, highlighting apprehensions regarding

overdependence on technology. These findings indicate that students perceive AI as a meaningful enhancer of self-efficacy, particularly in competence, confidence, and applied field learning. The high Z for competence (*Item 8*) aligns with literature emphasising AI’s role in experiential and self-paced learning environments, where personalised recommendations and real-time analytics empower learners to perform tasks with higher autonomy and precision. The above is in line with Zade *et. al* (2024) ^[11].

The moderate gains in creativity, problem-solving, and critical thinking corroborate the growing evidence that AI can act as a catalyst for higher-order cognitive skills when integrated into project-based and inquiry-led pedagogies. However, the relatively low perceptions of AI’s impact on communication skills (*Item 2*) suggest that digital platforms may lack sufficient interactive or collaborative features to foster interpersonal growth an area that requires targeted instructional design interventions.

The notable concern about creativity decline due to overuse (*Item 6*) mirrors global debates about the risk of “automation complacency,” where excessive reliance on AI could lead to reduced original thought. This underlines the necessity of balanced AI adoption strategies embedding technology as a supportive tool while safeguarding the need for human-led brainstorming, debate, and reflective practice. Overall, the personality development outcomes suggest that AI in agricultural education holds promise for empowering learners’ competence and problem-solving abilities, but strategic pedagogical frameworks are essential to ensure it enhances rather than erodes creative and interpersonal skillsets. This balanced approach will be critical for preparing graduates to navigate both technologically advanced and human-centred agricultural systems.

Table 4: Distribution of attitude statements according to Z-values

Z Range	Interpretation	Sample Items
> +1.0	Very Strong Positive Perception	Item 11, 16
+0.5 to +1.0	Positive Perception	Items 3, 9, 10, 14, 24
0.0 to +0.5	Mild Positive	Items 1, 2, 5, 7, 17, 20
-0.5 to 0.0	Slightly Below Average	Items 15, 18, 21, 23
< -1.5	Strong Negative (reversed meaning)	Items 4, 6, 8

The Z-score analysis provides a clear picture of participants’ perceptions towards AI tools in agricultural education. Items with Z > +1.0, such as *Item 11* (AI makes learning more enjoyable) and *Item 16* (AI can give real-time advice to farmers), indicate a very strong positive perception, showing that learners highly value AI for enhancing engagement and providing practical, timely support.

The positive perception range (+0.5 to +1.0) includes *Items 3, 9, 10, 14, and 24*, reflecting favourable attitudes toward AI in exam preparation, query solving, pest/disease diagnosis, encouraging active participation, and improving competence. These results suggest that students see AI as a productive supplement to their learning, particularly in technical and participatory contexts.

Items in the mild positive range (0.0 to +0.5) *1, 2, 5, 7, 17, and 20* show moderate acceptance. Students acknowledge AI’s utility for understanding complex topics, improving academic quality, supporting lab learning, aiding in crop diagnosis, boosting confidence, and promoting critical

thinking. However, the moderate scores hint at scope for greater integration and training to maximise benefits.

The slightly below average range (-0.5 to 0.0) *Items 15, 18, 21, and 23* reveals ambivalence about AI’s role in interaction, communication skill development, knowledge of agricultural trends, and mental strength. These areas may require targeted interventions to address limitations or misconceptions.

Finally, strong negative perceptions (< -1.5) in *Items 4, 6, and 8* such as AI reducing the need for human expertise, the preference for traditional methods, and feelings of impersonality indicate resistance rooted in concerns about overreliance on technology and loss of human connection. These concerns highlight the importance of blending AI use with human-centric, experiential learning approaches.

Conclusion
The overall findings indicate that students in agricultural education generally hold a favourable and constructive

attitude towards the use of AI tools, with the majority falling in the medium to high attitude range and a relatively low variation in responses. Across the three dimensions Perceived Academics, Perceived Learning, and Perceived Personality Development AI was recognised for its ability to enhance examination preparation, practical skills, independent learning, critical thinking, and field-based competence.

High Z-scores in areas such as self-directed learning (Item 11), real-time advisory support (Item 16), and diagnostic/problem-solving functions reflect strong acceptance of AI's role in making learning more engaging, interactive, and applicable to real-world agricultural contexts. The positive perception of AI as a complementary academic tool highlights its potential to support blended learning models that combine technology-driven efficiency with traditional pedagogical strengths.

However, the presence of low and negative Z-scores for certain items particularly those related to the risk of reduced human expertise (Item 4), preference for traditional methods (Item 6), feelings of impersonality (Item 8), and concerns about creativity decline (Item 22) signals the need for a balanced and human-centric AI integration strategy. These apprehensions emphasise that AI adoption must be accompanied by strong human mentorship, collaborative learning opportunities, and safeguards against overreliance. In conclusion, the data supports the notion that AI tools, when thoughtfully integrated into agricultural education, can significantly enrich academic performance, learning engagement, and professional skill development. The challenge and opportunity lie in designing strategic, context-appropriate AI adoption frameworks that amplify its benefits while mitigating its limitations ensuring that graduates emerge not only technologically proficient but also adaptable, creative, and grounded in the human dimensions of agriculture.

Recommendation/Policy implication

1. Integrate Structured AI Training into the Curriculum
2. Promote Blended Learning Models Combining AI and Human Mentorship
3. Establish Institutional Policies for Responsible and Creative AI Use

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Conflict of Interest

All authors declare that they have no conflict of interest.

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