

Interplay of Instructional Approaches, Appropriate Resources, Attitudes Towards Agriculture and Fieldwork Performance in Animal and Dairy Science

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ABSTRACT

Effective agricultural education requires the bridging of theoretical knowledge with practical field competence. Grounded in Constructivist Theory, this study examined whether instructional approaches, appropriate resources, and students' attitudes toward agriculture influence fieldwork performance in Animal and Dairy Science programs. A descriptive correlational research design was used. Data were collected using a researcher-developed questionnaire validated by experts and pilot-tested, demonstrating strong reliability and internal consistency. Confirmatory Factor Analysis established construct validity and acceptable model fit. Descriptive statistics were used to summarize the study variables, while multiple regression analysis was used to test the influence of instructional approaches, appropriate resources, and students' attitudes toward agriculture on fieldwork performance. The findings showed that instructional approaches and appropriate resources were rated as generally high, along with students' attitudes toward agriculture, which were rated as generally very high. Fieldwork performance was at an average level, indicating that the students demonstrated a satisfactory level of foundational competence in performing basic practical field tasks. Multiple regression analysis revealed that the combined variables significantly influenced fieldwork performance, although they explained only a small proportion of the variance. Among these factors, only students' attitudes toward agriculture significantly influenced fieldwork performance, while instructional approaches and appropriate resources showed no significant individual effects. The findings highlight the importance of fostering positive attitudes, providing adequate resources, and implementing effective instructional approaches. This study provides practical guidance for educators and program developers to strengthen experiential learning and prepare students for real-world agricultural practice. It recommends that future research incorporate institutionalized performance rubrics to more comprehensively assess practical skills.

Keywords: Animal and dairy science, Appropriate resources, Attitudes towards agriculture, Fieldwork performance, Instructional approaches

INTRODUCTION

Practical skills are essential for preparing students to be field-ready in Animal and Dairy Science programs. Given Northern Mindanao's significant agricultural landscape and its role as the Philippines' second-largest contributor to agricultural output, effective education in this sector is vital. Without it, a skills gap may emerge, hindering economic growth and limiting graduates' ability to meet industry demands. While institutions such as TESDA have demonstrated effectiveness in enhancing technical competence, inconsistencies in students' fieldwork performance persist, as reflected in an uneven demonstration of practical competencies, including difficulties in task execution, equipment handling, and application of theoretical knowledge to real-world settings (Arihana & Iksan, 2023).

Existing studies have identified several factors that influence student performance. Instructional approaches, such as blended and experiential learning, enhance practical skills (Scott et al., 2023; Ragland & Karcher, 2022). Likewise, structured teaching, adequate resources, and student interest are critical determinants of performance (Turyamureba et al. 2024). In contrast, limited resources, ineffective instructional methods, and negative student attitudes are associated with poor performance (Baliyan et al., 2021). However, despite these findings, the current literature remains fragmented, lacking a comprehensive analysis of how these variables interact and collectively impact fieldwork performance.

Considering this evidence, this study aimed to determine the combined influence of instructional approaches, appropriate resources, and students' attitudes towards agriculture on the fieldwork performance. By addressing this gap, this study provides evidence that can inform institutional policies, curriculum development, and teacher training to enhance learning engagement and competence. Ultimately, this contributes to producing a more skilled, field-ready workforce to support the agricultural economy of Northern Mindanao.

Furthermore, the study aligns with the United Nations Sustainable Development Goals, particularly SDG 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth), by strengthening practical competencies that support regional productivity and sustainable development.

THEORETICAL AND CONCEPTUAL FRAMEWORK

This study is anchored in the Constructivist Learning Theory, which posits that knowledge is actively constructed through reflection, experience, and meaningful classroom engagement rather than passively taught (Putri et al., 2024). In this study, learning occurs primarily when students interact with authentic real-world tasks integrating new ideas with prior understanding in Animal and Dairy Science programs. However, despite constructivism's emphasis on experiential learning, students' fieldwork performance remains inconsistent, suggesting a gap between theoretical instructional delivery and actual competence development.

In this framework, fieldwork performance represents the outcome of students' constructed knowledge, skills, and attitudes demonstrated during fieldwork laboratory activities. These fieldwork experiences provide experiential learning opportunities that allow students to actively engage in agricultural practices, enhancing concepts learned in the classroom (Kassim et al., 2024). These experiences are essential for producing graduates who are highly skilled, ethically grounded and ready to meet industry demands. Through direct participation and reflection, students construct their understanding of Animal and Dairy Science processes, consistent with constructivist views that knowledge develops through continuous interaction between experience and cognition (Chitty & Hesp, 2024). This aligns with David (2022), who emphasized that the constructivist approach promotes student-centered, multisensory learning experiences rather than rote memorization, thereby enhancing practical competence and professional identity formation.

Despite these theoretical assertions, there is limited empirical evidence explaining how instructional approaches, appropriate resources, and student attitudes towards agriculture collectively influence fieldwork performance in Animal and Dairy Science programs, particularly in local agricultural education contexts such as Northern Mindanao.

This study is further shaped by three interrelated independent variables: instructional approaches, appropriate resources, and student attitudes towards agriculture, all of which function within the constructivist learning environment.

Instructional approaches encompass various pedagogical strategies that facilitate knowledge construction. These emphasize experiential, student-centered learning approaches that enable students' to apply theoretical knowledge in practical contexts through concrete experience and reflective observation (Scott et al., 2023). Moreover, instructional approaches that integrate digital media provide flexible and engaging learning experiences (Badhe et al. 2024). From a constructivist framework, this approach enables students to actively engage in multiple learning modes, such as group discussions, problem-solving, case studies, and simulations, fostering both independent and collaborative knowledge construction. Ultimately, this contributes to improved understanding and enhanced fieldwork performance.

Appropriate resources are essential for enabling experiential learning. Ye et al. (2022) emphasized that adequate resources enhance practical skills and understanding. Access to well-equipped laboratories, farm facilities, diverse animal herds, and specialized equipment provides hands-on experience that strengthens reflection and practical performance (Calsamiglia & Loviglio, 2020; Lazaro & Paglinawan, 2025). Digital resources further support learning by enabling flexible and autonomous access to databases, journals, and e-books, promoting inquiry-based learning and continuous knowledge updates (Kasymaliev et al., 2023; Gisip et al., 2024; Odili et al., 2020; Balachandran & Mahalakshmi, 2023). Additionally, mentorship from instructors and professionals enhances students' technical skills, supports academic and career decision-making, and ensures safety during fieldwork, thereby improving overall student performance (Erickson & Wattiaux, 2021; Pommerening, 2021; Wang, 2024; Mara & Morar, 2024).

Student attitudes towards agriculture refer to the dispositions, beliefs, and mindsets that influence engagement, perseverance, and fieldwork performance in Animal and Dairy Science programs (Erickson et al., 2021). Grounded in constructivism, positive attitudes create a conducive learning environment for active knowledge construction. These include motivation toward agricultural careers, self-efficacy in practical tasks, willingness to engage in hands-on activities, openness to innovation, and perseverance in challenging conditions.

Although existing research acknowledges these variables individually, they are frequently analyzed in isolation, thereby constraining the comprehension of their combined and interactive effects on fieldwork performance. Within a constructivist learning environment, instructional approaches, appropriate resources, and students' attitudes towards agriculture interact dynamically and collectively contribute to the development of the knowledge, skills, and attitudes required for industry readiness in Animal and Dairy Science programs (Ragland et al., 2023). This interaction formed the conceptual basis for this study.

Guided by this gap, the present study investigates the combined influence of these variables on students' fieldwork performance in Animal and Dairy Science programs. Specifically, it aims to assess students' perceptions of their instructors' instructional approaches, determine the extent of use of appropriate resources, evaluate students' attitudes towards agriculture, identify their fieldwork performance, and analyze the significant influence of these factors on students' fieldwork performance.

METHODOLOGY

Research Design

A descriptive correlational design was employed to examine the interplay of instructional approaches, appropriate resources, attitude towards agriculture, and fieldwork performance (Creswell, 2014). This design enabled the researchers to investigate the strength and direction of correlations without manipulating the variables. These factors potentially interact within educational settings (Creswell, 2014). Although correlations do not establish causality, this research design provides a valuable initial step in understanding these complex relationships in education.

Research Locale

The study was conducted at a Higher Education Institution in Northern Mindanao, Philippines, a region recognized for its strong agricultural production and contribution to the national economy. This setting was selected because of its relevance to Animal and Dairy Science education and emphasis on laboratory-based instruction.

Participants of the Study

This study involved 230 students enrolled in the Bachelor of Science in Agriculture major in Animal and Dairy Science in the 1st Semester of the Academic Year 2025-2026. Total enumeration was employed in the study, wherein eligible students were included to ensure a comprehensive representation of the targeted population.

Research Instrument

A researcher-developed questionnaire was used to collect data. This underwent content validation by experts, and a pilot test was administered to assess the clarity, relevance, and reliability of the instrument, consisting of four (4) sections: Instructional Approaches (10 items), Use of Appropriate Resources (9 items), Attitudes toward Agriculture (6 items), measured using the 5-point Likert scale. Confirmatory Factor Analysis (CFA) was performed to establish construct validity, which indicated an acceptable model fit. The model fit was evaluated using multiple indices, including the CMIN/DF, Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), and PClose. Reliability testing using Cronbach's alpha yielded satisfactory internal consistency coefficients for Instructional Approaches ($\alpha= 0.887$), Appropriate Resources ($\alpha= 0.854$), and Attitudes towards Agriculture ($\alpha= 0.847$), all exceeding the acceptable threshold of $\alpha \geq 0.70$, indicating good internal consistency.

Scoring Procedure

The data were analyzed and interpreted using the following rating scales: For the Instructional Approaches, Appropriate Resources and Attitude Towards Agriculture

Range	Description	Interpretation
4.51-5.00	Strongly Agree	Very High
3.51-4.50	Agree	High
2.51-3.50	Neutral	Moderate
1.51-2.50	Disagree	Low
1.00-1.50	Strongly Disagree	Very Low

For the Fieldwork Performance in Dairy and Animal Science

Range	Interpretation
1.0	Excellent
1.25-1.50	Very Good
1.75-2.00	Above Average
2.25-2.50	Average
2.75-3.00	Passing
3.25-3.50	Conditional
3.75-5.00	Failed

Data Gathering Procedure and Ethical Consideration

Data were collected using a researcher-developed-questionnaire administered face-to-face in designated classrooms after class hours. Student responses were anonymized using identification codes, and academic records were matched through a designated intermediary to ensure confidentiality and data protection in compliance with the Data Privacy Act of 2012. Moreover, ethical approval was obtained from the Institutional Research Ethics Committee, and informed consent was secured from all participants prior to data collection. Participants were assured of confidentiality and voluntary participation.

Statistical Treatment of Data

The data were analyzed using descriptive and inferential statistical methods. Descriptive statistics, including frequency, mean, percentage and standard deviation, were used to summarize the data for the four research objectives. On the other hand, multiple regression analysis was employed to test the null hypotheses at the 0.05 level of significance. Prior to regression analysis, the assumption of normality was assessed using a histogram and quantile-quantile (Q-Q) plot, which indicated that the data were approximately normally distributed. This confirmed the appropriateness of multiple regression analysis in this study.

RESULTS AND DISCUSSIONS

The following tables present the results of the study conducted to determine the Interplay of Instructional Approaches, Appropriate Resources, Attitudes towards Agriculture and Field Work Performance in Animal and Dairy Science. Table 1 presents the frequency, percentage, and mean distribution of the participants' assessment of their instructors' instructional approaches in laboratory subjects. The results show that instructional approaches were rated as high, with an overall mean of 4.13. This indicates that instructors employ an instructional approach that engages learners in hands-on and participatory learning experiences in most of their laboratory subjects. This further suggests that instructors consistently utilize learner-centered strategies focusing on active learning, demonstration, and experiential activities, which are essential in Animal and Dairy Science education. This approach includes field-based instruction such as slaughtering, meat processing, precision agriculture practices and extension activities, where students are given opportunities to apply theoretical knowledge in real or simulated agricultural settings, fostering students' independence, practical competence and meaningful engagement in laboratory-based learning.

Table 1. Frequency, Percentage and Mean Distribution of the Participants' Assessment of their Instructors' Instructional Approaches in Laboratory Subjects

Range	Description	Interpretation	Frequency	Percentage
4.51-5.00	Strongly Agree	Very High	64	27.83
3.51-4.50	Agree	High	135	58.7
2.51-3.50	Neutral	Moderate	30	13.04
1.51-2.50	Disagree	Low	1	0.435
1.00-1.50	Strongly Disagree	Very Low	0	0
		Total	230	100
		Overall Mean	4.13	
		Interpretation	High	
		SD	0.53	

Most participants rated the instructional approaches as “High” (58.7%) while (27.83%) rated it as “Very high.” A smaller portion rated them as “Moderate” (13.04%) and only (0.435%) rated it as “Low.” This indicates that students' generally perceive their instructors' as effectively using active and participatory teaching methods in laboratory settings. These findings suggest that instructors should simulate real-life agricultural situations and allow students to apply their theoretical knowledge through practical experiences. The results are consistent with Dela Peña (2025), who emphasized that innovative teaching methods create supportive learning environment that enhance students' fieldwork experiences in agriculture. Furthermore, it aligns with Kolb's Experiential Learning Theory, which posits that learning is strengthened through concrete experience, reflective observation, and active participation, thereby improving students fieldwork performance (Scott et al., 2023).

Table 2 presents the frequency, percentage, and mean distribution of the participants' use of appropriate resources in their laboratory subjects. The results show that appropriate resources were rated as high, with an overall mean of 4.09. This suggests that the use of laboratory resources is consistently integrated into students' laboratory subjects, indicating that they have regular access to agricultural tools, equipment, and facilities necessary for their laboratory-based learning. Moreover, this reflects that students are consistently supported by hands-on experiences guided by their instructors in agricultural settings. This involves understanding technical procedures and enhancing manipulative skills that connect classroom knowledge with practical field applications in Animal and Dairy Science education.

Table 2 Frequency, Percentage, and Mean Distribution of the Participants' Use of Appropriate Resources in their Laboratory Subjects

Range	Description	Interpretation	Frequency	Percentage
4.51-5.00	Strongly Agree	Very High	54	23.48
3.51-4.50	Agree	High	140	60.87

2.51-3.50	Neutral	Moderate	36	15.65
1.51-2.50	Disagree	Low	0	0
1.00-1.50	Strongly Disagree	Very Low	0	0
		Total	230	100
		Overall Mean	4.09	
		Interpretation	High	
		SD	0.54	

In addition, most of the participants rated the use of appropriate resources as “High” (60.87%), some rate it as “Very high” (23.48%), and only (15.65%) rated it as “Moderate.” This indicates that students generally perceive that laboratory resources are adequately available and effectively utilized in their fieldwork activities.

This results aligns with Rayment et al. (2023), who reported that integrating appropriate agricultural resources into laboratory subjects helps bridge the gap between theoretical concepts and practical applications. Similarly, the findings highlight the need for adequate laboratory resources to improve students practical skills and motivation, implying the necessity of equipping learning environment for effective agricultural training (Mustika & Hamidah, 2025).

Table 3 shows the frequency, percentage, and mean distribution of the participants’ attitudes towards agriculture. The results indicate that the participants demonstrated a very high attitude towards agriculture, as reflected in the overall mean of 4.71. This suggests that students have a strong interest in and engagement with a laboratory-based instruction, which enhances their appreciation of real-world applications and the importance of agriculture in the field of Animal and Dairy Science.

Table 3 Frequency, Percentage, and Mean Distribution of the Participants’ Attitude towards Agriculture

Range	Description	Interpretation	Frequency	Percentage
4.51-5.00	Strongly Agree	Very High	172	74.78
3.51-4.50	Agree	High	52	22.61
2.51-3.50	Neutral	Moderate	6	2.61
1.51-2.50	Disagree	Low	0	0.00
1.00-1.50	Strongly Disagree	Very Low	0	0.00
		Total	230	100
		Overall Mean	4.71	
		Interpretation	Very High	
		SD	0.41	

Furthermore, most of the participants (74.78%) rated their attitude as “Very High,” (22.61%) rated it as “High,” and (2.61%) rated it as “Moderate,” indicating a positive attitude towards agriculture. This distribution indicates that the participants highly valued agriculture and viewed it as a significant field of study.

Stwalley (2023) noted that students are more likely to apply knowledge to future employment when they are consistently exposed to modern agricultural technologies, which enhances their confidence and motivation in performing agricultural tasks. Similarly, Alrawashdeh et al. (2022) emphasized that engaging students in sustainable agriculture practices fosters stronger connections to the local agricultural industry, thereby enhancing students commitment and aspiration toward the sector.

Overall, the findings suggest that a very high attitude towards agriculture reflects intrinsic motivation and readiness to engage in field-based agricultural experiences. This underscores the importance of fostering positive perceptions of agriculture to encourage engagement in students fieldwork activities and support the development of future professionals in the agricultural sector.

Table 4 shows the frequency, percentage, and mean distribution of the participants' fieldwork performance in Dairy and Animal Science. The ability of students to carry out fieldwork was at the "Average" level, as indicated by the overall mean of 2.19. This suggests that students demonstrated satisfactory competence in their fieldwork performance and reached an average level of foundational competence. However, their practical skills have not yet matured to the level of advanced mastery, indicating a significant opportunity for strategic instructional enhancement to achieve higher performance. According to Arihana and Iksan (2023), continuous fieldwork is recommended to enhance both practical and soft skills, ensuring that students are better prepared for professional demands. This also suggests the need for enhanced instructional strategies and academic support for laboratory settings to help students perform at a higher level of fieldwork.

Table 4 Frequency, Percentage and Mean Distribution of the Participants' Fieldwork Performance in Dairy and Animal Science

Range	Interpretation	Frequency	Percentage
1.00	Excellent	0	0.00
1.25-1.50	Very Good	6	2.61
1.75-2.00	Above Average	71	30.87
2.25-2.50	Average	127	55.22
2.75-3.00	Passing	20	8.70
3.25-3.50	Conditional	5	2.17
3.75-5.00	Failed	1	0.43
	Total	230	100
	Overall Mean	2.19	
	Interpretation	Average	
	SD	0.37	

Among the 230 students of animal and dairy science, 127 of the students obtained an "Average" rating with grades between 2.25-2.50 indicating that students demonstrated a satisfactory level of field work performance in their laboratory subjects. Moreover, 71 students achieved a grade between 1.75-2.00, interpreted as "Above Average" indicating that students performed better in their fieldwork performance, demonstrating a stronger understanding and competence in their laboratory subjects.

Meanwhile, 20 students fell within the grades of 2.75-3.00 interpreted as "Passing" suggesting a smaller group that has minimal but acceptable fieldwork performance. Additionally, 5 students received a "Conditional" grade, suggesting that they required additional support to improve and meet the course requirements. Only 6 students obtained a grade between 1.25-1.50 interpreted as "Very Good", while no students achieved the highest rating of 1.00 as "Excellent". This suggests that very high fieldwork performance is relatively uncommon. On the other hand, only one student received a failing grade, indicating that low performers were very rare among the students of animal and dairy sciences.

Table 5 presents the results of the regression analysis in determining the influence of instructional approaches, appropriate resources, and attitude towards agriculture on students' fieldwork performance in Animal and Dairy Science. The overall regression was statistically significant, ($F(3,226)=2.89, p=.036$), indicating that the independent variables, when taken together had a significant influence on students fieldwork performance. Thus, the null hypothesis is rejected in this study.

Table 5 Regression Analysis of the Influence of Instructional Approaches, Appropriate Resources, and Attitude on their Fieldwork Performance

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.491	.302		8.249	.000

Assessment of Instructional Approaches	.027	.055	.038	.483	.630
Use of Appropriate Resources	.094	.055	.138	1.705	.089
Attitude towards Agriculture	-.170*	.065	-.186	-2.612	.010
Model Summary $R = .192$ $R^2 = .037$ Adjusted $R^2 = .024$ $F(3,226) = 2.89^*$ $p = .036$					

* significant at 0.05 level

Despite the model’s statistical significance, it explained only 3.7% of the variance ($R^2=.037$), suggesting that other factors may contribute to students’ fieldwork performance, such as students’ motivation, self-efficacy, behavioral engagement, prior hands-on experiences, and environmental conditions during fieldwork laboratory activities. These findings highlight the critical role of students’ attitudes in enhancing practical competence, while also supporting the principles of Constructivist Theory, which emphasize the importance of experience, engagement, and learner disposition in the development of meaningful learning (Sagario & Versano, 2023)

Taken in isolation from the other variables, instructional approaches in students’ laboratory subjects did not significantly influence fieldwork performance ($p = .630$). This indicates that although instructional approaches in teaching laboratory subjects are important for content delivery, they do not directly influence practical performance during fieldwork activities. In agricultural education, learning often occurs through experiential and hands-on activities, which may go beyond traditional classroom activities. According to Sagario and Versano (2023), experiential learning environment are more effective in improving students’ competencies and attitudes towards agricultural activities, emphasizing the importance of practical engagement rather than instruction alone. Thus, H_{02} cannot be rejected, indicating that instructional approaches in laboratory subjects do not significantly influence students’ fieldwork performance.

Similarly, appropriate resources did not significantly influence fieldwork performance ($p = .089$). While the availability and accessibility of these resources and facilities support agricultural learning, they do not automatically influence fieldwork performance. This reflects with Dinie and Ernawati (2023) findings that students may perceive the infrastructure or equipment for practical learning activities as not standardized, leading to some activities being performed manually due to a lack of tools. Conversely, adequate facilities were identified as motivators for students’ to engage in fieldwork, activities influencing their choice of agriculture as a field of study. Moreover, the results suggest that a practical learning environment affects students’ perception and engagement in laboratory activities. Therefore, H_{03} cannot be rejected, suggesting that the use of appropriate resources does not significantly influence fieldwork performance.

In contrast, attitude towards agriculture significantly influenced fieldwork performance ($B = -0.170$, $p = 0.010$). The negative coefficient indicates an inverse relationship between students’ attitudes towards agriculture and their fieldwork performance grades. However, this statistical direction should not be interpreted as a negative effect. Instead, it must be understood in relation to the grading system used in the study, where lower numerical values represent higher performance levels (1.0 = Excellent and 5.0 = Failed). Therefore, as students’ numerical grades in fieldwork decrease, which actually reflects improved performance. This means that the negative coefficient reflects positive academic outcome in practical terms, since better attitudes are associated with better fieldwork performance. Thus, H_{04} is rejected, indicating that students’ attitudes toward agriculture significantly influence their fieldwork performance. In practical terms, students who demonstrate stronger interest, motivation and positive disposition towards agriculture are more likely to perform better in field-based activities, showing higher competence in applying theoretical knowledge to real agricultural tasks.

This finding highlights the essential role of affective factors in laboratory-based instruction. Students who possess strong interest, positive perceptions, and intrinsic motivation are more likely to engage in agricultural tasks, demonstrating greater fieldwork performance. In line with the Constructivist Learning Theory, learning is enhanced when students are involved in knowledge construction and a positive attitude is the driving force that encourages students to construct knowledge through meaningful experiences, thus improving understanding and skill acquisition during fieldwork activities. Supporting this, Nwigwe et al. (2024) emphasized that higher levels

of attitude and autonomy support contribute to improved competency development among university students in practical learning. Similarly, Ranjan (2025) emphasized that students who exhibit favorable attitudes towards experiential learning are more motivated to apply classroom learning to real-world practices. Moreover, students with very high attitude toward agriculture were more likely to pursue agricultural careers, suggesting that positive attitudes foster sustained learning engagement and improved fieldwork performance (Troka et al. 2024).

Unlike much of the existing literature that suggests instructional approaches and learning resources directly translate to better performance, the present study provides empirical evidence that only a limited portion of variance in fieldwork performance among Animal and Dairy Science is explained by these factors.

CONCLUSION

The study established that students' fieldwork performance in Animal and Dairy Science is significantly associated with their attitude toward agriculture, underscoring the importance of motivation, interest, and personal engagement in constructing students' practical competencies. This aligns with the Constructivist Learning Theory, which emphasizes knowledge construction through students' experience, reflection, and integration of prior knowledge.

The results further revealed that students generally demonstrated an average level of fieldwork performance, indicating satisfactory foundational skills in Animal and Dairy Science but also highlighting the need for continued improvement to achieve a higher level of mastery and proficiency. While instructional approaches and learning resources contribute to laboratory-based instruction, their direct influence on fieldwork performance appears limited compared to attitudinal factors.

In light of these findings, it is recommended that instructors continue to implement experiential learning in laboratory subjects, with greater emphasis on activities that promote independent inquiry and hypothesis formulation. Such practices should provide students with opportunities to ask questions, design experiments, and reflect on their performance, thereby enhancing their ability to apply theoretical knowledge to real-life agricultural contexts. In addition, learner-centered and reflective teaching strategies should be strengthened through structured feedback, guided reflection, and active engagement in fieldwork activities to further improve students' practical competence and critical thinking skills. Furthermore, administrators of educational institutions are encouraged to strengthen the availability, adequacy, and equitable access to laboratory resources while promoting exposure to modern agricultural technologies through upgraded facilities, equitable resource distribution, and integration of digital and hands-on instructional tools. Institutions should also ensure the presence of highly competent instructors with advanced experience in agricultural practices, as this is essential in supporting effective learning and improving students' fieldwork performance.

Although, students generally hold very high attitude toward agriculture, further enhancement is needed to deepen engagement to interactive activities, structured reflection, and evaluation for competence development. Future research may also consider additional factors focusing on psychological, behavioral and environmental conditions that would influence fieldwork performance using a mixed-method approach. Overall, a balanced approach integrating attitudes, resources, and hands-on learning is essential to prepare students for real-world agricultural practice.

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