

AI Integration in Education During Practicum: Attitudes, Perceptions, Anxiety, and Digital Competence of Field Study Students

Charlie T. Anselmo  Mary Jane D. Aguilar  Mary Joy D. Bulacos  Noemi T. Abapo  Luisito Jr. Marcial  Luige Miguel C. Cariño  Mary Cris C. Magdaraog  Babylyn M. Cordova 

Isabela State University, Cauayan City, Isabela, Philippines

Philippine National Police

Shiloh Christian School, Bismarck North Dakota, USA

Forrest City School District, Arkansas, USA

Presidential School in Andijan, Andijan City, Uzbekistan

Emilio Jacinto National High School-SDO Quezon City, Philippines

DepEd Navarro Elementary School, General Trias City, Cavite, Philippines

corresponding author: charlie.t.anselmo@isu.edu.ph

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Abstract Artificial intelligence (AI) has become an important component of modern education, offering innovative opportunities to enhance teaching, learning, assessment, and instructional planning in schools. Understanding how pre-service teachers perceive and use AI during their practicum is essential for preparing them to integrate emerging technologies into future classroom practices. This study examined the demographic profiles, level of AI exposure, AI tools commonly used, attitudes toward AI, perceptions of AI, AI-related anxiety, and the relationships among attitude, perception, AI-related anxiety, and digital competence of 55 field study students. A descriptive-correlational research design was employed using a structured and validated questionnaire administered to purposively selected respondents. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize the data, whereas Pearson's product-moment correlation determined the relationships among the major variables. The findings revealed that most respondents had moderate exposure to AI tools and primarily used ChatGPT and Google Gemini during their practicum placements. The respondents demonstrated positive attitudes and perceptions toward AI integration in science education, while AI-related anxiety was generally neutral, indicating moderate concerns regarding privacy, ethics, and dependence on AI use. Correlation analysis showed significant positive relationships between attitude, perception, and digital competence, whereas AI-related anxiety was negatively associated with these variables. These findings suggest that greater digital competence and favorable perceptions contribute to stronger readiness for AI integration in science teaching. Strengthening AI literacy, ethical awareness, and practical AI training in teacher education programmes is recommended to enhance preservice teachers' confidence and competence in effectively and responsibly integrating AI into future classroom instruction.

Keywords: *Artificial Intelligence, Science Education, Field Study Students, Digital Competence, Teacher Education*

INTRODUCTION

Artificial intelligence (AI) is revolutionizing education. This is making a big difference in how we teach, learn, plan lessons, and even personalize instruction. In science education, AI has made it easier to tailor learning experiences, dive into scientific concepts in a more engaging way, and obtain feedback through AI-supported assessment tools (Mnguni, 2025). AI applications have helped create systems that boost

engagement, encourage critical thinking, and offer personalized learning paths for students. However, these advancements have also brought challenges, including ethical concerns, resource gaps, and teacher preparedness (Alzakwani et al., 2025; Mnguni, 2025). Recognizing AI's potential, organizations such as UNESCO and OECD are pushing for responsible AI integration in education, focusing on ethical frameworks, data privacy, and fair access (Alzakwani et al., 2025). There is a growing focus on equipping future teachers with AI literacy and digital skills to maximize the use of AI tools. These skills are crucial for dealing with AI's ethical dilemmas and privacy issues, and the challenges of preparing teachers, while also balancing excitement for innovation with thoughtful reflection (Cooper et al., 2025; Vera et al., 2025).

In the Philippines, the government is pushing for digital transformation in education through the Department of Education (DepEd) and the Commission on Higher Education (CHED). They are modernizing the curriculum by bringing in Information and Communication Technology (ICT), including AI tools, into the mix (Vera et al., 2025). Teachers and students are using AI applications, such as ChatGPT, Google Gemini, and Microsoft Copilot, for planning lessons, creating content, and assessments. But there's a catch—AI-specific training is still pretty limited in teacher education programs. This gap means that pre-service teachers are not fully prepared to use AI responsibly and effectively in the classroom (Labis, 2025; Vera et al., 2025). Research on AI readiness, anxiety, and competence among teacher education students in the Philippines is still scarce. This highlights the need to investigate how prepared and apprehensive pre-service teachers are about integrating AI into education (Labis, 2025). Field Study and Practice Teaching help bridge the gap between theory and practice. During their practicum, pre-service teachers get hands-on experience in classrooms with different levels of ICT resources and infrastructure (Diokno, 2025). Mentor teachers play a significant role in AI adoption by showing how to use AI and offering guidance. AI is used in lesson planning, creating instructional materials, assessments, and managing classrooms, showing its practical roles (Labis, 2025; Wulandari & Purnamaningwulan, 2024). However, pre-service teachers might face challenges such as AI anxiety, low confidence, and unclear institutional policies or guidelines. These barriers can make it difficult to integrate AI effectively, pointing to the need for support systems, digital skills training, and ethical frameworks to help teachers use AI confidently and responsibly (Diokno, 2025; Wulandari & Purnamaningwulan, 2024).

Most existing studies focus primarily on in-service teachers, leaving pre-service teachers during practicum substantially understudied, particularly regarding their interactions with AI technologies (Jiang & Meng, 2025; Wulandari & Purnamaningwulan, 2024). Prior research has tended to examine only one or two AI-related variables, such as attitude or digital competence, rather than considering the combined influence of attitude, perception, AI anxiety, digital competence, and AI use (Jiang & Meng, 2025; Labis, 2025). Consequently, limited evidence explains how these variables interact to affect AI integration during practicums. Additionally, few Philippine studies have developed predictive models identifying factors influencing AI use among Field Study students, creating a gap in localized, evidence-based understanding of state universities' AI readiness in teaching practicum (Suson, 2025; Vera et al., 2025). This study addresses these gaps by examining the relationships and predictive effects of attitude, perception, AI anxiety, digital competence, and AI use frequency among Field Study students during their practicum, filling a critical void in comprehensive, context-specific AI integration research in teacher education.

RESEARCH QUESTIONS

This study aimed to examine the integration of artificial intelligence (AI) in education during the practicum of field study student teachers. Specifically, this study sought to answer the following questions:

- What is the demographic profile of the respondents in terms of age, sex, and exposure to AI tools or applications in science education?

- What AI tools do field study students commonly use during their practicum? What is the level of respondents' attitudes toward artificial intelligence in science education?
- What is the level of respondents' perceptions of artificial intelligence in science education?
- What is the level of respondents' AI-related anxiety in science education?
- Is there a significant relationship between respondents' attitudes toward AI, perceptions of AI, AI-related anxiety, and digital competence?

METHODS

Research Design

This study employed a descriptive-correlational research design to examine the attitudes, perceptions, AI-related anxiety, and digital competence of field study students regarding the integration of AI during their practicum. The descriptive component was used to determine the respondents' demographic characteristics and the levels of the study variables, while the correlational component examined the relationships among attitude, perception, AI-related anxiety, and digital competence. This research design was considered appropriate because it enabled the researcher to investigate naturally occurring relationships among variables without manipulating the study environment, thereby providing a comprehensive understanding of AI integration among the pre-service teachers.

Participants and Sampling

The respondents of the study were 55 field study students enrolled in the College of Teacher Education of a state university during the academic year 2025–2026. These respondents were selected because they were actively engaged in practicum experiences in which AI tools could be utilized for lesson planning, instructional material preparation, classroom management, and assessment. A purposive sampling technique was employed to ensure that only students with actual field study or practice teaching experience were included in the study. Participation was voluntary, and informed consent was obtained from all respondents before data collection was conducted.

Research Instrument

Data were collected using a structured questionnaire consisting of five sections: demographic profile, attitudes toward AI, perceptions of AI, AI-related anxiety, and digital competence. The attitude items were adapted from the General Attitudes toward Artificial Intelligence Scale (GA AIS), while the perception and anxiety items were based on validated instruments from previous studies. The questionnaire was modified to suit the context of science education and the practicum experiences of the field study students. All items were measured on a five-point Likert scale. Prior to data collection, the questionnaire was reviewed by experts to establish content validity, and reliability testing yielded Cronbach's alpha coefficients greater than 0.70, indicating acceptable internal consistency of the questionnaire.

Data Collection Procedure

Prior to conducting the study, permission was obtained from the appropriate university officials and the College of Teacher Education (CTE). Ethical principles, including voluntary participation, informed consent, anonymity, and confidentiality, were strictly observed throughout the study. The questionnaire was administered to the respondents during their field study and practicum periods through both printed questionnaires and Google Forms,

depending on the respondents' accessibility and availability. Completed questionnaires were checked for completeness before encoding and statistical analysis.

Data Analysis

The collected data were encoded, cleaned, and analyzed using IBM SPSS Statistics Version 26. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to describe the respondents' demographic profile, AI exposure, AI tools used, and the levels of attitudes, perceptions, AI-related anxiety, and digital competence. To determine whether significant differences existed across demographic groups, independent samples t-test and one-way analysis of variance (ANOVA) were employed, depending on the number of comparison groups. Furthermore, Pearson's product-moment correlation was used to determine the relationships among attitude toward AI, perception of AI, AI-related anxiety, and digital competence. All statistical analyses were interpreted at a significance level of 0.05.

RESULTS AND DISCUSSION

Figure 1 Demographic Profile of respondents

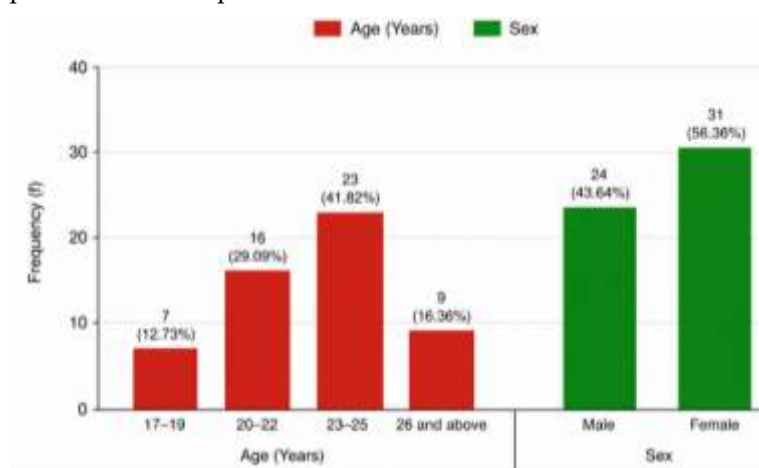


Figure 1 distribution of respondents according to Age and Sex

Figure 1 illustrates the distribution of respondents according to their age and sex. The graph shows that the majority of respondents were 19–20 years old (78.18%), followed by those aged 21–22 years (20.00%), while only 1.82% were 25 years or older. In terms of sex, female respondents (87.27%) substantially outnumbered male respondents (10.91%), with 1.82% preferring not to disclose their sex. These findings indicate that the participants were predominantly young pre-service teachers, and that the teacher education programme was largely composed of female students. This demographic profile is consistent with the composition of many teacher education institutions, where female enrollment generally exceeds that of males. The predominance of respondents within the typical undergraduate practicum age range suggests that they were at an appropriate stage of professional preparation and were actively engaged in developing the pedagogical and technological competencies required for future teaching practice (Vera et al., 2025; Cooper et al., 2025). Additionally, understanding the respondents' demographic characteristics provides essential context for interpreting their attitudes, perceptions, and readiness to integrate artificial intelligence into science education.

Figure 2. Distribution of Respondents According to Exposure to AI Tools or Applications in Science Education

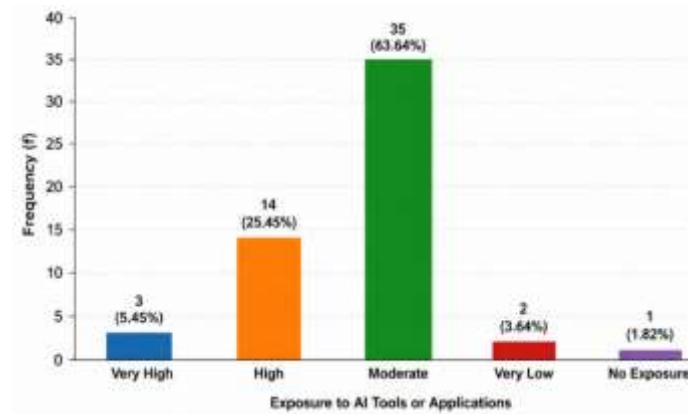
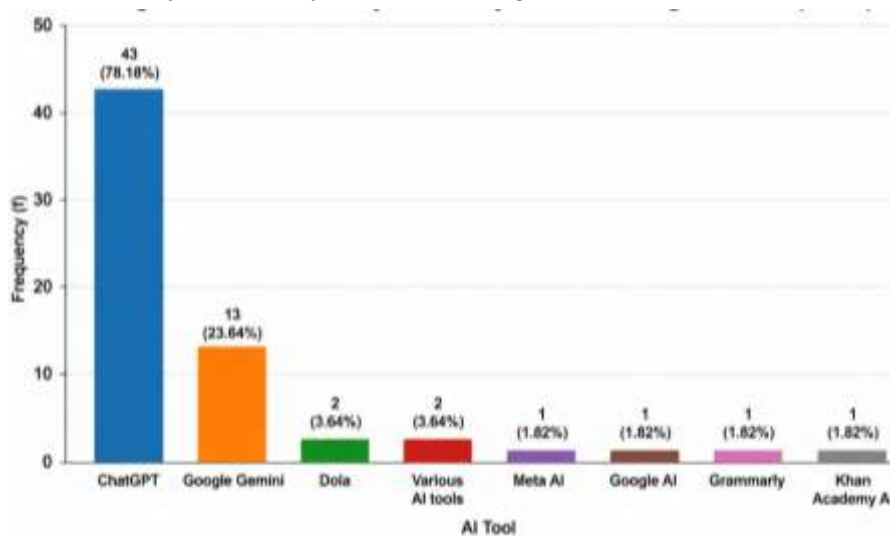


Figure 2 presents the respondents' level of exposure to AI tools or applications in science education. Most respondents reported **moderate exposure** (35 respondents, 63.64%), followed by **14 respondents** (25.45%) who indicated high exposure. Only **three respondents** (5.45%) reported very high exposure, while **two respondents** (3.64%) had very low exposure and **one respondent** (1.82%) had no exposure. The findings show that most Field Study students have already encountered AI tools, but their experience is generally limited to a moderate level. This suggests that more structured training, practical activities, and guided use of AI applications may help improve their confidence and competence in integrating AI into science teaching.

Figure 3 AI Tools Used by Field Study Students During Practicum (n = 55)



Note. The percentages exceed 100% because the respondents were allowed to indicate more than one AI tool.

Figure 3 illustrates the AI tools used by the field study students during their practicum. The graph shows that ChatGPT was the most commonly used AI tool, with 43 respondents (78.18%), followed by Google Gemini, which was used by 13 respondents (23.64%). A small number of respondents reported using Dola and various AI tools (3.64% each), while Meta AI, Google AI, Grammarly, and Khan Academy AI were each used by only 1.82% of the respondents. The findings indicate that field study students primarily rely on generative AI platforms to support lesson preparation, information gathering, and instructional activities during their practicum. The limited use of other AI applications suggests that respondents are more familiar with widely available generative AI tools than with specialized educational AI platforms. Overall, the results demonstrate that generative AI has become an important resource for pre-service teachers in carrying out academic and teaching-related tasks.

Table 1. Attitudes Toward Artificial Intelligence in Science Education (n = 55)

Indicators	Mean	SD	%	Verbal Interpretation
I believe that integrating AI into science education enhances teaching and learning outcomes.	3.58	0.94	71.64	Agree
I am open to using AI tools to conduct science experiments and simulations.	3.67	0.88	73.45	Agree
AI applications can make science learning more engaging and interactive for students.	3.62	0.87	72.36	Agree
I am confident that exploring AI-based learning platforms for science education will prove fruitful.	3.44	0.88	68.73	Agree
AI technology can assist teachers in evaluating scientific data and student output.	3.56	0.90	71.27	Agree
I am willing to attend training programs related to the use of AI in science teaching.	3.67	0.94	73.45	Agree
The use of AI tools aligns with the 21st-century learning goals in science education.	3.65	0.95	73.09	Agree
AI promotes creativity and innovation in science learning activities.	3.64	0.87	72.73	Agree
Integrating AI into science instruction prepares teachers for future teaching demands.	3.67	0.86	73.45	Agree
I have a positive attitude toward AI as a tool for improving science education.	3.64	0.85	72.73	Agree
Overall	3.61	0.89	72.29	Agree

Table 1 shows that the majority of the respondents were 19–20 years old (78.18%), followed by those aged 21–22 years (20.00%), while only 1.82% were 25 years or above. This indicates that most of the participants belonged to the typical undergraduate age group of pre-service teachers completing their field study and practicum requirements. According to Vera et al. (2025), pre-service teachers in this age range are generally more receptive to emerging educational technologies because of their familiarity with digital learning environments. Similarly, Cooper et al. (2025) noted that younger teacher-education students tend to demonstrate greater openness toward integrating artificial intelligence into teaching and learning. The findings suggest that the respondents were at an appropriate stage of professional preparation to develop AI-related knowledge and competencies for future classroom practices.

Table 2. Perceptions of Artificial Intelligence in Science Education (n = 55)

Indicators	Mean	SD	%	Verbal Interpretation
AI tools provide reliable and accurate data.	3.56	0.89	71.27	Agree
The use of AI enhances students' scientific understanding and problem-solving skills.	3.67	0.86	73.45	Agree
AI-based systems can assist in organizing and analyzing complex scientific data.	3.71	0.82	74.18	Agree
AI encourages independent and inquiry-based learning in the sciences.	3.62	0.87	72.36	Agree
I perceive AI as a reliable partner for conducting laboratory experiments in the future.	3.40	0.91	68.00	Neutral
AI integration should be included in science teachers' educational programs.	3.78	0.81	75.64	Agree
There are ethical concerns regarding the use of AI-	3.69	0.90	73.82	Agree

generated scientific content.

AI can reduce human error in scientific data analysis.	3.60	0.88	72.00	Agree
Teachers should be trained to critically evaluate AI-generated science output.	3.87	0.76	77.45	Agree
AI has great potential to transform the way science is taught and learned in schools.	3.82	0.80	76.36	Agree
Overall	3.67	0.85	73.45	Agree

Table 2 reveals that the majority of respondents were female (87.27%), while 10.91% were male and 1.82% preferred not to disclose their sex. The results indicate that female students constituted a larger proportion of the field study participants, reflecting the common enrollment pattern in many teacher education programs. Vera et al. (2025) emphasized that pre-service teachers, regardless of sex, are increasingly exposed to AI technologies during teacher preparation, while Jiang and Meng (2025) reported that positive attitudes toward AI integration are more strongly associated with digital competence and AI readiness than with demographic characteristics such as sex. These findings suggest that, although female respondents predominated in the study, opportunities to develop AI competence and integrate AI into science education should be equally accessible to all pre-service teachers.

Table 3. AI-Related Anxiety in Science Education (n = 55)

Indicators	Mean	SD	%	Verbal Interpretation
I worry that AI might replace teachers' roles in science education.	3.42	0.96	68.36	Agree
I am concerned about making mistakes when using AI tools for science-related tasks.	3.31	0.92	66.18	Neutral
I feel overwhelmed by the rapid growth of AI technology in education.	3.18	0.95	63.64	Neutral
I am afraid of relying excessively on AI for scientific information.	3.47	0.90	69.45	Agree
I am concerned about the privacy and security of data when using AI applications.	3.65	0.88	73.09	Agree
I feel nervous about using AI-based software to analyze scientific data.	3.20	0.91	64.00	Neutral
I am hesitant to use AI tools because I lack confidence in my technical abilities.	3.08	0.94	61.64	Neutral
I feel uneasy about the ethical implications of AI in science.	3.52	0.89	70.55	Agree
My anxiety about AI affects my willingness to integrate it into science education.	3.14	0.93	62.91	Neutral
Overall	3.33	0.92	66.58	Neutral

The data on AI-related anxiety in science education among the 55 participants indicated a moderate overall anxiety level, with a mean score of 3.33 (SD = 0.92), which was interpreted as neutral. Specific concerns revealed that participants tended to agree most strongly with worries about AI replacing teacher roles (mean = 3.42, 68.36% agreement), fear of over-reliance on AI for scientific information (mean = 3.47, 69.45% agreement), privacy and security issues related to AI applications (mean = 3.65, 73.09% agreement), and unease about the ethical implications of AI use in science (mean = 3.52, 70.55% agreement). Meanwhile, items addressing technical confidence, nervousness using AI-based tools, and overwhelm with rapid AI growth evoked more neutral responses, suggesting mixed or moderate apprehension rather than strong anxiety. This pattern aligns with research acknowledging that AI-

related anxiety is complex, reflecting cognitive and affective domains, including concerns about job displacement, ethical challenges, and technological competence (Falebata, 2024). Moderate anxiety levels highlight the tension between recognizing AI's potential in education and the uncertainty or discomfort it generates among users, especially regarding professional roles and ethical standards (Raza et al., 2025). Such anxiety may influence the willingness to integrate AI into teaching practices, emphasizing the importance of targeted AI literacy and ethical guidelines to mitigate fears and encourage constructive adoption (Kai et al., 2026; Verboom et al., 2025).

Table 4. Correlation Matrix of Attitude, Perception, AI-Related Anxiety, and Digital Competence

Variables	1	2	3	4
1. Attitude toward AI	1.000			
2. Perception of AI	0.721*	1.000		
3. AI-Related Anxiety	-0.418*	-0.395*	1.000	
4. Digital Competence	0.653*	0.612*	-0.367	1.000

Note. Pearson's product-moment correlation. $p < .05^{**}$, $*p < .01$.

In Table 4, we observe some interesting connections between people's feelings about AI, their perceptions of it, their anxiety related to AI, and their digital skills, based on a study of 55 participants. There was a strong positive link between attitudes toward AI and perceptions of it ($r = 0.721$, $p < .01$). This means that if someone has a more favorable attitude toward AI, they are likely to have a more positive perception of it. Digital skills were also positively correlated with attitude ($r = 0.653$, $p < .01$) and perception of AI ($r = 0.612$, $p < .01$). Therefore, people who are more digitally competent tend to have better attitudes toward and perceptions of AI technology. Conversely, anxiety about AI was negatively correlated with both attitude ($r = -0.418$, $p < .01$) and perception of AI ($r = -0.395$, $p < .01$). This suggests that the more anxious someone is about AI, the less favorable their attitude and perception are. Interestingly, while AI-related anxiety also negatively correlated with digital competence ($r = -0.367$), this was not statistically significant in this particular dataset. These findings align with broader research showing that digital literacy can help reduce anxiety about AI and encourage positive attitudes toward its use. For example, having higher digital skills can boost confidence and lead to more favorable views of AI in both educational and professional settings, whereas anxiety can be a barrier to positive engagement with AI tools (Huttayavilaiphan, 2024; Kasinidou et al., 2025; Shalu et al., 2025). Therefore, supporting the development of digital competence and reducing AI anxiety could be key to improving people's acceptance and effective use of AI technologies.

CONCLUSION

The results revealed that field study students had encountered artificial intelligence (AI) tools, with the majority experiencing a moderate degree of exposure, mainly through generative AI applications, such as ChatGPT and Google Gemini, during their practicum. The participants exhibited favorable attitudes and perceptions of AI in science education, acknowledging its potential to enhance teaching, learning, and professional development. Although some AI-related anxiety was observed, it remained neutral, indicating that concerns about privacy, ethics, and AI's role did not significantly deter respondents from using AI in educational contexts. Additionally, correlation analysis identified significant links between attitude, perception, AI-related anxiety, and digital competence, showing that positive attitudes and perceptions, along with higher digital competence, correlate with a greater readiness to incorporate AI into science education. In summary, the study concludes that field study students are generally prepared to embrace AI technologies in their future teaching careers but need ongoing institutional support and training to ensure that AI is integrated into science education effectively, ethically, and responsibly.

RECOMMENDATIONS

According to the results, teacher education programs should enhance the incorporation of AI into their curricula by offering organized training sessions, interactive workshops, and practical activities aimed at improving pre-service teachers' understanding of AI, digital skills, and ethical considerations. Faculty members should demonstrate the responsible application of AI tools in lesson planning, evaluation, and classroom teaching to boost students' confidence and practical abilities. Additionally, universities should create institutional policies for the ethical and suitable use of AI in education while encouraging a critical assessment of AI-produced content. Future research could broaden this study by involving a larger and more varied group from various teacher education programs and by exploring other elements, such as AI self-efficacy, acceptance of technology, readiness for instruction, and real classroom application, to gain deeper insights into AI integration among pre-service teachers.

LIMITATIONS OF THE STUDY

This study was limited to 800 BS Criminology students enrolled at HGBaquiran College; therefore, the findings may not be generalizable to students from other higher-education institutions or academic programs. The study relied primarily on self-reported responses to measure cultural values and attitudes toward criminology, which may have been influenced by social desirability or response bias. In addition, the use of a cross-sectional descriptive-correlational design limited the study to identifying relationships and predictive influences among variables without establishing causal relationships between them. Although several demographic and cultural background variables were included, other factors that may affect students' attitudes and academic performance, such as learning motivation, study habits, peer influence, institutional support, and psychological well-being, were not examined.

FUTURE RESEARCH DIRECTIONS

Future studies should replicate this research in other colleges and universities with larger and more diverse samples to enhance the generalizability of these findings. Researchers are encouraged to include additional variables, such as learning motivation, academic resilience, study habits, self-efficacy, institutional support, and classroom engagement, to provide a more comprehensive understanding of the factors influencing students' attitudes and academic performance. Comparative studies across different academic disciplines or regions should be conducted to determine whether cultural backgrounds influence students differently in various educational contexts. Furthermore, longitudinal and mixed-methods research designs are recommended to examine how cultural backgrounds and students' attitudes develop over time and to gain deeper insights into the experiences that shape academic success in education.

ETHICS STATEMENT

Prior to the study, permission to administer the survey was obtained from the relevant institutional authorities. Participation was voluntary, and respondents were informed of the purpose, procedures, and expected outcomes of the research before data collection. Written informed consent was obtained from all participants, who were informed of their right to decline participation or withdraw at any time without penalty. The confidentiality and anonymity of the respondents were maintained by ensuring that no personally identifiable information was disclosed or included in the analysis or reporting of results. This study adhered to the ethical principles of respect for people, beneficence, non-maleficence, and justice throughout the research process and complied with ethical standards for research involving human participants. If required by the institution, the study was conducted following the approval and guidelines of the institution's Research Ethics Committee.

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AI DISCLOSURE STATEMENT

During the preparation of this manuscript, the authors used Publish or Perish, SciSpace, and Gemini AI to assist with literature searching, grammar checking, language refinement, and improving writing clarity. These tools were not used to generate research data, perform statistical analyses, interpret findings, or develop conclusions. After using these tools, the authors carefully reviewed and edited the manuscript as needed and accepted full responsibility for the accuracy, originality, and integrity of the work.

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