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Gendered paths of AI anxiety: Exploring self-competence and efficacy in college students

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Abstract

In a world where artificial intelligence (AI) is slowly integrating itself into students' lives, one thing is certain: it is inevitable. College students are adamant and still uncertain of AI's potential. Hence, this study explores the complex relationships among AI anxiety, AI self-efficacy, and AI self-competency among college students. The study used a descriptive correlational research design employing a moderated mediation analysis with 1,006 convenience-sampled college students from a higher education institution in the Philippines. The study was also conducted during the 2nd semester of the 2024-2025 academic year. A standardized instrument was also used to determine AI anxiety, AI self-efficacy, and AI self-competence. Both descriptive statistics (means and standard deviations) and inferential statistics (Pearson's *r* and multiple linear regression) were calculated using statistical software. Findings indicate average levels across the three constructs, with significant positive correlations observed between AI anxiety, AI self-efficacy, and AI self-competency. Gender, on the other hand, emerged as a moderating factor, influencing the relationships between AI self-efficacy and self-competency. Mediation analysis further demonstrated that AI self-efficacy significantly mediates the relationship between AI anxiety and AI self-competency. These results offer important insights into how cognitive and emotional factors interact in AI-related learning, contributing to a more nuanced understanding of students' preparedness and adaptability in environments increasingly shaped by AI. The findings have implications for educational strategies that support students in technology-rich academic settings.

Keywords: AI anxiety; AI self-competence; AI-self-efficacy; Gender; Moderation and mediation analysis; Process Macro

1. Introduction

The integration of AI has become increasingly prominent in educational settings, shaping how college students engage in learning (Simiyu et al., 2026). Chen, He, et al. (2025) believed that the rapid development of AI technology, while empowering higher education, has also introduced anxiety and stress among university students. As students navigate the complexities of AI integration, factors such as AI anxiety, AI self-competence, and AI self-efficacy play pivotal roles in shaping their experiences and outcomes. Of particular interest is understanding how gender influences the relationships between these key constructs among college students. AI anxiety refers to the apprehension and concerns individuals may harbor toward AI technologies, which can influence their interactions and engagement with such tools. Kim et al. (2025) defined it as a feeling of apprehension or fear that stems from the accelerated development of AI technologies. In the paper by Kaya et al. (2024), they speculated that AI anxiety contributes to an individual's attitude toward AI. It also negatively affects students' learning motivation (Wang, Wei, et al., 2024). On the other hand, AI self-competence pertains to individuals' perceived capabilities and skills in effectively utilizing AI technologies for academic purposes. In the words of Heydarnejad (2025), self-competence indicates the belief that an individual is competent in executing a task or achieving a goal. It also encompasses the proficiency in operating devices and programs as well as the ability to communicate using technologies and digital skills (Chiu et al., 2024). At the same time, Priamono et al. (2024) highlighted that self-competence can mediate the positive influence of AI and learning among students. Additionally, AI self-efficacy encompasses individuals' beliefs in their ability to utilize AI tools to achieve desired outcomes in the academic realm. Jiang (2025) supported this idea by defining it as an individual's confidence in their ability to use AI technologies effectively. At the same time, Bewersdorff et al. (2025) defined AI self-efficacy as students' confidence in their capacity to interact with, understand, learn, and use AI technologies and applications.

As the digital transformation continues to reshape learning environments, understanding the interplay between AI anxiety, AI self-competence, and AI self-efficacy becomes increasingly crucial. Recent trends indicate a growing emphasis on AI-driven personalized learning experiences, adaptive assessment tools, and virtual assistants in educational settings. AI anxiety is complex and has substantial effects on educational practice (Wu & Li, 2025). At the same time, Erol et al. (2026) stated that AI anxiety can be a negative predictor for AI addiction, and self-efficacy can become a protective factor to reduce addiction. Additionally, Katsamba (2025) reported that AI self-efficacy mediates the relationships among AI use, digital literacy, and students' creativity. In another paper, Akcakanat and Kilicarslan (2025) explained that AI anxiety can increase students' job finding anxiety as well. However, concerns surrounding AI ethics, bias, and data privacy have also gained prominence, potentially contributing to AI anxiety among students. Moreover, with the rise of remote and hybrid learning models in response to global events, the role of AI in facilitating virtual classrooms and supporting student engagement has become paramount.

Local literature also reported some interesting findings regarding the study's variables. For instance, in the paper by Maghanoy et al. (2025), they found that high levels of AI anxiety among their participants were associated with sociotechnical blindness rather than with learning-related concepts. Dumagay (2025) and Jacinto (2025) also reported moderate AI anxiety among the participants in their studies. In terms of AI self-competence, Biri et al. (2025) reported that students were shocked, anxious, and experienced disbelief and self-doubt due to accusations of AI-assisted work. However, Ramos (2025) mentioned that digital tools may enhance self-directed learning and optimize the learning environment. As for AI self-efficacy, Aliño et al. (2024) showed that students' AI self-efficacy enhances users' trust in AI. A recent paper by Licuanan et al. (2026) also reported a high level of self-efficacy in using ChatGPT among graduate students, especially in the domain of academic writing. Sumandal (2023) also agreed that participants in his study had a high level of self-efficacy in using AI. These local literatures focused solely on measuring each variable in the study.

From the aforementioned ideas, perspectives, and trends regarding AI, here lies the gap in the research that needs to be investigated: there is no particular research that has focused on investigating the moderating effect of gender and the mediating role of AI self-efficacy in the relationship between AI anxiety and AI self-competence. This premise motivated the author to do this investigation.

Thus, this study aims to examine the dynamics of gender differences in the link between AI anxiety and AI self-competence, and the mediating role of AI self-efficacy among college students. By employing a moderated-mediation model, this research seeks to uncover the complex relationships and potential moderating effects of gender on these constructs, as well as the mediating role of AI self-efficacy. Through this investigation, a deeper understanding of how gender influences students' perceptions, attitudes, and competencies related to AI in the educational context will be developed, providing valuable insights for educators, policymakers, and stakeholders to optimize AI integration strategies and support mechanisms tailored to diverse student needs and experiences.

By investigating gender differences in the relationships between AI anxiety and AI self-competence, and the mediating role of AI self-efficacy among college students, this study not only addresses current trends but also provides insights into how gender dynamics may shape students' perceptions and interactions with AI technologies. Ultimately, this research contributes to the ongoing discourse on leveraging AI in education, while accounting for gender-specific factors to enhance learning experiences and support student success in the digital age.

2. Literature Review

2.1. AI Anxiety and AI Self-Efficacy

Research conducted by Chen, Hu, et al. (2025) sheds light on the multifaceted implications of AI anxiety, revealing that dimensions such as learning, AI configuration, job replacement, and sociotechnical blindness positively impact motivated learning and AI self-efficacy. In a related

study, Chen et al. (2024) found that AI self-efficacy can negatively influence AI anxiety, highlighting the complex interplay between these constructs. Hsu et al. (2023) further explored this relationship by highlighting a significant negative correlation between AI learning anxiety and Machine Learning Self-Efficacy. Moon (2024) extended this discussion by identifying a negative relationship between AI self-efficacy and AI anxiety. Kim and Lee (2025) found that higher AI self-efficacy protects against job stress caused by organizational perfectionism. Moreover, Montag et al. (2023) emphasized the importance of technology self-efficacy by demonstrating a negative correlation between attitudes towards AI fear and technology self-efficacy. Lastly, Wang, Ruan, et al. (2024) revealed that generative AI anxiety can predict the behavioral intention to design generative AI-assisted teaching strategies. These collective findings underscore the intricate interactions among AI anxiety, self-efficacy, and various outcomes in learning and work environments, underscoring the importance of understanding and addressing these factors for individual well-being and organizational effectiveness.

2.2. AI Anxiety and AI Self-Competence

The discourse surrounding AI anxiety and its ramifications in educational and career contexts continues to evolve. Wu and Li (2025) delve into the intricate nature of AI anxiety, emphasizing its impact on educational practices and advocating for initiatives to cultivate positive attitudes towards AI integration in learning environments. Abdellatif et al. (2024) demonstrate the efficacy of AI-driven assessments in enhancing listening skills and boosting self-competence among participants. On the other hand, Duan et al. (2025) highlight the detrimental effects of AI anxiety on career decisions, underscoring the significance of psychological factors in shaping individuals' professional trajectories. Yasar and Karagucuk (2025) further emphasize the importance of addressing AI anxiety in educational settings to enhance students' career readiness in an AI-driven era and to gain insights into how psychological factors influence career decision-making amid technological advancements. Additionally, Melo et al. (2025) shed light on the correlation among exposure to AI, learning approaches, and anxiety levels, revealing that students with limited exposure and a reliance on rote memorization tend to experience higher anxiety, while those adept at engaging critically with AI tools exhibit greater confidence. These collective insights underscore the multifaceted impact of AI anxiety on educational practices, career decisions, and student well-being, emphasizing the need for tailored strategies to navigate the evolving landscape of AI integration in learning environments and professional pathways.

2.3. AI Self-Efficacy and AI Self-Competence

The literature on AI and its impact on various aspects of education and self-competence continues to provide valuable insights. Khan et al. (2024) established a link between AI-tech trust, AI self-efficacy, and the intent to adopt AI decisions, underscoring the importance of trust in technology in shaping individuals' confidence in using AI tools. Priamono et al. (2024) reinforced the positive influence of AI and mobile learning on student learning outcomes, with self-competence playing a significant role in enhancing educational achievements. Itasanmi et al. (2025) further highlighted the predictive power of AI self-efficacy on students' AI self-competency, illustrating the importance of self-belief in mastering AI-related skills. Dewi et al. (2025) supported these findings by demonstrating that AI self-efficacy positively impacts self-competence and academic performance among students, emphasizing the role of confidence in learning outcomes. Additionally, Zhu et al. (2025) demonstrated that higher technological proficiency can boost self-esteem by enhancing self-efficacy, highlighting the empowering effects of technological competence on individuals' self-perception and capabilities. Together, these studies underscore the intertwined relationships between AI self-efficacy, self-competence, and academic performance, emphasizing the critical role of confidence and proficiency in navigating the evolving landscape of AI integration in education.

2.4. Mediating Effect of AI Self-Efficacy with AI Anxiety and AI Self-competence

Research on self-efficacy across various aspects of learning and technology integration continues to

provide valuable insights. Chen et al. (2023) found that self-efficacy acts as a moderator, mediating the processes of academic adaptability, self-esteem, and learning burnout, illustrating its role in shaping students' responses to academic challenges. Liang et al. (2023) found that self-efficacy and cognitive engagement mediate the positive relationship between generative AI interaction and learning achievement, underscoring the importance of confidence and active engagement in using AI technologies for learning. Wang et al. (2023) emphasized the mediating role of self-efficacy in Higher Education Institutions' AI capability, ultimately influencing students' learning performance. Additionally, Wang et al. (2022) highlighted how online learning self-efficacy serves as a mediator in the association between interaction and engagement among students in online learning environments. Huang et al. (2024) demonstrated that self-efficacy for receptive skills mediates the relationships among generative AI acceptance, perceived teachers' enthusiasm, and learners' well-being, underscoring the impact of self-belief on student outcomes. Shao et al. (2025) further explored the mediating role of perceived AI ethics in the relationships among self-efficacy, technological factors, and attitudes toward AI technologies, underscoring the significance of ethical considerations in shaping students' attitudes and perceptions toward AI. These studies collectively highlight the pivotal role of self-efficacy in mediating the relationships between various factors, learning outcomes, and attitudes towards technology in educational settings, providing valuable insights for enhancing learning experiences and student well-being.

2.5. Moderating Effect of Gender on AI Anxiety and AI Self-competence

Gender plays a significant moderating role across various aspects of technology adoption and use, as evidenced by recent research. Xia et al. (2023) demonstrated that gender moderated satisfaction with the needs for autonomy and competence in the context of AI. Elshaer et al. (2024) highlighted the moderating effect of gender on the relationship between performance expectancy and ChatGPT usage. Conversely, Strzelecki and ElArabawy (2024) discovered that gender did not moderate the relationships between acceptance and utilization of ChatGPT among university students. Nouraldeen (2023) found that gender moderated the relationships among technology readiness, perceived usefulness, perceived ease of use, and AI adoption among students. Zhang et al. (2023) conducted a study on the moderating effect of gender in the relationships between determinants and continuance intention to use chatbots, identifying gender differences in two instances. Lastly, Polo-Peňa et al. (2021) found that gender moderated the relationship between participants' experience in a gamification program and perceived self-efficacy. These findings collectively underscore the importance of considering gender dynamics in technology adoption and use, highlighting the nuanced ways in which gender influences individuals' perceptions, behaviors, and experiences in technology use.

Figure 1 summarizes the proposed model for the moderated mediation analysis for this investigation. It highlighted the idea that AI anxiety influences AI self-competence among college students. On the other hand, AI self-efficacy is presumed to mediate the relationship between AI Anxiety and AI self-competence. Lastly, gender is assumed to have a moderating effect on the relationship between AI anxiety and AI self-competence among college students as well. At the same time, the current study hypothesized the following:

H1: Students' AI anxiety has a significant influence on their AI self-competence.

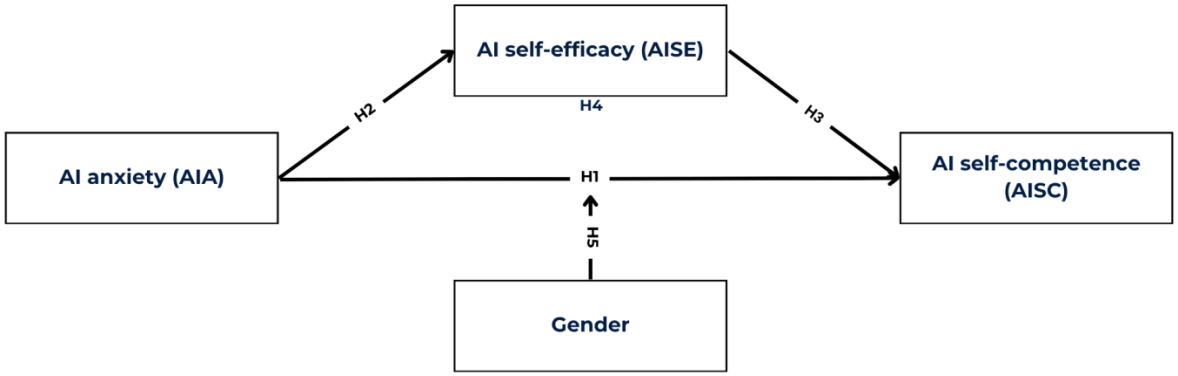
H2: Students' AI anxiety has a significant influence on their AI self-efficacy.

H3: Students' AI self-efficacy has a significant influence on their AI self-competence.

H4: Students' AI self-efficacy significantly mediates the relationship between AI anxiety and AI self-competence.

H5: Students' gender significantly moderates the relationship between AI anxiety and AI self-competence.

Figure 1
Proposed Research Model for the Moderated Mediation Analysis



3. Method

3.1. Research Design

This paper used a descriptive-correlational research design with moderated mediation analysis, with gender as the moderator and AI self-efficacy as the mediator, to examine the relationship between AI anxiety and AI self-competence among students. Specifically, it used moderated-mediation analysis to examine the indirect and conditional relationships between key variables. Lau (2017) mentioned that correlational studies aim to determine whether there are differences in the characteristics of a population of subjects, depending on whether they were exposed to an event of interest in a naturalistic setting. On the other hand, Edwards and Konold (2020) stipulated that a moderated mediation analysis is a valuable technique for assessing whether an indirect effect is conditionally attributed to the values of a moderating variable. The primary focus was to investigate the effect of AI anxiety on their perceived AI self-competence. The analysis also included AI self-efficacy as a mediating variable, capturing the mechanism through which AI anxiety impacts AI self-competence. Moreover, the study introduced gender as a moderator, hypothesizing that the strength and/or direction of the relationships in the mediation model might vary based on gender identity. The inclusion of gender aimed to determine whether male and female (or other gender-identifying) students differ in how AI anxiety affects self-efficacy and, consequently, their AI self-competence.

3.2. Participants

The chosen population was college students from a higher education institution in a highly urbanized city in Central Luzon, Philippines. 1,006 participants completed the online survey covering the period from January to February, 2024. In the study, there were 567 (56.36%) female students and 439 (45.64%) male students, aged 18 to 31 years old. The study population was chosen because the participating institution has a reputation for student competitiveness and achievement in board examinations and other relevant school activities, which confer prestige and recognition. The paper used convenience sampling to achieve the desired number of participants. To be included in the study, a participant must meet the following basic requirements: a) bona fide student of the participating school; b) enrolled in the current academic year during the conduct of the study; c) a regular student with at least 18 units of academic load for the current semester; and d) willing to participate in the online survey voluntarily.

During data collection, strict confidentiality was maintained through data privacy measures to build trust and confidence among participants. There was no imposition, threat, or any form of intimidation or harm from the participant. Informed consent was also obtained, and participants may choose not to participate or decline the online survey.

3.3. Instrument

To gather substantial data, this paper employed two instruments from two prior studies that covered the study's topic: AI anxiety, AI self-efficacy, and AI self-competence. The first one was from a past paper by Wang and Wang (2022) on the variable AI anxiety. The instrument has 21 items, with four (4) subfactors which included learning, AI configuration, job replacement, and sociotechnical blindness. The four subfactors have reliabilities ranging from .917 to .974, and the overall coefficient is .964. Sample item for learning subfactor includes "*Learning to understand all of the special functions associated with an AI technique/product makes me anxious.*" As for the job replacement, a sample item goes like this "*I am afraid that an AI technique/product may make us dependent.*" In terms of sociotechnical blindness, "*I am afraid that an AI technique/product may be misused.*" Lastly, for the AI configuration, "*I find humanoid AI techniques/products (e.g., humanoid robots) scary.*" As for the second set of instruments, the work of Carolus et al. (2023) pertained to the AI self-efficacy and AI self-competency constructs of the study. Both constructs have six items each and two (2) subfactors. For AI self-efficacy, there is a subfactor for AI problem-solving and Learning, with a corresponding sample item such as "*I can rely on my skills in difficult situations when using AI.*" For AI problem solving, and "*I can keep up with the latest innovations in AI applications*" for Learning. In terms of AI self-competence, it also got two (2) subfactors which include, AI persuasion literacy and AI emotion regulation with a corresponding sample item like "*I don't let AI influence me in my everyday decisions*" for AI persuasion literacy and "*I keep control over feelings like frustration and anxiety while doing everyday things with AI*" for AI emotion regulation. Both variables had a Cronbach's alpha coefficients ranging from .70 to .90. According to Taber (2018), a rule of thumb for the acceptability of a reliability coefficient is .70 or higher for an instrument to be considered consistent and reliable.

3.4. Data Analysis

The paper aims to investigate the existing mediation effect of AI self-efficacy in the relationship between AI anxiety and AI self-competence, with gender as a moderator. The statistical analysis included both descriptive and inferential analyses. Before undergoing statistical treatment, a test of normality using Shapiro-Wilk test was performed and found that the data was normally distributed since the result obtained for AI anxiety (p = .489), AI self-efficacy (p = .054), and AI self-competence (p = .157) were all greater than the alpha significance level of .05. For descriptive statistics, the study employed mean and standard deviation to analyze AI anxiety, AI self-efficacy, and AI self-competence. To determine the level of participants' responses, a five-point scale was adopted, and the mean score intervals were interpreted as follows: 4.21–5.00 = Very High, 3.41–4.20 = High, 2.61–3.40 = Moderate, 1.81–2.60 = Low, and 1.00–1.80 = Very Low. For the inferential analysis, Pearson's r and linear regression with Hayes' Process Macro model 5 were used, with bootstrapping. According to Igartua and Hayes (2021), Process Macro model 5 is a conditional process model that combines simple mediation with moderation of the direct path. All of the computations were aided by a statistical software, Statistical Package for the Social Sciences (SPSS) version 23.

4. Results

The succeeding table below presents the results of both the descriptive and inferential calculations of the study. Table 1 presents the mean and standard deviation distribution, including the reliability coefficients, and the result of the correlation computation. Tables 2 and 3 present the results of the moderation and mediation analyses in the study.

Table 1
Mean, Standard Deviation, Reliability, and Correlations (n = 1,006)

Variables	*Mean*	*SD*	*α*	*1*	*2*	*3*
1) AI anxiety	3.27	0.846	.968	–	.120	.242
2) AI Self-Efficacy	3.04	0.788	.918		–	.455
3) AI Self- Competence	3.53	0.840	.933			–

Table 1 displays the means, standard deviations, reliability result (Cronbach's alpha), and correlations among the variables in the study with a sample size of 1,006. The mean AI anxiety score is 3.27 (SD = 0.846, α = 0.968), AI self-efficacy has a mean of 3.04 (SD = 0.788, α = 0.918), and AI self-competency has a mean of 3.53 (SD = 0.840, α = 0.933). The correlations reveal significant relationships: AI anxiety is positively correlated with AI self-efficacy (r = 0.120, p < .01) and AI self-competency (r = 0.242, p < .01), while AI self-efficacy and AI self-competency are positively correlated (r = 0.455, p < .01). These findings provide valuable insights into the interrelationships among AI anxiety, AI self-efficacy, and AI self-competency, highlighting the importance of these constructs in the study's context.

Table 2
Mediation Analysis of AI self-efficacy (n = 1,006)

	β	*SE*	*LLCI*	*ULCI*
AIA → AISE[1]	0.1121*	.0292	0.0549	0.1693
AIA → AISC[2]	0.3814*	.0860	0.2126	0.5502
AISE → AISC[2]	0.4602*	.0300	0.4013	0.5191

Note. [1]R^2= .0145; F (1, 1004) = 14.7784, p = .001; [2]R^2=.2469; F (4, 1001) = 82.0270, p < .001; *p < .05

Table 2 presents the results of a mediation analysis conducted with a sample size of 1,006 individuals. The analysis reveals significant path coefficients (β) for the relationships between AI Anxiety [AIA] and AI Self-Efficacy 1 [AISE1] (β = 0.1121, SE = 0.0292, 95% CI [0.0549, 0.1693]), AIA and AI Self-Competence 2 [AISC2] (β = 0.3814, SE = 0.0860, 95% CI [0.2126, 0.5502]), and AISE1 and AISC2 (β = 0.4602, SE = 0.0300, 95% CI [0.4013, 0.5191). The results show that AIA has a significant indirect effect on AISC2 through AISE1. The proportion of variance explained (R^2) for the models is reported as 0.0145 for the first model and 0.2469 for the second model, with corresponding F-values and p-values indicating statistical significance. The use of bootstrapping with 5,000 samples enhances the robustness of the mediation analysis results, providing insights into the relationships between AI anxiety, self-efficacy, and self-competence in the studied population.

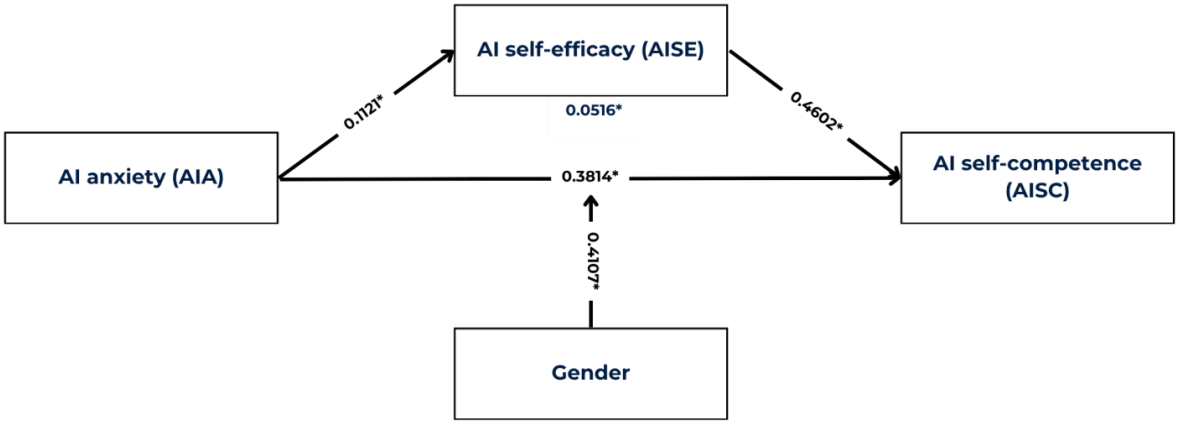
Table 3
Test of Moderated Mediation (n = 1,006)

Mediator Variable	*β*	*SE*	*LLCI*	*ULCI*
AI self-efficacy	0.0516*	.0184	0.0155	0.0880
Conditional Indirect Effect	0.4107*	.1853	0.0470	0.7743
Female	0.2504*	.0384	0.1751	0.3256
Male	0.1193*	.0397	0.0414	0.1973

Note. R^2= .0043; F(1, 1001)= 5.6918; p = .0172; *p < .05.

Table 3 presents the results of a test of moderated mediation with a sample size of 1,006 individuals. The analysis reveals a significant direct effect of AI self-efficacy (β = 0.0516, SE = 0.0184, 95% CI [0.0155, 0.0880]), indicating its impact on the outcome variable. Furthermore, the conditional indirect effects are reported for the Female group (β = 0.2504, SE = 0.0384, 95% CI [0.1751, 0.3256]) and the Male group (β = 0.1193, SE = 0.0397, 95% CI [0.0414, 0.1973]), suggesting that gender moderates the relationship between the mediator variable (AI self-efficacy) and the outcome variable. The proportion of variance explained (R^2) for the model is 0.0043, with an associated F-value and p-value indicating statistical significance. The use of bootstrapping with 5,000 samples enhances the reliability of the moderated-mediation analysis results, providing insights into how gender influences the mediation process involving AI self-efficacy and the outcome variable. Shown in Figure 2 are the final results of the moderated-mediation analysis, indicating their significant coefficients.

Figure 2
Result of the Tested Moderated-Mediation Model



Note. $*p < .05$.

5. Discussion

The main research objective of this study is to analyze the AI anxiety, AI competence, and AI self-efficacy of college students. Specifically, it aims to discover the intricate relationships among the three variables, testing the mediating effect of AI self-efficacy in the relationship between AI anxiety and participants' AI self-competence.

The current study presented valuable insights into the intricate relationships among AI anxiety, AI self-efficacy, and AI self-competency within the context of the study. For AI anxiety, the study found a moderate mean score. A similar result was reported in local studies by Peluta (2025), Cagande et al. (2026), and Aksit et al. (2025), in which the AI anxiety of their respondents was also moderate. Hence, according to a local study by Cruz-Ocampo et al. (2025), AI tools must be integrated into the curriculum with utmost caution, prioritizing ethics. The investigation provided a snapshot of the interplay between the three major constructs. The mean scores for AI anxiety, AI self-efficacy, and AI self-competency indicated an average outlook within the study population. In one particular paper, Kaya et al. (2024) offered that AI anxiety can play an important role in a person's attitude towards AI. On the other hand, Itasanmi et al. (2025) reported that their respondents had high levels of AI self-competence and low AI self-efficacy, which somewhat contradicts the current investigation. In previous research by Obateru et al. (2025), they reported a significant association among AI anxiety, readiness, and digital literacy. Local studies such as those of Sumandal (2023), Balasa (2025), and Licuanan et al. (2026) also reported high self-efficacy in AI, which contradicts the current study's findings. On the other hand, Biri et al. (2025) reported that self-doubt among students after accusations of using AI in their schoolwork can affect their academic competence. Co (2025) also noted that students have a more positive outlook toward AI integration.

Additionally, the correlation matrix reveals significant positive associations between AI anxiety and both AI self-efficacy and AI self-competency, as well as a substantial positive correlation between AI self-efficacy and AI self-competency, underscoring the interconnected nature of these constructs in the study. In a recent paper by Dewi et al. (2025), they claimed that AI self-efficacy positively influences students' self-competence. Batool et al. (2025) also found that AI anxiety negatively correlated with students' self-efficacy, which somewhat contradicts the current study's results. Local studies also showed that AI anxiety affects students learning motivation (Cagande et al., 2026) and students' perception towards AI integration in education (Devanadera, 2025). Aliño et al., (2024) also emphasized the relationship of AI self-efficacy in fostering trust in AI among students.

Moving on to inferential analysis, the results of the test of moderated mediation shed light on the role of gender in influencing the relationships among AI self-efficacy, conditional indirect effects, and gender categories. The significant direct effect of AI self-efficacy highlights the impact

of individuals' confidence in utilizing AI tools on the outcome variable. Katsamba (2025), on the other hand, employed self-competence as a mediator in the relationship between AI usage and digital literacy with students' creativity. Notably, the conditional indirect effects for both female and male participants suggest that gender moderates the mediation process involving AI self-efficacy and the outcome variable, indicating that the relationship between these factors varies across gender groups. The result also provided a deeper understanding of how gender influences the mediated pathways linking AI self-efficacy to the outcome variable among the study participants. Local studies also support the findings of the study showing variance in the AI anxiety in terms of gender (Dumagay, 2025; Jacinto, 2025).

Lastly, the results of the mediation analysis, focusing on the relationships between AI anxiety and AI self-competence, indicated an indirect effect of AI self-efficacy. The findings indicate that self-efficacy mediates half of the process linking AI anxiety and AI self-competence. The current study supports the idea of Wang et al. (2023), who argued that the mediating effect of self-efficacy on AI capability in higher education institutions influences students' learning performance. Additionally, Huang et al. (2024) demonstrated that self-efficacy mediated the relationships among generative AI acceptance, perceived teachers' enthusiasm, and learners' well-being. This finding underscores the importance of individuals' beliefs in their abilities in shaping their responses to academic challenges and well-being outcomes. As for the moderation analysis, the study also found a significant indirect effect in the relationship between AI anxiety and AI self-competence. This finding aligns with a previous study by Xia et al. (2023), which depicted gender as a moderator of satisfaction with the needs for autonomy and competence in AI. Also, the study's results concurred with Nouraldeen's (2023) paper, revealing gender as a moderating factor in the relationships among technology readiness, perceived usefulness, perceived ease of use, and AI adoption among students. The reported path coefficients and confidence intervals provide insights into the strength and direction of these relationships within the study population. Overall, the results of the moderated mediation analysis contribute to understanding the complex interplay among AI-related constructs, academic outcomes, and psychological factors, highlighting the multifaceted nature of individuals' experiences in educational settings influenced by AI anxiety and self-efficacy.

6. Conclusion

This study offers valuable insights into the intricate relationships among AI anxiety, AI self-efficacy, and AI self-competency among college students. The research sheds light on the interplay between these constructs, with mean scores indicating an average outlook within the study population. Significant positive associations were found between AI anxiety and both AI self-efficacy and AI self-competency, and a strong positive correlation between AI self-efficacy and AI self-competency, underscoring the interconnected nature of these variables. The investigation also revealed a moderating role for gender in the relationships among AI self-efficacy, conditional indirect effects, and gender categories, highlighting gender-based variations. Furthermore, the mediation analysis elucidated the impact of self-efficacy in mediating pathways involving AI anxiety and AI self-competence among students. These findings contribute to a deeper understanding of how AI anxiety, AI self-efficacy, and AI self-competence interact, emphasizing the multifaceted nature of students' experiences in educational settings influenced by AI anxiety and AI self-efficacy.

7. Limitations of the Study

Despite the insightful findings of the current investigation, several limitations warrant consideration. Firstly, reliance on convenience sampling can introduce sampling bias, limiting the generalizability of results beyond the specific subset of students included in the study. Secondly, the study's reliance on self-reported measures of AI anxiety, self-efficacy, and self-competency may be susceptible to social desirability bias, underscoring the need for supplementary objective assessments. At the same time, a cross-sectional design limits the exploration of temporal changes

in the constructs under study, underscoring the potential benefits of longitudinal investigations. Finally, while the study also hints at moderation and mediation analyses involving gender and self-efficacy, further elaboration on these statistical intricacies is necessary for a comprehensive understanding of the identified relationships. Addressing these limitations through refined sampling techniques, diverse data sources, longitudinal approaches, enriched contextual details, and in-depth statistical analyses would bolster the study's validity and relevance.

8. Implications of the Study

The findings of the current study suggest that preparedness for an AI-driven future is as much a psychological challenge as it is a technical one. Because AI self-efficacy serves as a vital mediator, the most critical implication is that educational institutions must prioritize building students' belief in their own capabilities to effectively bridge the gap between their initial AI anxiety and eventual AI self-competency. Interestingly, the positive correlation between anxiety and competency suggests that a certain level of "optimal stress" may actually motivate students to master these tools; therefore, educators should focus on reframing this anxiety as a catalyst for growth rather than a barrier to learning. Furthermore, the role of gender as a moderating factor indicates that a "one-size-fits-all" approach to technology integration may be ineffective. Instead, institutions should develop gender-responsive pedagogical strategies that address how different groups translate confidence into practical skills, ensuring that digital literacy programs are equitable and tailored to the diverse cognitive and emotional needs of the student body.

Data availability: Upon reasonable request, the corresponding author will provide the datasets created and/or analysed during the current work.

Declaration of interest: The author declares that there is no conflict of interest regarding the publication of this research. All findings and interpretations presented in this study are free from any commercial or personal bias.

Ethical declaration: This paper did not undergo Ethics Committee Review primarily because our institution does not have an Ethics Review Board yet and is currently in the process of establishing an Institutional Review Board itself in order to address the issues and concerns of Ethics Review. Nevertheless, the proponent observed all of the necessary ethical considerations during the process of data gathering and other essential procedures and protocols as well as the Data Privacy concerns of the respondents were also taken into account. The proponent also emphasize that informed consent was provided prior to the data gathering and the study's purpose, procedures, and their rights to withdraw at any time without consequences were reiterated. This is to protect the respondents to all kinds of threats and harm due to their voluntary participation in the said study.

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