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Article

AI Detection in Academic Writing: A Quantitative Study on Anxiety Predictors among Pre-Service Teachers in Higher Education

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Abstract

Applications of artificial intelligence (AI) in academic writing have introduced heightened levels of technological monitoring, particularly affecting students' emotional states within educational environments. This study employed a quantitative research design to examine factors predicting academic anxiety among a sample of 300 Chinese pre-service teachers who frequently utilise AI-assisted tools such as ChatGPT and Grammarly. The investigation explored how concerns regarding false detection, policy ambiguity, perceived academic pressure, and awareness of AI detection contribute to academic anxiety, and how these factors subsequently influence academic confidence, using Structural Equation Modelling (SEM) for analysis. The findings reveal that the most significant contributors to elevated anxiety are the fear of being incorrectly identified and the lack of clarity in institutional policies, both of which negatively affect academic confidence. Perceived academic pressure also demonstrated a positive, moderate association with anxiety, whereas awareness of AI detection showed a weaker yet notable effect. These outcomes underscore the potential psychological consequences of AI surveillance in educational settings, emphasise the importance of clarifying institutional policies, and highlight the role of digital literacy in mitigating academic stress and enhancing students' self-efficacy. The study carries important policy implications concerning the balance between technological advancement, student mental wellbeing, and academic integrity, thereby supporting the development of teacher education programmes.

Keywords

Artificial Intelligence Detection, Academic Anxiety, Pre-Service Teachers, Higher Education, Technological Surveillance in Academia.

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Introduction

Research Background

The integration of AI into academic writing has significantly reshaped the education sector by offering solutions to previously challenging tasks, supporting the development of language proficiency, and facilitating more efficient idea generation. However, this digital transformation has also prompted concerns regarding academic integrity, as many higher education institutions have implemented AI detection systems. These tools aim to differentiate between original work and AI-generated content, yet their use introduces novel forms of academic surveillance, which may affect students' well-being. For pre-service teachers—students preparing to enter the teaching profession—these dynamics are particularly pertinent, given that their academic and professional development is closely linked to evaluative and accountability structures (Hussain, 2024).

Emerging evidence suggests a relationship between the utilisation of AI tools, detection mechanisms, and student anxiety. Research among Chinese university students indicates that those who preferred working with AI-assisted writing tools exhibited higher levels of cognitive and avoidance-related writing anxiety (Yu, 2024). While AI technologies are often promoted as beneficial aids for learning, the apprehension of being flagged by detection systems can undermine students' confidence and create an environment rife with misunderstanding. Similarly, American students reported low trust in the fairness and accuracy of AI detection systems, expressing concerns about false positives and inconsistent application of academic integrity policies (Lee et al., 2024). Such perceptions may exacerbate stress, particularly when students lack a clear understanding of acceptable AI usage or feel exposed to evolving academic norms.

European studies corroborate this psychological perspective, highlighting how trait anxiety and a weak sense of academic belonging in higher education contribute to increased intentions to withdraw (Bostan-Tofan et al., 2023). The additional anxiety induced by AI detection systems may be especially significant for pre-service teachers, who face concurrent pressures related to academic performance and professional expectations. Moreover, research largely indicates that anxiety associated with AI tool usage does not enhance academic outcomes, although some studies suggest that these tools can positively influence academic self-efficacy (Zhou, 2024). Collectively, these findings underscore the critical need to identify factors predicting anxiety within this population, providing an evidence-based foundation for interventions and policy measures that support both academic achievement and mental well-being.

Research Problem

Pre-service teachers in higher education encounter distinctive academic challenges as they prepare to enter the teaching profession, navigating the demands of coursework, practicum placements, and institutional expectations. The expanding implementation of AI detection systems in academic writing introduces an additional layer of monitoring, which may exacerbate academic anxiety. Although previous research has identified a relationship between the use of AI-assisted writing tools and heightened anxiety among general student populations (Yu, 2024), there remains a notable lack of studies examining the specific impact on pre-service teachers. This gap restricts the capacity of educators to develop targeted strategies that effectively support the emotional well-being of students within teacher preparation programmes.

Research Objectives

1. To assess the extent of academic anxiety experienced by pre-service teachers in higher education in response to the implementation of AI detection systems in academic writing.
2. To investigate the primary psychological and academic factors, such as fear of false detection, unclear institutional policies, and perceived academic pressure, that contribute to anxiety among pre-service teachers.
3. To examine the association between awareness of AI detection and levels of anxiety, and to evaluate how this relationship influences the academic confidence of pre-service teachers.

Significance of Study

The present study holds practical significance in fostering positive developments in both the academic and emotional support of pre-service teachers in higher education. It offers insights into the impact of emerging technologies on aspiring teachers by identifying specific predictors of anxiety related to the use of AI-based

detection systems within educational practices. An understanding of these psychological outcomes can enable teacher education programmes to cultivate academic environments where reliance on AI tools is managed in a manner that safeguards student well-being. Previous research has indicated that excessive dependence on AI technologies and institutional surveillance can undermine students' confidence and elevate stress levels, particularly when guidance on AI usage is ambiguous or absent (Rodríguez Bermeo et al., 2025). The findings of this study may inform institutional policies and the development of training initiatives that are both effective and supportive. Furthermore, integrating components of digital literacy and AI ethics into teacher education programmes can equip future educators to model responsible and informed use of technology in their classrooms.

Literature Review

AI in Academic Writing: Trends and Tools

Recent research indicates that Chinese university students are increasingly integrating AI-powered writing tools, such as ChatGPT and Grammarly, into their academic activities. Li et al. (2023) observed active engagement with ChatGPT in Chinese language courses, where students employed it for grammar correction, structural enhancement, and content reflection, thereby fostering autonomous writing practices. Supporting these observations, Liang, Huang and Teo (2024) utilised SEM with Chinese EFL learners and found that perceived ease of use and task relevance accounted for 71% of the variance in students' intentions to use Grammarly, providing quantitative evidence for the widespread adoption of AI-assisted writing tools in China.

In response to this trend, several Chinese universities have introduced formal guidelines to regulate AI usage in academic writing. A qualitative analysis of policy documents conducted by Xiao, Chen and Bao (2023) concluded that while AI tools are encouraged for preliminary tasks, such as literature searches and coding support, their use in thesis writing is restricted. Students are required to acknowledge any AI assistance, and failure to do so may result in penalties (Xiao et al., 2023). These policies aim to preserve the authenticity of student work while permitting the supportive utilisation of AI. To implement these regulations, institutions increasingly employ AI detection software; however, reliability concerns remain. Chen, Hu and Wei (2025), using SEM with 387 Chinese undergraduates, found that "AI anxiety"—students' apprehension regarding monitoring by AI tools—was significantly linked to writing-related stress, mediated by factors such as self-efficacy. Although this study did not directly assess detection accuracy, it underscores the psychological impact of AI surveillance on students. Additionally, anecdotal and survey data from Chinese universities highlight that false positives are a major concern, with students reportedly using services to reduce the likelihood of AI detection flags in dissertations.

Psychological Impact of AI Detection in Chinese Higher Education

The incorporation of AI detection systems into academic workflows across Chinese universities has introduced an additional layer of psychological pressure for students. A quantitative study by Chen et al. (2025) examined the relationship between AI-related anxiety and writing stress among undergraduates. Employing SEM, the study demonstrated that students with low AI self-efficacy experienced markedly higher anxiety levels when subjected to AI monitoring. The presence of AI detection tools, particularly when coupled with limited confidence in students' ability to manage these technologies, was associated with decreased motivation and heightened emotional strain during academic tasks (Li et al., 2023).

Yu (2024) investigated writing anxiety among Chinese students in contexts permitting the use of AI-generated text, with attention to the emotional responses elicited under such conditions. While AI tools such as ChatGPT contributed to increased productivity and improved language quality, their regular use was simultaneously linked to elevated cognitive and somatic anxiety. Students expressed fears of detection, potential academic penalties, and the inability to meet institutional expectations. Additional evidence highlights institutional uncertainty as a factor exacerbating student anxiety. Wang and Wang (2024), applying the Theory of Planned Behaviour, examined how institutional policies influence emotional responses to AI in academic settings. Their findings indicated that ambiguous policies or perceived lack of control over AI surveillance intensified students' psychological distress. Similarly, Xiao et al. (2023) emphasised that variations in AI detection policies across Chinese institutions create confusion, contributing to students' apprehension and fear regarding AI monitoring.

Academic Anxiety among Chinese Pre-Service Teachers

Chinese pre-service teachers experience academic anxiety as a multifaceted phenomenon, encompassing emotional strain induced by demanding coursework, practicum responsibilities, and the additional pressures imposed by AI surveillance. These students are expected to perform at a high level in both theoretical and practical components of their training, with anxiety arising from the cumulative weight of these obligations. The introduction of AI detection systems adds a novel dimension of stress, heightening emotional vulnerability when students perceive their academic outputs are under constant scrutiny.

A significant source of this anxiety is unfamiliarity with AI tools and monitoring mechanisms. Chen et al. (2025) introduced the concept of "AI anxiety" among Chinese undergraduates, revealing that low AI self-efficacy was a strong predictor of writing-related stress. Although their sample comprised general undergraduates, it is reasonable to infer that similar dynamics affect pre-service teachers, who may rely on AI-assisted writing yet remain apprehensive about being erroneously flagged. Corroborating this, research among U.S. pre-service teachers found that limited digital literacy and heightened concern over false detection by plagiarism software were closely linked to increased writing anxiety and diminished self-efficacy (Maftei, Grigore, & Merlici, 2023). These studies collectively suggest that the interplay of performance-related stress and technological insecurity significantly amplifies academic distress. Further evidence from European contexts emphasises the importance of self-efficacy and perceived evaluative pressure as stable determinants of anxiety in pre-service teachers (Klassen & Chiu, 2010). Additionally, a study from Spain employing SEM demonstrated that higher levels of digital literacy mitigated the impact of academic stress on anxiety, with teacher trainees possessing greater technological competence reporting lower anxiety when engaging with digital tools (Zhang et al., 2024).

Pre-Service Teachers in Chinese Higher Education

Chinese pre-service teachers occupy a distinctive position within higher education, as they are required to integrate academic learning with practical teaching experiences across both university and school settings. This dual responsibility generates substantial pressure, particularly given the highly competitive nature of the educational sector. Qin et al. (2022) identified elevated levels of academic burnout among pre-service mathematics teachers in western China, attributing stress largely to occupational factors such as heavy workloads, perfectionistic tendencies, and stringent performance expectations encountered during teaching practicum.

The emotional well-being of Chinese pre-service teachers has garnered growing scholarly attention. Xie and Luo (2025) examined English language pre-service teachers and found a significant association between anxiety concerning teaching practicum and lower levels of professional identity development. Many participants reported feeling unprepared for the teaching profession, with their concerns linked to rigorous performance standards and ambiguity in evaluative expectations. In a similar vein, Ao, Zhang and Tian (2024) applied SEM to develop mental health indicators across a large cohort of Chinese education majors, highlighting the psychological challenges faced during teacher preparation. Comparative international research provides additional insight. Maftei et al. (2023), in a U.S.-based study, observed that pre-service teachers with limited digital literacy experienced heightened anxiety in relation to plagiarism detection technologies. These findings parallel trends in China, where AI detection tools are increasingly integrated into academic assessment. Similarly, Zhang et al. (2024) reported that in Spanish teacher education programmes, students possessing higher digital competence exhibited lower stress levels and a greater sense of control over their academic performance.

Conceptual Framework: Predictors of AI-Related Academic Anxiety in Chinese Pre-Service Teachers

This study draws on established psychological and educational frameworks to examine the predictors of academic anxiety among Chinese pre-service teachers in the context of AI detection in academic writing. Academic anxiety under conditions of technological monitoring is influenced by multiple intervening factors, including fear of false detection, digital literacy, institutional communication, and performance pressure. For instance, Rogers (2007) demonstrated that computer anxiety negatively affected technology integration among pre-service teachers in the United States, revealing that higher anxiety levels were associated with reduced likelihood of effectively incorporating digital tools into their training environments.

Within the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT), Wang et al. (2024) introduced the concept of GenAI anxiety as a measurable construct influencing behavioural intentions to utilise AI in learning contexts. Their study indicated that, alongside self-efficacy and pedagogical knowledge, concerns regarding generative AI significantly impacted pre-service teachers' intentions to incorporate AI tools into instructional design. Similarly, Uçar and Ertekin (2019) identified a negative relationship between pedagogical content knowledge in technology and teaching-related anxiety, suggesting that pre-service teachers with greater competence in educational technology tend to experience lower levels of subject-specific instructional anxiety. Moreover, Yeşilyurt (2014) highlighted that test anxiety, concerns regarding academic dishonesty, and academic locus of control are significant predictors of academic self-efficacy among teacher candidates. These constructs are particularly pertinent in AI detection contexts, where perceived surveillance may amplify anxiety and ethical uncertainty, thereby influencing pre-service teachers' confidence and performance in academic tasks.

Theoretical Studies for Understanding AI-Related Academic Anxiety in Pre-Service Teachers

To understand the development and manifestation of AI-related academic anxiety among Chinese pre-service teachers, it is essential to ground the analysis in theoretical frameworks that emphasise individuals' beliefs in their own capabilities and the emotional significance of academic outcomes. This section draws upon two primary models: Self-Efficacy Theory and Control-Value Theory. These frameworks elucidate how constructs such as digital literacy, AI detection, and academic confidence interact to influence anxiety within AI-monitored academic settings. Self-Efficacy Theory, as proposed by Bandura, posits that individuals' beliefs in their capacity to perform tasks significantly shape their emotional and behavioural responses to achievement-related situations.

Within educational contexts, higher levels of digital self-efficacy have been associated with reduced anxiety when engaging with new technologies. For example, Lemon and Garvis (2016) found that Australian pre-service teachers with stronger digital self-efficacy demonstrated greater confidence and lower stress when integrating digital technologies into instructional practice. Similarly, Jia and Tu (2024) reported that both general and AI-specific self-efficacy were positively linked to motivation and inversely related to learning-related anxiety. Control-Value Theory asserts that academic emotions, including anxiety, arise from the interaction between perceived control over tasks and the value placed on their outcomes. Supporting this, Gokoglu Uçar and Ertekin (2019) identified that uncertainty and insufficient pedagogical confidence contribute to elevated anxiety among teacher trainees. In a comparable study, Chu et al. (2023) observed that Chinese pre-service teachers who perceived limited institutional provision of digital teaching resources exhibited higher levels of stress. These findings collectively indicate that both individual self-efficacy and contextual control perceptions are critical determinants of AI-related academic anxiety.

Ethical and Policy Perspectives on AI in Chinese Academia

Chinese higher education institutions have increasingly implemented policies to regulate the use of AI within academic settings. In 2023, the Ministry of Education, in conjunction with the Cyberspace Administration, issued the "Interim Measures applicable to the Management of Generative AI Services," emphasising ethical AI usage, data privacy, and institutional accountability. At the institutional level, universities such as Fudan and Tianjin mandate disclosure of AI tool utilisation and prohibit the inclusion of AI-generated content in theses unless expressly authorised by the instructor. Despite these regulations, research suggests that policy implementation is inconsistent across institutions and often lacks clarity for students, resulting in confusion and uncertainty regarding acceptable practices (Liang et al., 2023).

Beyond regulatory frameworks, ethical considerations persist concerning authorship, originality, and student rights. Students have expressed concerns about privacy, the absence of informed consent, and inadequate procedures to appeal false positives generated by AI detection systems. While Chinese policies prioritise academic integrity, international frameworks, including the European Commission's Ethics Guidelines for Trustworthy AI, emphasise informed consent, explainability, and the right to challenge algorithmic decisions. This contrast underscores a gap between enforcement practices and ethical safeguards within Chinese higher education. Scholars caution that, without transparent procedures and institutional accountability, AI detection tools may exacerbate student anxiety rather than promote academic fairness (Jobin, Ienca, & Vayena, 2019).

Literature Gap

Despite increasing scholarly attention to the integration of AI in academic contexts, research investigating its psychological impact on pre-service teachers—particularly in China—remains limited. Existing studies predominantly focus on AI adoption, instructional applications, or general student perceptions, neglecting the potential of AI detection technologies to serve as a source of academic anxiety for those preparing for teaching careers. Key factors such as digital literacy, perceived control, fear of false detection, and clarity of institutional policies remain largely unexplored, especially through quantitative approaches like SEM. Furthermore, although theoretical frameworks such as Self-Efficacy and Control-Value Theory provide substantial explanatory potential, they are rarely applied to understand anxiety specifically associated with AI-monitored writing environments. This gap underscores the necessity for targeted empirical research to examine how pre-service teachers perceive and respond to AI surveillance in academic settings, offering insights that are both theoretically meaningful and practically relevant to the fields of education, psychology, and AI ethics.

Methodology

Research Design

This study adopted a quantitative, cross-sectional design to investigate the predictors of academic anxiety associated with AI detection among pre-service teachers in Chinese higher education. Data were obtained via a structured questionnaire administered to a purposive sample of 300 pre-service teachers. The instrument incorporated validated Likert-scale items to assess constructs such as digital literacy, AI-related anxiety, and perceptions of institutional policies. Partial least squares SEM (PLS-SEM) was conducted using Smart PLS software to analyse the data and evaluate the hypothesised models. This methodological approach was selected due to its suitability for complex models with multiple latent variables, its robustness in handling non-normal data distributions, and its utility in exploratory research aimed at prediction and theory development.

Sampling Technique

In this study, a stratified random sampling technique was employed to ensure that the sample accurately represented the diversity of academic years and specialisations within teacher education programmes. The target population comprised pre-service teachers enrolled at multiple Chinese universities. Participants were randomly selected within predefined strata, including programme level and major discipline, to enhance the generalisability of the findings. This approach ensured an equal probability of selection within each subgroup, and the randomisation process maintained balanced representation across the final sample of 300 pre-service teachers.

Survey Instrument

The study utilised a structured questionnaire designed to assess multiple latent constructs associated with AI-related academic anxiety among pre-service teachers. The survey items targeted key variables, including digital literacy, technological self-efficacy, perceived clarity of institutional policies, fear of AI detection, and levels of academic anxiety. The instrument was specifically developed to support SEM analysis, enabling the examination of complex interrelationships between variables. Items were adapted from validated measures in existing literature and subsequently evaluated by academic experts to ensure content validity. The demographic information presented in Tables 1 to 3 indicates that all 300 pre-service teacher participants had prior exposure to AI tools for academic purposes, including ChatGPT and Grammarly. In terms of teaching experience, participants were reasonably distributed across academic years, with fourth-year students comprising the largest proportion (28.7%) and third-year students the smallest (20.7%). This distribution demonstrates a balanced representation across varying levels of academic progression, thereby enhancing the generalisability of the study's findings.

Table 1: *Total Samples Taken in Survey.*

		Statistics	
		What is your current year of experience?	**Have you previously used AI tools (e.g., ChatGPT, Grammarly) for academic purposes?**
N	Valid	300	300

Table 2: *Demographic for Years of Experience of Pre-Service Teachers.*

What is your current year of experience?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	79	26.3	26.3	26.3
	2	73	24.3	24.3	50.7
	3	62	20.7	20.7	71.3
	4	86	28.7	28.7	100.0
	Total	300	100.0	100.0	

Table 3: *Demographic for AI Tools used for Academic Purposes?*

Have you previously used AI tools (e.g., ChatGPT, Grammarly) for academic purposes?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	300	100.0	100.0	100.0

Results

SEM conducted through SmartPLS was employed to investigate the relationships among the principal constructs of the study, as illustrated in Figure 1. The model comprises four independent variables—Fear of False Detection, Lack of Policy Clarity, Perceived Academic Pressure, and AI Detection Awareness—which influence the mediating variable, Academic Anxiety. Academic Anxiety subsequently impacts the dependent variable, Academic Confidence. The framework demonstrates how anxiety operates as a central psychological pathway linking institutional and emotional factors to students' academic self-assurance. Each independent variable consists of multiple observed indicators, and the model shows that heightened fear, ambiguous policies, increased academic pressure, and limited awareness contribute to elevated anxiety, which in turn diminishes academic confidence among pre-service teachers. This structural arrangement aligns with the theoretical foundations of the study.

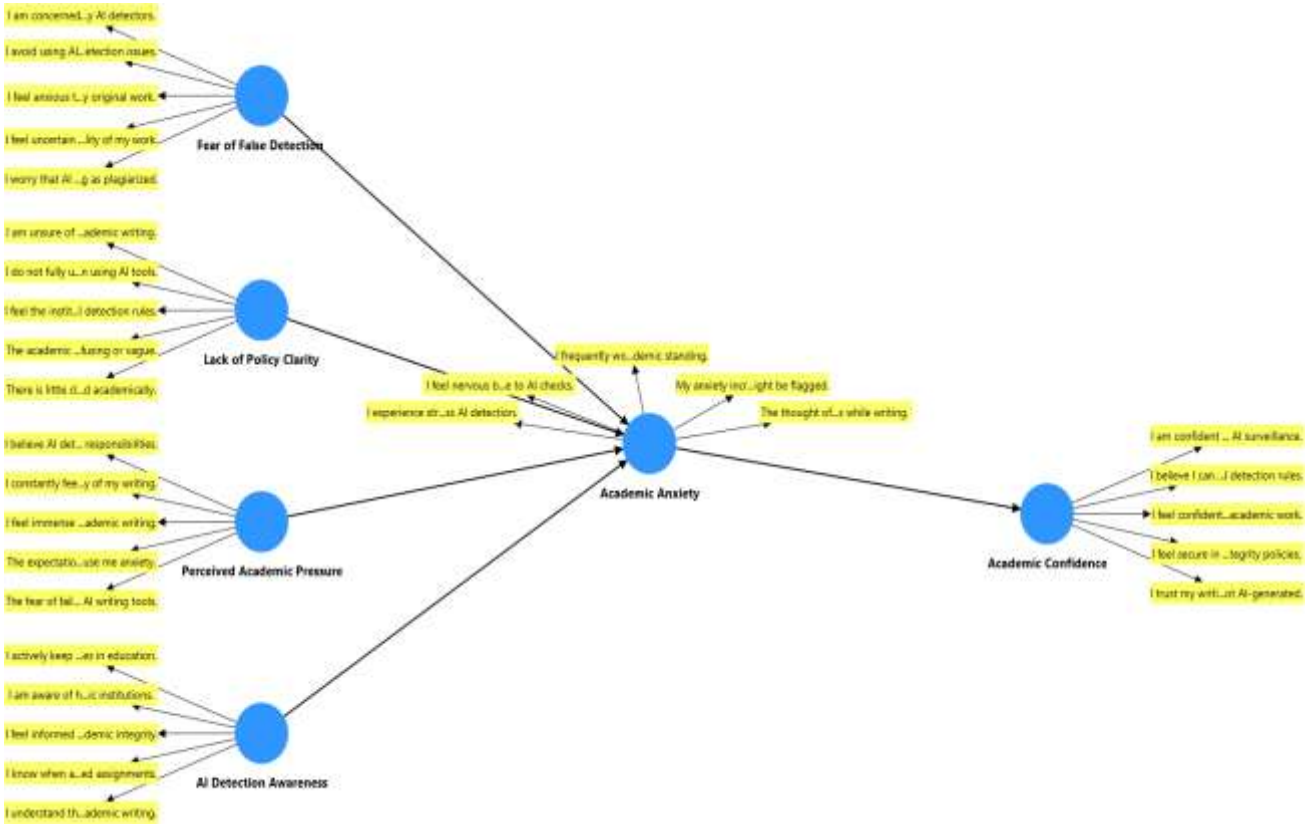

Figure 1: *Structural Equation Model.*

Reliability and Validity (2nd)

Table 4 demonstrates that all constructs satisfy the established criteria for internal consistency and convergent validity. Cronbach's alpha values range from 0.838 to 0.861, reflecting high reliability. Composite reliability measures, rho_a and rho_c, exceed 0.84 for all constructs, indicating consistent measurement of the respective latent variables. The Average Variance Extracted (AVE) values range from 0.608 to 0.643, surpassing the 0.50 benchmark and thereby confirming convergent validity. Collectively, the constructs—AI Detection Awareness, Academic Anxiety, Academic Confidence, Fear of False Detection, Lack of Policy Clarity, and Perceived Academic Pressure—are both statistically valid and reliable for inclusion in SEM analysis.

Table 4: *Construct Reliability and Validity.*

	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
AI Detection Awareness	0.845	0.845	0.890	0.617
Academic Anxiety	0.861	0.861	0.900	0.643
Academic Confidence	0.838	0.838	0.886	0.608
Fear of False Detection	0.844	0.845	0.889	0.616
Lack of Policy Clarity	0.860	0.860	0.899	0.640
Perceived Academic Pressure	0.845	0.849	0.890	0.618

Model Performance (2nd)

R-Square

The R-square values reported in Table 5 demonstrate the strong explanatory capability of the model. Academic Anxiety exhibits an R-square of 0.824, indicating that 82.4% of its variance is accounted for by the four independent variables: Fear of False Detection, Lack of Policy Clarity, Perceived Academic Pressure, and AI Detection Awareness. Likewise, Academic Confidence has an R-square of 0.757, suggesting that 75.7% of its variance is explained by Academic Anxiety. These elevated values indicate a well-fitting model and confirm that the selected predictors collectively account for a substantial proportion of the variance in both the mediating and dependent variables.

Table 5: *R-Square.*

	R-Square	R-Square Adjusted
Academic Anxiety	0.824	0.822
Academic Confidence	0.757	0.756

F-Square

The f-square values presented in Table 6 reflect the effect size of each predictor on the dependent variables. Academic Anxiety demonstrates a substantial effect on Academic Confidence ($f^2 = 3.112$). Fear of False Detection ($f^2 = 0.091$) and Lack of Policy Clarity ($f^2 = 0.079$) exert moderate effects on Academic Anxiety, whereas AI Detection Awareness ($f^2 = 0.061$) and Perceived Academic Pressure ($f^2 = 0.034$) show smaller effects. These findings indicate that all predictors meaningfully contribute to the model, with Academic Anxiety emerging as the most influential factor.

Table 6: *F-Square.*

	AI Detection Awareness	Academic Anxiety	Academic Confidence	Fear of False Detection	Lack of Policy Clarity	Perceived Academic Pressure
AI Detection Awareness		0.061				
Academic Anxiety			3.112			
Academic Confidence						
Fear of False Detection		0.091				
Lack of Policy Clarity		0.079				
Perceived Academic Pressure		0.034				

Collinearity Statistics

The Variance Inflation Factor (VIF) values presented in Table 7 range from 1.563 to 2.006, all substantially below the critical threshold of 5.0, indicating that multicollinearity is not a concern among the indicators. This implies that each item provides distinct information for its respective construct. The maximum VIF of 2.006 remains within acceptable limits. These findings confirm that the model variables are statistically distinct and stable, supporting the suitability of the data for further analysis using SEM.

Table 7: *Collinearity Statistics.*

	VIF
I actively keep up with updates on AI detection technologies in education.	1.639
I am aware of how AI detection tools function in academic institutions.	1.778
I am concerned about being falsely accused of misconduct by AI detectors.	1.653
I am confident that I can succeed academically even with AI surveillance.	1.692
I am unsure of the university's policy on AI detection in academic writing.	1.814
I avoid using AI-supported tools in writing to prevent detection issues.	1.780
I believe AI detection adds more stress to my academic responsibilities.	1.827
I believe I can meet academic standards without violating AI detection rules.	1.693
I constantly feel the need to prove the originality of my writing.	1.805
I do not fully understand what is allowed and not allowed when using AI tools.	1.946
I experience stress about whether my work will pass AI detection.	1.863
I feel anxious that AI systems could misinterpret my original work.	1.690
I feel confident in my ability to write original academic work.	1.714
I feel immense pressure to perform well in academic writing.	1.563
I feel informed about the role of AI in assessing academic integrity.	1.860
I feel nervous before submitting assignments due to AI checks.	1.933
I feel secure in my understanding of academic integrity policies.	1.646
I feel the institution has not provided enough information about AI detection rules.	1.857
I feel uncertain about how AI systems judge the originality of my work.	1.755
I frequently worry about how AI detection could impact my academic standing.	1.787
I know when and where AI detection is applied in submitted assignments.	1.784
I trust my writing will be recognized as genuine and not AI-generated.	1.905
I understand the implications of AI detection in academic writing.	1.750
I worry that AI tools may wrongly label my writing as plagiarized.	1.853
My anxiety increases when I use writing tools that might be flagged.	1.958
The academic guidelines related to AI usage are confusing or vague.	1.829
The expectations from faculty regarding AI use cause me anxiety.	1.983
The fear of failure increases my stress when using AI writing tools.	1.787
The thought of AI evaluation affects my focus while writing.	2.006
There is little clarity on how AI-generated content is evaluated academically.	1.828

Path Correlation (2nd)

Figure 2 illustrates the path correlations among the study variables as analysed through SEM. Fear of False Detection (β = 0.297) and Lack of Policy Clarity (β = 0.252) exert the strongest positive effects on Academic Anxiety. AI Detection Awareness (β = 0.231) and Perceived Academic Pressure (β = 0.183) also demonstrate positive influences, albeit to a lesser extent. Academic Anxiety has a strong negative effect on Academic Confidence (β = 0.870), indicating that elevated anxiety substantially reduces students' confidence levels. These findings underscore the pivotal role of both institutional clarity and emotional factors in shaping pre-service teachers' responses within AI-monitored academic contexts.

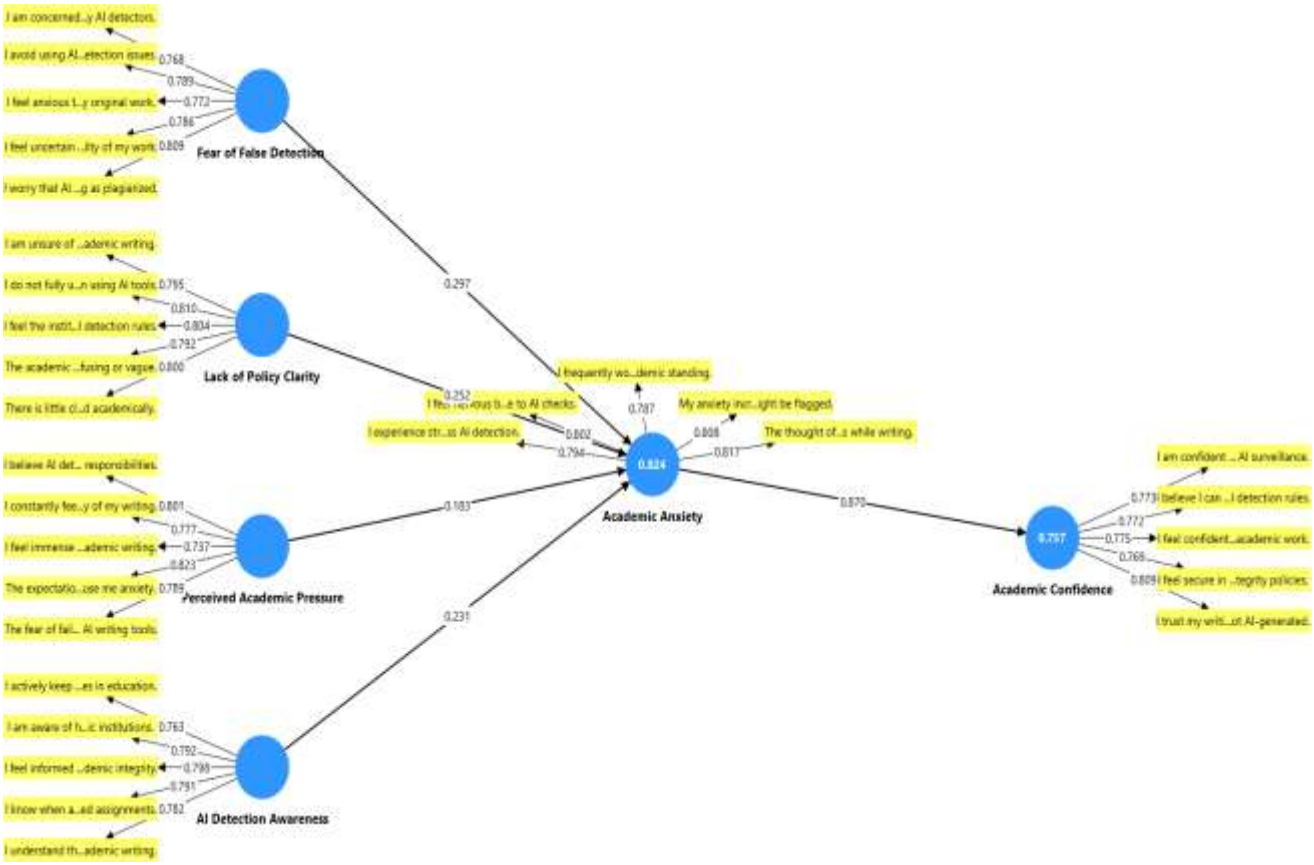

Figure 2: *Path Correlation between the Variables.*

Direct Effect of Variables

The direct effect results presented in Table 8 confirm both the magnitude and direction of the relationships among the study constructs. Academic Anxiety exhibits a strong negative direct effect on Academic Confidence (β = 0.870), indicating that increases in anxiety are associated with substantial reductions in confidence. Among the predictors of Academic Anxiety, Fear of False Detection (β = 0.297) exerts the strongest direct influence, followed by Lack of Policy Clarity (β = 0.252), AI Detection Awareness (β = 0.231), and Perceived Academic Pressure (β = 0.183). These findings demonstrate that all four predictors significantly contribute to anxiety, with fear and policy ambiguity exerting the most pronounced effects.

Table 8: *Direct Effect.*

	Path Coefficients
Academic Anxiety -> Academic Confidence	0.870
AI Detection Awareness -> Academic Anxiety	0.231
Fear of False Detection -> Academic Anxiety	0.297
Lack of Policy Clarity -> Academic Anxiety	0.252
Perceived Academic Pressure -> Academic Anxiety	0.183

Indirect Effect of Variables

Table 9 reports the indirect effects of the four predictors on Academic Confidence via the mediating role of Academic Anxiety. Fear of False Detection exerts the strongest indirect influence (β = 0.258), followed by Lack of Policy Clarity (β = 0.219), AI Detection Awareness (β = 0.201), and Perceived Academic Pressure (β = 0.159). These findings indicate that these variables affect Academic Confidence not directly, but through their impact on Academic Anxiety, which subsequently diminishes confidence. This evidence reinforces the mediating role of Academic Anxiety within the model, demonstrating how both institutional and psychological factors shape academic outcomes in AI-monitored academic settings.

Table 9: *Indirect Effect.*

	Total Indirect Effects
AI Detection Awareness -> Academic Confidence	0.201
Fear of False Detection -> Academic Confidence	0.258
Lack of Policy Clarity -> Academic Confidence	0.219
Perceived Academic Pressure -> Academic Confidence	0.159

Total Effect of Variables

The total effects presented in Table 10 illustrate the comprehensive influence of each independent variable on the dependent variable, encompassing both direct and indirect pathways. Academic Anxiety exerts the strongest total effect on Academic Confidence (β = 0.870), establishing it as the primary determinant of confidence outcomes. Fear of False Detection (β = 0.297), Lack of Policy Clarity (β = 0.252), AI Detection Awareness (β = 0.231), and Perceived Academic Pressure (β = 0.183) all significantly contribute to Academic Anxiety. These predictors also demonstrate moderate total effects on Academic Confidence, with Fear of False Detection (β = 0.258) emerging as the most impactful. These findings further substantiate the mediating role of Academic Anxiety in influencing pre-service teachers' academic confidence.

Table 10: *Total Effects.*

	Total Effects
Academic Anxiety -> Academic Confidence	0.870
AI Detection Awareness -> Academic Anxiety	0.231
AI Detection Awareness -> Academic Confidence	0.201
Fear of False Detection -> Academic Anxiety	0.297
Fear of False Detection -> Academic Confidence	0.258
Lack of Policy Clarity -> Academic Anxiety	0.252
Lack of Policy Clarity -> Academic Confidence	0.219
Perceived Academic Pressure -> Academic Anxiety	0.183
Perceived Academic Pressure -> Academic Confidence	0.159

The results indicate that Academic Anxiety substantially diminishes Academic Confidence among pre-service teachers, particularly within AI-monitored academic contexts. Fear of False Detection and Lack of Policy Clarity emerge as the most influential predictors of anxiety, while AI Detection Awareness and Perceived Academic Pressure also contribute, albeit to a lesser extent. Importantly, all four variables exert indirect effects on Academic Confidence by elevating anxiety, confirming its role as a critical mediating factor. These findings underscore the significant psychological consequences of institutional and emotional pressures associated with AI surveillance in academic writing.

Discussion

The findings of this study indicate that Fear of False Detection, Lack of Policy Clarity, AI Detection Awareness, and Perceived Academic Pressure significantly influence Academic Anxiety among pre-service teachers in Chinese higher education. Among these predictors, Fear of False Detection exhibits the highest path coefficient, highlighting it as the most powerful determinant. This underscores pre-service teachers' concerns about potential wrongful accusations stemming from the limitations of AI detection systems, a phenomenon corroborated by prior research reporting frequent false positives and unjust flagging in AI-based academic surveillance tools (Ateeq et al., 2024).

Lack of Policy Clarity emerged as the second most significant predictor. Ambiguity in institutional guidelines regarding AI use fosters uncertainty among students regarding acceptable practices, particularly in high-stakes assessment contexts. Such ambiguity contributes to heightened anxiety, consistent with studies demonstrating that unclear technological policies exacerbate academic stress (Huang & Zhang, 2022). AI Detection Awareness and Perceived Academic Pressure also exert significant but comparatively smaller effects. While awareness may encourage vigilance, it can induce hyper-consciousness, intensifying anxiety. Likewise,

well-documented academic pressures in teacher education are amplified when students perceive scrutiny not only from faculty but also through automated systems.

The structural model further demonstrates that Academic Anxiety exerts a substantial negative effect on Academic Confidence. This finding confirms the hypothesis that heightened anxiety, triggered by both institutional and psychological factors, undermines pre-service teachers' belief in their academic abilities. Academic Confidence is crucial in teacher education, where students are prepared for both academic performance and leadership roles in future classrooms. Prior research indicates that elevated anxiety correlates with reduced engagement, lower motivation, and diminished performance (Kim & Asbury, 2020). Within AI-regulated environments, these effects are intensified by perceptions of constant surveillance and mistrust, such that even academically capable students may doubt their competence under persistent algorithmic oversight.

The study's findings substantiate and extend Self-Efficacy Theory and Control-Value Theory within the context of AI detection in education. Self-Efficacy Theory posits that individuals' belief in their abilities influences both emotional and behavioural responses to task demands. In this study, low AI-related self-efficacy emerges as a contributor to heightened anxiety, whereas higher levels of digital literacy and confidence serve as protective factors. This aligns with Lemon and Garvis (2016), who observed that in digitised classroom environments, stronger digital self-efficacy is associated with lower stress. Control-Value Theory further elucidates that learners experience anxiety when they perceive tasks as valuable yet have limited control. Insufficient AI policies, high fear of false detection, and ambiguous monitoring practices leave students feeling powerless, generating emotional distress. These theoretical frameworks explain why, despite the potential empowering effects of AI tools, anxiety can persist unless accompanied by institutional transparency and targeted training. Collectively, these perspectives position AI-related Academic Anxiety not only as an individual concern but also as a systemic issue embedded within broader educational expectations.

The results correspond with prior studies in both Western and Asian contexts while introducing novel insights. For example, Maftei et al. (2023) reported in a U.S. study that pre-service teachers experienced anxiety when using plagiarism detection tools, particularly if their digital competencies were low. Similarly, Zhang et al. (2024) found in European teacher education programs that higher digital literacy mitigated the relationship between academic stress and anxiety. However, the present study uniquely emphasises the dominant role of Fear of False Detection, a relatively underexplored variable, in shaping anxiety within AI detection contexts. This complements existing Chinese research, which has focused broadly on technological anxiety but not specifically on AI detection systems (Ao et al., 2024). Additionally, the findings support Qin et al. (2022), who documented widespread academic stress and burnout among Chinese pre-service teachers, reinforcing the cultural relevance of performance-related pressures. Another distinctive contribution of this research is the mediation structure of the model. While many studies concentrate on direct effects, this study demonstrates how Academic Anxiety mediates the impact of institutional and psychological factors on Academic Confidence. This finding advances the literature by identifying anxiety as a central mechanism through which environmental stressors influence self-perception and motivation within academic contexts.

Beyond the primary findings, the research quantified Academic Anxiety among pre-service teachers, revealing that a substantial portion of variance in anxiety is attributable to both psychological and institutional factors. SEM results indicate that Fear of False Detection and Lack of Policy Clarity are the greatest contributors to anxiety development. These findings correspond with Ateeq et al. (2024), who highlighted the psychological burden of ambiguous AI surveillance practices. Although weaker, AI Detection Awareness aligns with Huang and Zhang (2022), who observed that heightened focus on monitoring tools can exacerbate stress. Moreover, the inverse relationship between Academic Anxiety and Academic Confidence corroborates prior claims that anxiety undermines engagement and self-assurance in academic performance (Kim & Asbury, 2020). In summary, the discussion emphasises the critical need to address AI-related Academic Anxiety as both an educational and psychological concern. Institutions should recognise the emotional consequences of surveillance technologies and prioritise transparency, fairness, and supportive measures to strengthen Academic Confidence among future educators.

Limitations and Future Research

This study has several limitations that warrant consideration. Firstly, the findings were derived from self-reported questionnaires, which may be subject to social desirability bias or inaccuracies in participants' self-

assessment. Secondly, the sample was restricted to Chinese pre-service teachers, limiting the representational scope and generalisability of the results to other populations. Thirdly, the cross-sectional research design precludes the establishment of causal relationships between the identified predictors and Academic Anxiety. Furthermore, although the study employed SEM to explore complex relationships among variables, qualitative insights into participants' emotional and cognitive experiences were not captured, limiting the depth of contextual understanding. Future research should address these limitations through mixed-method approaches, longitudinal designs, and broader, more diverse samples, including international participants. Comparative studies across different cultural contexts could reveal cross-cultural similarities and differences in the influence of AI detection systems on Academic Anxiety, Academic Confidence, and digital literacy. Such investigations would provide a more comprehensive understanding of the psychological and educational responses to AI surveillance in higher education, highlighting the diversity of experiences beyond the Chinese context.

Conclusion

The findings of this study indicate that AI detection systems in academic writing exert a considerable influence on the psychological well-being and Academic Confidence of Chinese pre-service teachers. The analysis identified Fear of False Detection and Lack of Policy Clarity as the most prominent predictors of Academic Anxiety, which in turn adversely affected students' confidence in their academic capabilities. The SEM results confirmed the mediating role of Academic Anxiety, demonstrating that institutional ambiguity and perceived performance pressure are substantial stressors within AI-monitored educational settings. These outcomes underscore the critical importance of establishing transparent institutional policies regarding AI use, enhancing digital literacy, and providing targeted emotional support within teacher education programmes. Addressing these factors is essential to ensure that the integration of AI technologies in academic environments does not undermine the development of competent, confident, and well-prepared future educators.

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