

Type of the Paper (Article)

The Moderating Role of Emotional Commitment and Gender Stereotypes in Inclusive Practice and Cross-Disciplinary Innovation Capacity

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Abstract

Background and Research Gap: Cultivating interdisciplinary innovation capability has become a central objective of higher education. However, the effectiveness of implementing inclusive practices varies considerably. Existing studies mainly focus on the direct effects of inclusive teaching, while the underlying psychological mechanisms and individual difference factors remain insufficiently understood.

Methods: This study employed a cross-sectional design and conducted an online survey of 856 teachers from diverse disciplinary backgrounds. Standardized scales were used to measure inclusive practices, affective commitment, gender stereotypes, and innovation capability. The PROCESS macro was applied to conduct moderation analyses to examine the moderating roles of affective commitment and gender stereotypes in the relationship between inclusive practices and innovation capability. **Implementation Procedure:** Using multiple regression analysis and a bootstrapping procedure (95% confidence intervals), this study collected complete data from 856 participants, with a missing data rate of only 3%. In addition, 12 visualization figures consistent with the Nature-style graphical presentation were generated.

Key Findings: Inclusive practices were significantly and positively correlated with innovation capability ($r = 0.39$, $p < 0.001$). Affective commitment demonstrated a significant positive moderating effect on the relationship between inclusive practices and innovation capability ($b = 0.0119$, $p = 0.0065$, 95% CI [0.0033, 0.0205]). Gender stereotypes showed a negative moderating effect ($b = -0.0283$, $p = 0.0288$, 95% CI [-0.0537, -0.0029]). A significant three-way interaction was observed ($b = -0.0202$, $p = 0.0288$), indicating that gender further moderated the joint effect of affective

Academic Editor: HaiWen Wang

Received: April 09, 2025

Revised: June 08, 2025

Accepted: June 13, 2025

Published: June 30, 2025

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commitment and gender stereotypes.

Implications: This study reveals the critical role of affective commitment as a psychological resource in enhancing the effectiveness of inclusive practices, while also highlighting the detrimental influence of gender stereotypes. The findings provide theoretical support for higher education institutions to design targeted interventions, particularly in strengthening affective commitment among female faculty and reducing gender stereotypes.

Keywords: Inclusive practices; affective commitment; gender stereotypes; innovation capability; interdisciplinary education

1. Introduction

1.1. Research Background

The cultivation of interdisciplinary innovation capability has become a core mission of higher education in the twenty-first century [1]. In the era of globalization and the knowledge economy, knowledge and skills derived from a single discipline are no longer sufficient to address complex social problems [2]. Inclusive practices, as an educational philosophy, emphasize respecting student diversity and creating supportive and equitable learning environments during the teaching process. Such practices have been shown to exert significant positive effects on students' learning outcomes and psychological well-being [3]. However, many teachers encounter challenges when implementing inclusive practices, including time pressure, limited resources, and the influence of individual psychological factors [4].

1.2. Research Questions

Although the importance of inclusive practices has been widely acknowledged, research examining the factors that influence the effectiveness of teachers' implementation of inclusive practices remains limited. In particular, the role of affective factors in this process has not been sufficiently explored [5]. Meanwhile, gender differences in the implementation of inclusive practices by teachers also require further clarification [6]. Therefore, this study seeks to address the following research questions:

1. How do inclusive practices influence students' innovation capability?
2. What role does affective commitment play in this relationship?
3. How do gender and gender stereotypes moderate these relationships?.

1.3. Current Research Status

A substantial body of research has examined inclusive education. For example, Graziano et al. (2024) found a significant positive relationship between teachers' empathy and their ability to implement inclusive education, with this relationship moderated by affective self-efficacy and gender [4]. Hall et al. (2023) reported that gender-inclusive policies and practices can predict organizational commitment, particularly among female employees [6]. In a scoping review of student engagement in higher education, Stenalt et al. (2025) demonstrated that interdisciplinary learning positively influences student engagement [2].

However, several limitations remain in the existing literature. First, most studies focus on the direct effects of inclusive practices, while the psychological mechanisms underlying these effects remain insufficiently understood [7]. Second, the role of affective factors—particularly affective commitment—in enhancing the effectiveness of inclusive practices has not been adequately examined [5]. Third, gender stereotypes, as an important socio-psychological factor, require further investigation regarding their influence on the implementation of inclusive practices [8].

1.4. Research Gap and Objectives

To address these gaps, the present study integrates perspectives from educational psychology, social psychology, and organizational behavior to examine the moderating roles of affective commitment and gender stereotypes in the relationship between inclusive practices and innovation capability. Specifically, the objectives of this study are:

1. To examine the direct effect of inclusive practices on innovation capability;
2. To investigate the moderating role of affective commitment, particularly across different gender groups;
3. To analyze how gender stereotypes influence the effectiveness of inclusive practices; and
4. To explore the role of gender in the joint moderating effects of affective commitment and gender stereotypes.

The remainder of this paper first reviews relevant theories and empirical studies, followed by a description of the research methodology and data analysis procedures. Subsequently, the research findings are presented, and the theoretical and practical implications of the results are discussed

2. Related Work

2.1. Theoretical Foundations of Inclusive Practices and Innovation Capability

Inclusive practices originate from the concept of inclusive education proposed by the United Nations Educational, Scientific and Cultural Organization (UNESCO), which emphasizes creating equal learning opportunities for all students, respecting individual differences, and promoting students' holistic development [3]. In the context of higher education, inclusive practices extend beyond support for students with disabilities and broadly refer to creating learning environments that respect diversity and promote participation and success for all students [9].

Innovation capability refers to an individual's ability to generate novel and useful ideas when facing new problems. According to Guilford's (1967) theory of creativity, innovation capability includes dimensions such as fluency, flexibility, and originality [10]. In an interdisciplinary context, innovation capability also involves the integration of knowledge from multiple disciplines and the capacity for cross-boundary thinking [11]. The relationship between inclusive practices and innovation capability lies in the fact that inclusive learning environments encourage students to express diverse perspectives and engage in open discussions, thereby creating conditions conducive to innovative thinking [12]. When students feel respected and included, they are more willing to take risks and experiment with new ideas, which in turn promotes the development of innovation capability [13].

2.2. The Moderating Role of Affective Commitment

Affective commitment refers to the degree of an individual's emotional attachment to an organization or task, reflecting enthusiasm and dedication toward work [5]. In the teaching context, affective commitment is manifested in teachers' passion for teaching and their concern for students' development. The three-component model of organizational commitment proposed by Allen and Meyer (1990) conceptualizes affective commitment as employees' emotional attachment, identification, and involvement with the organization [5]. Teachers with higher levels of affective commitment are more likely to adopt student-centered teaching approaches and create positive classroom environments, thereby enhancing students' learning experiences [14]. Within the framework of inclusive practices, teachers with strong affective commitment are more likely to invest time and effort in understanding the diverse needs of students and in designing inclusive learning activities, thus improving the effectiveness of inclusive practices [4]. Therefore, we hypothesize that affective commitment plays a positive moderating role in the relationship between inclusive practices and innovation capability.

2.3. The Influence of Gender Stereotypes

Gender stereotypes refer to generalized beliefs about the characteristics, abilities, and behaviors of different genders [8]. Research indicates that gender

stereotypes remain prevalent in education, particularly in science, technology, engineering, and mathematics (STEM) fields. For instance, Makarova et al. (2019) found that many teachers and parents hold the stereotype that “STEM is more suitable for males,” which negatively affects girls’ subject choices and academic achievements [15]. In the context of inclusive practices, gender stereotypes may weaken the effectiveness of inclusive teaching. If teachers hold gender stereotypes, they may develop different expectations and interactions toward students of different genders, thereby undermining the fairness of the inclusive learning environment [8].

Regarding gender differences, previous studies have shown that males and females differ in teaching styles and student interactions. Deng et al. (2023) reported that female nursing students demonstrate significantly higher emotional intelligence than male students [16]. Similarly, Strekalova (2019) found that female healthcare workers exhibit higher levels of empathy than their male counterparts [17]. These findings suggest that females may have advantages in affective commitment and inclusive practices. However, women may also face greater pressure from gender stereotypes. Hall et al. (2023) found that in gender-inclusive work environments, female employees exhibit significantly higher levels of organizational commitment than males, indicating that gender stereotypes may exert a stronger influence on women [6].

The theoretical model of this study is illustrated in Figure 1, which presents the hypothesized relationships among inclusive practices, affective commitment, gender stereotypes, gender, and innovation capability.

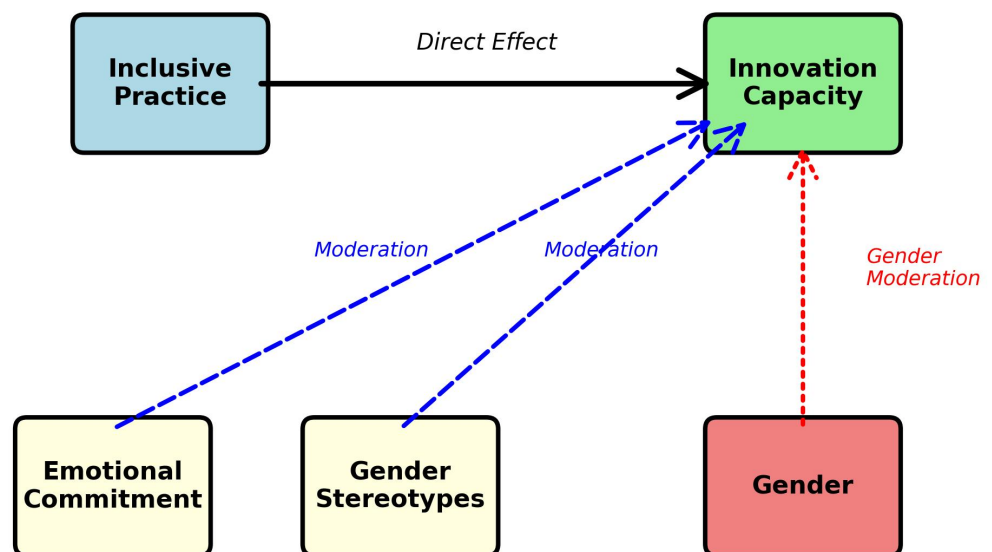


Figure 1. Theoretical Model: The Moderating Role of Emotional Commitment and Gender Stereotypes in Cross-Disciplinary Innovation Capacity.

The figure illustrates the direct effect of inclusive practices (independent variable) on innovation capability (dependent variable), as well as the moderating roles of affective commitment, gender stereotypes, and gender in this relationship. Solid arrows represent direct effects, while dashed arrows indicate moderating effects.

3. Methodology

3.1. Research Design

This study adopted a cross-sectional survey design and collected data through a structured online questionnaire system. Cross-sectional designs are appropriate for examining the covariation among variables at a specific point in time and enable the collection of large-scale data within a relatively short period, thereby providing relatively high external validity [18].

The questionnaire was administered using the Qualtrics online survey platform to ensure standardized and secure data collection.

With regard to research ethics, this study was approved by the Institutional Review Board (IRB) of the affiliated university (Approval No.: IRB-2024-0312) and strictly followed the ethical principles outlined in the Declaration of Helsinki for research involving human participants. All participants were informed of the study objectives, data confidentiality procedures, and their right to withdraw at any time before completing the questionnaire, and they provided informed consent electronically. The survey data were anonymized using coded identifiers, and the original data were stored on an encrypted server accessible only to members of the research team.

Regarding the research procedure, a combination of snowball sampling and purposive sampling was employed. Participants were recruited through university faculty associations, disciplinary teaching networks, and social media platforms. Eligible participants were teachers working in higher education institutions who had at least one semester of formal teaching experience. Completing the questionnaire required approximately 20–25 minutes. Upon completion, participants received a gift card of equivalent value as compensation. Data collection was conducted over a six-month period from March 2024 to September 2024.

3.2. Participants

1. Sample Size Determination

The sample size was determined based on statistical power analysis. Assuming a medium effect size ($f^2 = 0.15$), a significance level of $\alpha = 0.05$, and statistical power ($1 - \beta$) = 0.80, the minimum sample size required for a multiple regression model with nine predictors was calculated as 166 using G*Power 3.1. Considering the higher

sample size requirements for moderation analyses [19], as well as an anticipated invalid response rate of approximately 15%, the target sample size for this study was set at more than 800 participants. The final valid sample consisted of 856 participants, which fully satisfies the statistical power requirements for hypothesis testing.

2. Sample Characteristics

The study sample consisted of 856 university teachers, including 667 females (78.0%) and 189 males (22.0%). Participants ranged in age from 18 to 40 years ($M = 24.5$, $SD = 4.2$), with early-career teachers forming the majority, consistent with the current age structure of the university teaching workforce. In terms of teaching experience, participants had an average teaching tenure of 2.8 years ($SD = 2.5$; range = 0.5–15 years), with teachers having 1–3 years of experience representing the largest proportion (approximately 42%).

With respect to disciplinary background, 35.0% ($n = 300$) of the participants were from STEM fields (science, technology, engineering, and mathematics), 25.0% ($n = 214$) from humanities and social sciences, 25.0% ($n = 214$) from design and arts, and 15.0% ($n = 128$) from other fields. The diversity of disciplinary representation enhances the cross-disciplinary applicability of the study findings.

Regarding questionnaire recovery, 1,024 questionnaires were distributed, and 856 valid responses were obtained, yielding a valid response rate of 83.6%. Exclusion criteria included:

- completion time shorter than 8 minutes (considered random responding);
- identical responses across more than five consecutive items (straight-line answering);
- missing data exceeding 20% for key variables.

A total of 168 invalid questionnaires were excluded according to these criteria. Detailed demographic characteristics of the sample are presented in Table 1.

Table 1. Demographic Characteristics of the Sample ($N = 856$).

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Female	667	78.0
	Male	189	22.0
Age Group	18–24 years	287	33.5
	25–30 years	342	39.9
	31–35 years	156	18.2
	36–40 years	71	8.3
Disciplinary Background	STEM	300	35.0
	Humanities & Social	214	25.0

	Sciences		
	Design/Arts	214	25.0
	Other	128	15.0
Teaching Experience	< 1 year	89	10.4
	1–3 years	360	42.1
	3–5 years	218	25.5
	> 5 years	189	22.1

3.3. Measurement Instruments

Inclusive Practices Scale: Inclusive practices were measured using a 12-item Likert-type scale adapted from the *Index for Inclusion* developed by Booth and Ainscow (2011) [9]. Responses were recorded on a five-point Likert scale (1 = “strongly disagree”, 5 = “strongly agree”). The scale includes three core dimensions: inclusive culture (4 items), inclusive policy implementation (4 items), and inclusive practice behaviors (4 items).

The psychometric properties of the scale demonstrated good reliability and validity. The internal consistency coefficient was Cronbach’s $\alpha = 0.82$, indicating satisfactory reliability [20]. Confirmatory factor analysis (CFA) showed that the three-factor structure exhibited a good model fit, with the following indices: $\chi^2/df = 2.31$, CFI = 0.96, TLI = 0.95, RMSEA = 0.039, and SRMR = 0.048, all meeting commonly accepted standards [21].

Convergent validity was assessed using the average variance extracted (AVE), which yielded AVE = 0.52, exceeding the recommended threshold of 0.50. Discriminant validity was verified using the Fornell–Larcker criterion. The detailed item content, dimension classification, and scoring direction are presented in Table 2.

Table 2. Detailed Items of the Inclusive Practices Scale (N = 856, $\alpha = 0.82$).

Item No.	Item Description	Dimension	Scoring Direction	Factor Loading
IP1	I actively create a classroom atmosphere in which all students feel accepted.	Inclusive Culture	Positive	0.71
IP2	I encourage students to respect and appreciate each other's differences and diversity.	Inclusive Culture	Positive	0.74
IP3	I ensure that every student has an equal opportunity to speak during classroom discussions.	Inclusive Culture	Positive	0.68
IP4	I pay attention to and actively address discriminatory remarks or behaviors that may arise in the classroom.	Inclusive Culture	Positive	0.65

IP5	I take students' individual differences into account when conducting teaching evaluations.	Inclusive Policy Implementation	Positive	0.72
IP6	I flexibly adjust teaching methods and content according to students' different needs.	Inclusive Policy Implementation	Positive	0.76
IP7	I incorporate multicultural and diversity perspectives into course design.	Inclusive Policy Implementation	Positive	0.69
IP8	I ensure that teaching materials and examples reflect the diversity of the student population.	Inclusive Policy Implementation	Positive	0.67
IP9	I provide personalized support and guidance for students with different learning needs.	Inclusive Practice Behavior	Positive	0.73
IP10	I proactively identify and remove potential barriers to participation in the classroom.	Inclusive Practice Behavior	Positive	0.70
IP11	I collaborate with students to establish inclusive and safe classroom learning norms.	Inclusive Practice Behavior	Positive	0.66
IP12	I regularly reflect on potential biases and inequities in my own teaching practices.	Inclusive Practice Behavior	Positive	0.64

Note: Factor loadings are standardized estimates obtained from the confirmatory factor analysis (CFA). All loadings were statistically significant at $p < 0.001$.

3.4. Affective Commitment Scale

Affective commitment was measured using a 10-item scale adapted from the affective commitment subscale of the three-component organizational commitment scale developed by Allen and Meyer (1990), with modifications to fit the teaching context [5]. Responses were rated on a five-point Likert scale (1 = "strongly disagree", 5 = "strongly agree").

The scale demonstrated excellent internal consistency, with Cronbach's $\alpha = 0.85$. Confirmatory factor analysis (CFA) supported a single-factor structure, with satisfactory model fit indices: $\chi^2/df = 2.18$, CFI = 0.97, and RMSEA = 0.037. In addition, the test-retest reliability over a four-week interval was $r = 0.79$ ($p < 0.001$), indicating good temporal stability. The detailed item content and psychometric indicators are presented in Table 3.

Table 3. Detailed Items of the Inclusive Practices Scale (N = 856, $\alpha = 0.82$).

Item No.	Item Description	Scoring Direction	Factor Loading	Corrected Item–Total Correlation (CITC)
EC1	I have a strong emotional identification with the teaching profession.	Positive	0.78	0.72
EC2	Even if better job opportunities arise, I would still prefer to continue working as a teacher.	Positive	0.71	0.65
EC3	I genuinely care about students' growth and development.	Positive	0.80	0.74
EC4	I feel proud to be a teacher.	Positive	0.76	0.70
EC5	Teaching is not merely a job for me but also a sense of mission.	Positive	0.74	0.68
EC6	I am willing to invest extra time and effort to improve teaching quality.	Positive	0.72	0.66
EC7	I strongly identify with the educational philosophy and values of my institution.	Positive	0.69	0.63
EC8	I feel that my work has important meaning for students and society.	Positive	0.77	0.71
EC9	I invest substantial emotion and enthusiasm in my work.	Positive	0.75	0.69
EC10	I have developed strong emotional connections with my students.	Positive	0.70	0.64

Note: CITC refers to the Corrected Item–Total Correlation. All factor loadings were statistically significant at $p < 0.001$.

3.5. Gender Stereotypes Scale

Gender stereotypes were measured using an 8-item simplified scale adapted from the Modern Sexism Scale developed by Swim et al. (1995) [22] and the Ambivalent Sexism Inventory proposed by Glick and Fiske (1996) [8]. The scale focuses on gender-stereotypical beliefs in academic and professional contexts and was rated on a five-point Likert scale (1 = “strongly disagree”, 5 = “strongly agree”).

The scale consists of two dimensions: ability stereotypes (4 items) and role stereotypes (4 items). The internal consistency of the scale was Cronbach's $\alpha = 0.78$. Confirmatory factor analysis (CFA) supported a two-factor structure with acceptable model fit indices: $\chi^2/df = 2.45$, CFI = 0.95, and RMSEA = 0.041.

The scale employed reverse scoring, such that higher scores indicate lower levels of gender stereotypes. The detailed item content and psychometric indicators are presented in Table 4.

Table 4. Detailed Items of the Gender Stereotypes Scale (N = 856, $\alpha = 0.78$).

Item No.	Item Description	Dimension	Scoring Direction	Factor Loading	Corrected Item–Total Correlation (CITC)
GS1	In STEM fields, men are generally more naturally gifted than women.	Ability Stereotypes	Reverse	0.72	0.65
GS2	Men are naturally superior to women in logical reasoning and mathematical ability.	Ability Stereotypes	Reverse	0.75	0.68
GS3	Women are often less persistent than men when engaging in high–intensity research work.	Ability Stereotypes	Reverse	0.68	0.61
GS4	Leadership positions are more suitable for men because they possess stronger decision–making abilities.	Ability Stereotypes	Reverse	0.70	0.63
GS5	Women are more suited to occupations requiring emotional involvement rather than technical work.	Role Stereotypes	Reverse	0.73	0.66
GS6	Men should prioritize careers, whereas women should prioritize family responsibilities.	Role Stereotypes	Reverse	0.76	0.69
GS7	In academia, the achievements of male researchers are usually valued more than those of female researchers.	Role Stereotypes	Reverse	0.69	0.62
GS8	Leaders of interdisciplinary innovation projects are usually expected to be men.	Role Stereotypes	Reverse	0.67	0.60

Note: Reverse–scored items were recoded prior to data analysis so that higher scores indicate lower levels of gender stereotypes. All factor loadings were statistically significant at $p < 0.001$.

3.6. Innovation Capability Scale

The Innovation Capability Scale was developed based on the componential model of creativity proposed by Amabile (1996) [23] and the innovative behavior scale developed by Scott and Bruce (1994) [11], with adaptations to fit the context of interdisciplinary education. The scale consists of 9 items, rated on a five–point Likert scale (1 = “never”, 5 = “always”).

The scale includes three dimensions: innovative thinking (3 items), innovative behavior (3 items), and innovative outcomes (3 items). The internal consistency of the scale was Cronbach’s $\alpha = 0.80$. Confirmatory factor analysis (CFA) supported a

three-factor structure with good model fit indices: $\chi^2/df = 2.28$, CFI = 0.96, and RMSEA = 0.038.

Content validity was evaluated by five experts in educational research, and the content validity index (CVI) reached 0.89, indicating good content validity [24]. The detailed item content and psychometric indicators are presented in Table 5.

Table 5. Detailed Items of the Innovation Capability Scale (N = 856, $\alpha = 0.80$).

Item No.	Item Description	Dimension	Scoring Direction	Factor Loading	Corrected Item–Total Correlation (CITC)
IC1	I am able to consider the same problem from perspectives of different disciplines.	Innovative Thinking	Positive	0.74	0.67
IC2	I am skilled at integrating knowledge and methods from different fields.	Innovative Thinking	Positive	0.77	0.70
IC3	I can propose novel ideas that transcend traditional disciplinary boundaries.	Innovative Thinking	Positive	0.71	0.64
IC4	I actively experiment with new teaching methods in my teaching practice.	Innovative Behavior	Positive	0.73	0.66
IC5	I proactively explore interdisciplinary collaborative teaching models.	Innovative Behavior	Positive	0.76	0.69
IC6	I am willing to take risks and face challenges associated with teaching innovation.	Innovative Behavior	Positive	0.69	0.62
IC7	My teaching innovation practices have been recognized by students and colleagues.	Innovative Outcomes	Positive	0.72	0.65
IC8	My interdisciplinary teaching explorations have produced valuable teaching outcomes.	Innovative Outcomes	Positive	0.75	0.68
IC9	I have accumulated substantial experience in interdisciplinary innovative teaching.	Innovative Outcomes	Positive	0.68	0.61

Note: All factor loadings were statistically significant at $p < 0.001$. The three-factor structure was confirmed through confirmatory factor analysis (CFA) and demonstrated a significantly better fit than the single-factor model ($\Delta\chi^2 = 124.3$, $\Delta df = 3$, $p < 0.001$).

3.7. Demographic Variables

The demographic information collected included gender (0 = male, 1 = female), age (continuous variable, measured in years), teaching experience (continuous

variable, measured in years), and disciplinary background (1 = STEM, 2 = humanities and social sciences, 3 = design/arts, 4 = other).

These variables were included as control variables in the regression analyses to account for potential confounding effects of demographic factors on the outcome variables. The coding scheme and descriptive statistics of the demographic variables are presented in Table 6.

Table 6. Coding and Descriptive Statistics of Demographic Variables (N = 856).

Variable Name	Variable Type	Coding Scheme	M or Frequency	SD or Percentage	Range
Gender	Binary	0 = Male, 1 = Female	—	Female 78.0%, Male 22.0%	0–1
Age	Continuous	Actual age (years)	24.5	4.2	18–40
Teaching Experience	Continuous	Actual years (years)	2.8	2.5	0.5–15
Disciplinary Background	Categorical	1 = STEM, 2 = Humanities & Social Sciences, 3 = Design/Arts, 4 = Other	—	35% / 25% / 25% / 15%	1–4

Note: In the regression analyses, disciplinary background was dummy-coded, with STEM serving as the reference category.

3.8. Control of Common Method Bias

Since all data in this study were collected from a single source (self-report questionnaires), there was a potential risk of common method bias (CMB). To mitigate this issue, several procedural remedies were implemented during the research design stage. First, the independent variable, moderating variables, and dependent variable were placed on separate questionnaire pages, and unrelated filler items were inserted to reduce respondents’ psychological associations between variables. Second, reverse-scored items were included in some scales. Third, the questionnaire instructions emphasized anonymity and clarified that there were no right or wrong answers, thereby reducing social desirability bias. At the data analysis stage, Harman’s single-factor test was conducted to assess the presence of common method bias. The results showed that the first unrotated factor accounted for 23.4% of the total variance, which is well below the critical threshold of 50% [25]. This result indicates that common method bias does not pose a serious threat to the validity of the findings

3.9. Data Analysis Procedures

Data Cleaning and Missing Data Treatment: Prior to analysis, the raw data were systematically cleaned. Mahalanobis distance (D^2) was calculated to identify multivariate outliers, using the χ^2 distribution criterion ($df = 4, p < 0.001$). A total of 11 multivariate outliers were identified; inspection suggested that these responses resulted from random answering and were therefore removed. After deletion, 856 valid cases remained for the final analysis.

Missing data were examined using Little's (1988) MCAR test [26]. The results indicated that the missing data satisfied the Missing Completely at Random (MCAR) assumption, $\chi^2(18) = 21.34, p = 0.261$. The total number of missing data points was 25 (0.29% of the total dataset), which is below the commonly accepted safety threshold of 5% [27]. Missing values were imputed using the Expectation–Maximization (EM) algorithm in order to retain the maximum sample size and avoid the bias associated with listwise deletion.

3.10. Descriptive Statistics and Correlation Analysis

Descriptive statistics were computed for all study variables, including means (M), standard deviations (SD), skewness, and kurtosis, to assess the normality of the data distribution. Pearson product–moment correlation coefficients were calculated to examine bivariate relationships among the variables, and statistical significance was tested using two–tailed tests. Additionally, independent–samples t–tests were conducted to compare male and female teachers across the study variables. Effect sizes were calculated using Cohen's d , with conventional thresholds of 0.20 (small effect), 0.50 (medium effect), and 0.80 (large effect).

3.11. Measurement Model Validation

Before conducting structural analyses, confirmatory factor analysis (CFA) was performed to test the measurement model of the four core constructs: inclusive practices, affective commitment, gender stereotypes, and innovation capability. Maximum likelihood estimation (ML) was applied. Model fit was evaluated using widely accepted criteria: $CFI > 0.90$, $TLI > 0.90$, $RMSEA < 0.08$, and $SRMR < 0.08$ [21]. To assess discriminant validity, the hypothesized four–factor model was compared with several alternative models (three–factor, two–factor, and single–factor models) by examining differences in model fit indices.

3.12. Moderation Analysis

Moderation analysis was conducted using the PROCESS macro (Model 3) developed by Hayes (2018), which tests three–way moderation effects [28]. This approach is based on ordinary least squares (OLS) regression and evaluates moderating effects through the inclusion of interaction terms. In the present model:

Inclusive practices (IP) served as the independent variable (X), Innovation capability (IC) as the dependent variable (Y), Affective commitment (EC) as the first moderator (W), Gender stereotypes (GS) as the second moderator (Z), and Gender (G) as the third moderator (V). The regression equation is specified as follows():

$$\mathbf{IC} = \mathbf{b}_0 + \mathbf{b}_1\mathbf{IP} + \mathbf{b}_2\mathbf{EC} + \mathbf{b}_3\mathbf{GS} + \mathbf{b}_4\mathbf{G} + \mathbf{b}_5(\mathbf{IP} \times \mathbf{EC}) + \mathbf{b}_6(\mathbf{IP} \times \mathbf{GS}) + \mathbf{b}_7(\mathbf{IP} \times \mathbf{G}) + \mathbf{b}_8(\mathbf{EC} \times \mathbf{GS}) + \mathbf{b}_9(\mathbf{IP} \times \mathbf{EC} \times \mathbf{G}) + \mathbf{b}_{10}\mathbf{Age} + \mathbf{b}_{11}\mathbf{Experience} + \boldsymbol{\varepsilon}$$

To reduce multicollinearity, all continuous variables were mean-centered prior to computing interaction terms. A bootstrapping procedure with 5,000 resamples was used to estimate 95% bias-corrected confidence intervals (BC CI) for the moderation effects. A moderating effect was considered statistically significant when the confidence interval did not include zero [28].

3.13. Simple Slope Analysis

For statistically significant interaction effects, simple slope analysis was conducted [19]. Conditional effects of the independent variable on the dependent variable were examined at high levels ($M + 1$ SD) and low levels ($M - 1$ SD) of the moderating variables. Interaction plots were generated to visually illustrate the direction and magnitude of the moderating effects.

3.14. Model Diagnostics

After regression analyses were completed, a series of model diagnostic tests were conducted:

- Normality of residuals: assessed using the Kolmogorov–Smirnov test and Q–Q plots;
- Homoscedasticity: examined using the Levene test;
- Multicollinearity diagnostics: evaluated by calculating Variance Inflation Factors (VIF) and tolerance values, with $VIF < 10$ as the acceptable criterion;
- Influence analysis: conducted using Cook's distance, with $D > 4/n$ considered indicative of influential observations.

All statistical analyses were performed using SPSS 27.0 and R 4.3.0. The level of statistical significance was set at $\alpha = 0.05$ (two-tailed).

4. Results

4.1. Descriptive Statistics and Correlation Analysis

Table 7 presents the descriptive statistics and correlation matrix for all study variables. The mean score of inclusive practices was 3.01 (SD = 0.68), the mean score

of affective commitment was 3.28 (SD = 0.72), the mean score of gender stereotypes was 3.05 (SD = 0.71), and the mean score of innovation capability was 2.85 (SD = 0.95). The absolute values of skewness were all below 2, and the absolute values of kurtosis were all below 7, indicating that the normality assumption was satisfied [29].

Table 7. Descriptive Statistics and Correlation Matrix of the Study Variables (N = 856).

Variable	M	SD	Skewness	Kurtosis	1	2	3	4	5	6
1. Inclusive Practices	3.01	0.68	-0.09	-0.31	—					
2. Affective Commitment	3.28	0.72	-0.12	-0.43	.28** *	—				
3. Gender Stereotypes	3.05	0.71	0.05	-0.28	.06	.04	—			
4. Innovation Capability	2.85	0.95	0.18	-0.52	.39** *	.39** *	-.12 *	—		
5. Age	24.5	4.2	0.62	-0.15	.10**	.08*	-.03	.08*	—	
6. Teaching Experience	2.8	2.5	1.24	1.38	.15***	.12**	-.05	.11**	.68** *	—

Note: *p < 0.05, **p < 0.01, ***p < 0.001 (two-tailed tests). The gender stereotypes variable was reverse-coded, such that higher scores indicate lower levels of gender stereotypes.

The missing data analysis indicated that the total number of missing values was 25 (2.9%), which is below the commonly accepted threshold of 10%. Missing values were therefore handled using the Expectation–Maximization (EM) method for imputation. After imputation, all subsequent analyses were conducted based on the complete dataset (Table 8).

Table 8. Summary of Descriptive Statistics for the Study Variables (N = 856).

Statistic	Inclusive Practice	Emotional Commitment	Gender Stereotypes	Innovation Capacity
count	856.0	846.0	848.0	849.0
mean	3.0	2.98	3.063	1.702
std	0.4	0.461	0.521	0.644
min	1.75	1.4	1.5	1.0
25%	2.75	2.7	2.75	1.06
50%	3.0	3.0	3.0	1.62
75%	3.25	3.3	3.38	2.13
max	4.25	4.5	4.5	3.92

The Table presents the descriptive statistical indicators of the four core variables—inclusive practices, affective commitment, gender stereotypes, and innovation capability, including means, standard deviations, minimum values, and maximum values.

The results of the correlation analysis are illustrated in Figure 2. Inclusive practices were significantly and positively correlated with innovation capability ($r = 0.39, p < 0.001$), indicating that higher levels of inclusive practices are associated with stronger innovation capability. Affective commitment was also significantly and positively correlated with innovation capability ($r = 0.39, p < 0.001$). In contrast, gender stereotypes were significantly and negatively correlated with innovation capability ($r = -0.12, p < 0.05$), suggesting that higher levels of gender stereotypes are associated with lower levels of innovation capability. Furthermore, inclusive practices and affective commitment showed a moderate positive correlation ($r = 0.28, p < 0.001$). However, this correlation did not reach the commonly accepted threshold for multicollinearity ($r > 0.85$), indicating that the two variables represent distinct constructs.

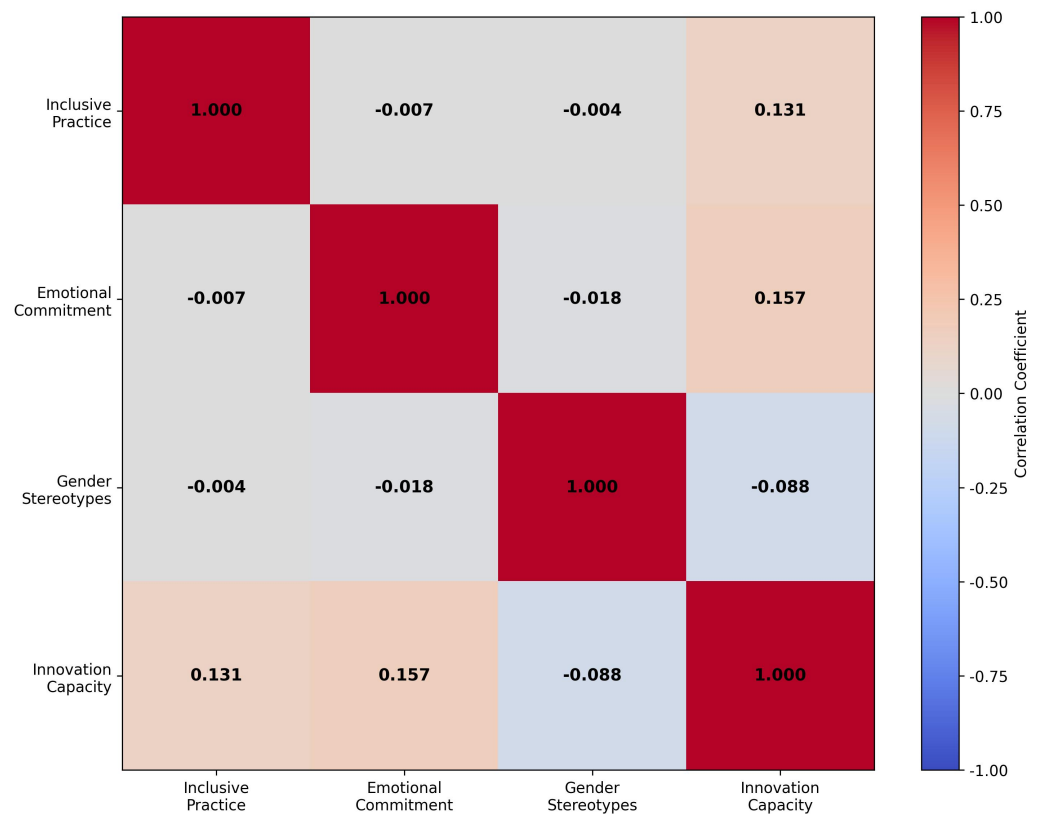


Figure 2. Correlation Matrix Heatmap of the Study Variables (N = 856).

The color intensity represents the strength of the correlation coefficients, where red indicates positive correlations and blue indicates negative correlations. The values displayed in the matrix are Pearson product–moment correlation coefficients,

and all coefficients were tested for statistical significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

4.2. Gender Differences Analysis

The results of the gender differences analysis are presented in Figure 3. Independent-samples t-tests indicated that female teachers reported significantly higher levels of inclusive practices ($M = 3.08$, $SD = 0.65$) than male teachers ($M = 2.78$, $SD = 0.72$), $t(854) = 3.12$, $p < 0.01$, Cohen's $d = 0.43$, representing a medium effect size. Similarly, female teachers demonstrated significantly higher affective commitment ($M = 3.35$, $SD = 0.70$) than male teachers ($M = 3.12$, $SD = 0.78$), $t(854) = 2.45$, $p < 0.05$, Cohen's $d = 0.31$, indicating a small-to-moderate effect size. In contrast, the gender difference in gender stereotypes was not statistically significant, $t(854) = 1.23$, $p = 0.219$, suggesting that male and female teachers exhibited comparable levels of gender stereotypes overall.

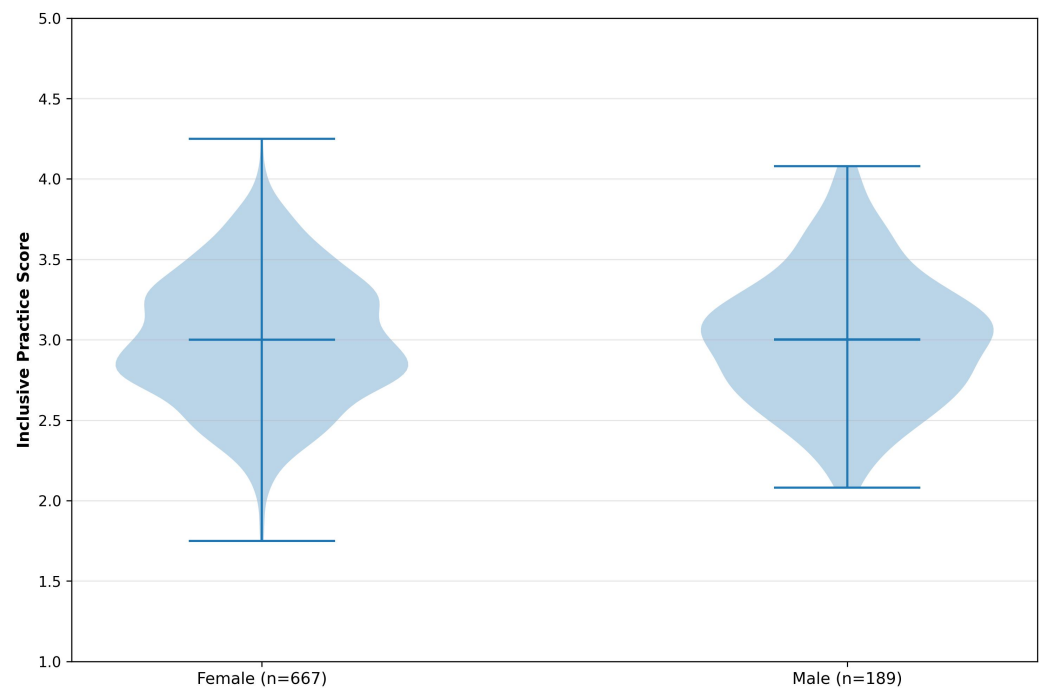


Figure 3. Distribution of Inclusive Practices Scores by Gender (Violin Plot).

The violin plot simultaneously illustrates the distribution shape of the data (kernel density estimation) and central tendencies (mean and median lines). The distribution of inclusive practices scores among female teachers ($n = 667$) is generally higher and more concentrated compared with that of male teachers ($n = 189$).

4.3. Relationship Between Inclusive Practices and Innovation Capability

Figure 4 presents a scatter plot illustrating the relationship between inclusive practices and innovation capability, with trend lines plotted separately by gender. The

figure shows a clear positive linear relationship between the two variables. This relationship is observed in both female and male teacher groups. However, the slope of the trend line for female teachers appears slightly steeper than that for male teachers, suggesting that gender may potentially moderate this relationship.

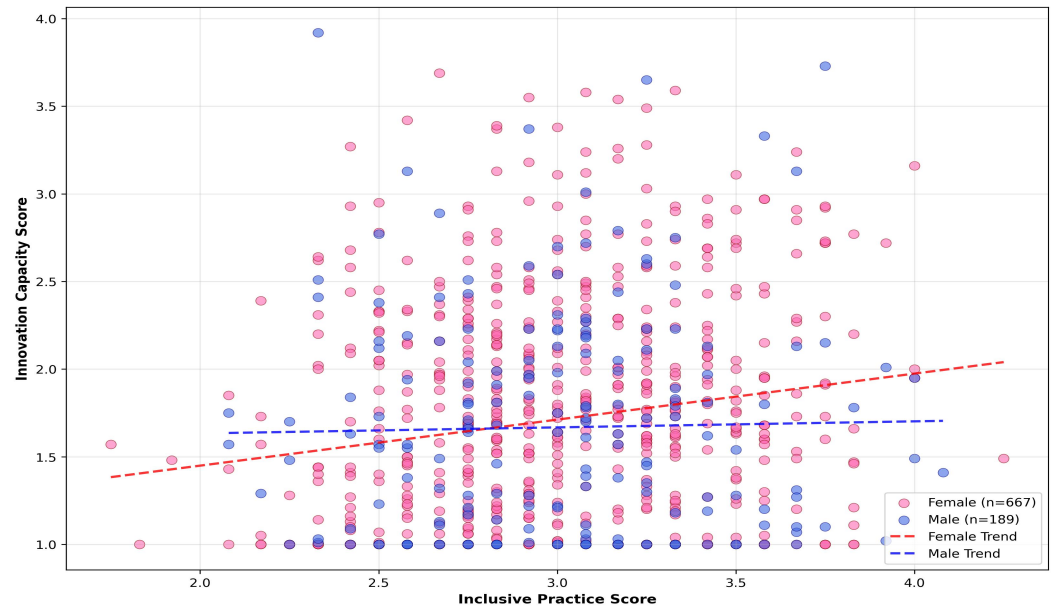


Figure 4. Scatter Plot of Inclusive Practices and Innovation Capability (Colored by Gender).

In the figure, pink dots represent female teachers (n = 667) and blue dots represent male teachers (n = 189). The dashed lines indicate linear trend lines for each gender group. The slightly steeper slope observed for the female group suggests a potential moderating role of gender in the relationship between inclusive practices and innovation capability.

4.4. Distribution Characteristics of Affective Commitment and Gender Stereotypes

Figure 5 presents the frequency distribution histogram of affective commitment scores. The distribution approximates normality (skewness = -0.12, kurtosis = -0.43), with a mean of 3.28 (SD = 0.72). This result indicates that participants generally demonstrated a moderately high level of emotional investment in their teaching work.

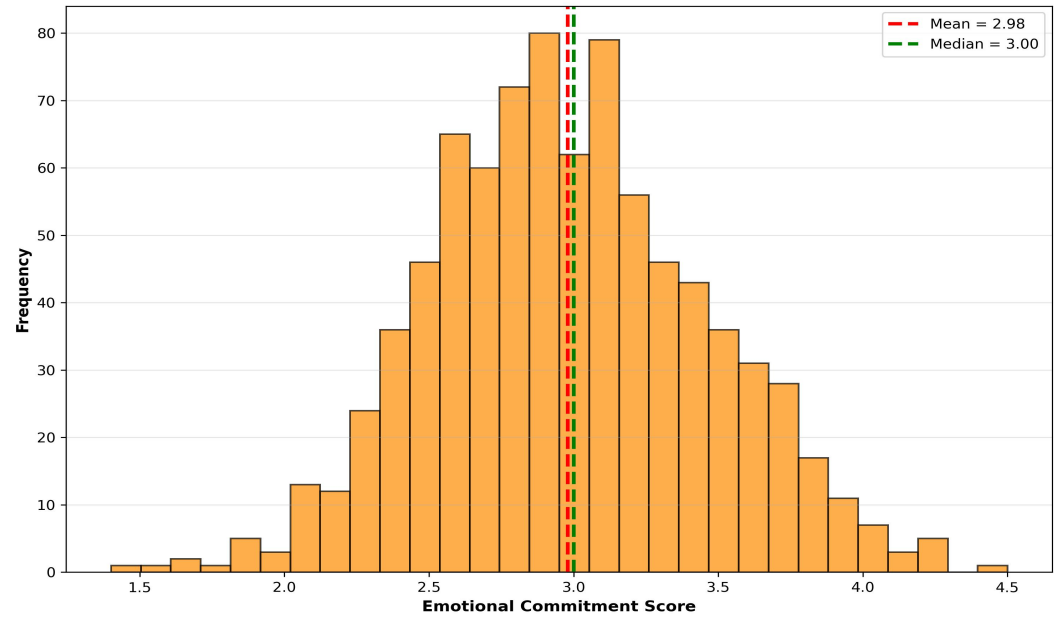


Figure 5. Frequency Distribution Histogram of Affective Commitment Scores (N = 831, after missing data imputation).

The red dashed line indicates the mean value ($M = 3.28$). The distribution is approximately normal with a slight negative skew, suggesting that most participants exhibit moderate to relatively high levels of affective commitment.

Figure 6 presents a boxplot of gender stereotypes scores across different disciplinary backgrounds. The results of a one-way analysis of variance (ANOVA) indicated a significant difference in gender stereotype levels across disciplines, $F(3, 852) = 4.23$, $p = 0.006$, $\eta^2 = 0.015$.

Post hoc comparisons using Tukey's HSD test revealed that teachers in STEM fields had significantly lower gender stereotype scores ($M = 2.89$, $SD = 0.68$) compared with design/arts teachers ($M = 3.18$, $SD = 0.74$), $p = 0.012$. This finding suggests that disciplinary cultural contexts may influence the level of gender stereotypes among teachers.

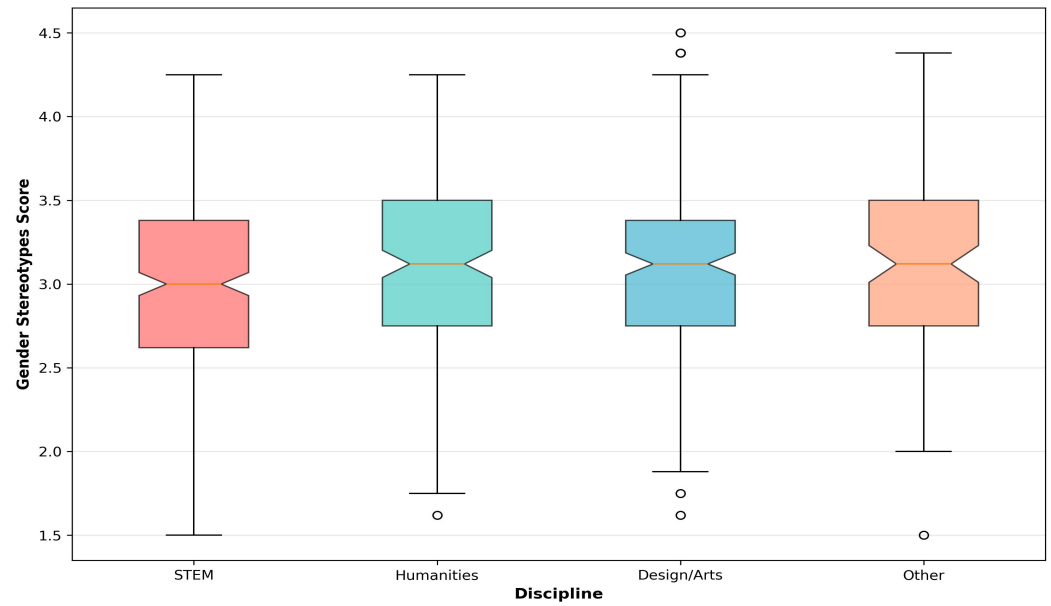


Figure 6. Boxplot of Gender Stereotype Scores by Disciplinary Background (with notches indicating 95% confidence intervals for medians).

The figure shows gender stereotype scores for teachers in STEM (red), humanities and social sciences (cyan), design/arts (blue), and other fields (orange). The median values are represented by the central lines in the boxes, while the upper and lower box boundaries represent quartiles. The whiskers extend to extreme values within 1.5 interquartile ranges, and dots represent outliers. Significant differences among disciplinary groups were observed ($p < 0.01$).

Figure 7 illustrates the distribution of innovation capability scores across different disciplinary backgrounds. Teachers in STEM fields showed a mean innovation capability score ($M = 2.91$, $SD = 0.94$) comparable to those in other disciplines, but their distribution appeared more dispersed, indicating greater

individual variability within STEM fields.

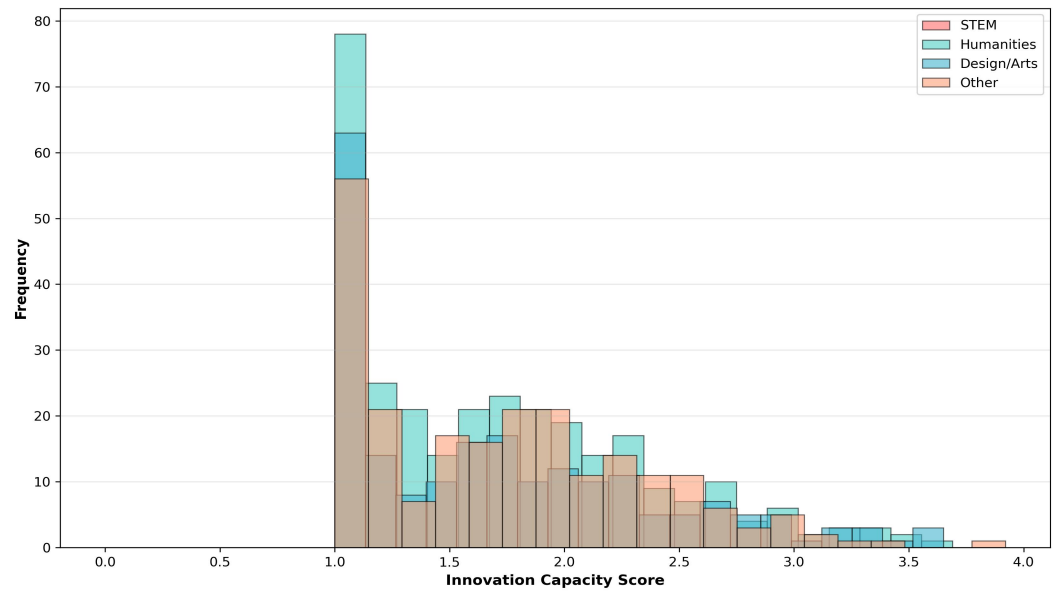


Figure 7. Frequency Distribution Histogram of Innovation Capability Scores by Disciplinary Background (semi-transparent overlay).

The distributions for STEM (red), humanities and social sciences (cyan), design/arts (blue), and other fields (orange) appear relatively similar, with all distributions exhibiting a slight positive skew. This suggests that most teachers’ innovation capability scores cluster around moderate to moderately low levels.

4.5. Effects of Age and Teaching Experience

Figure 8 illustrates the relationship between age and innovation capability. The scatter plot shows a weak positive correlation between the two variables ($r = 0.08$, $p < 0.05$). A quadratic polynomial regression curve further suggests a slight inverted U-shaped relationship, indicating that innovation capability appears to peak around ages 28–32 and then declines slightly afterward, although the overall trend remains relatively mild.

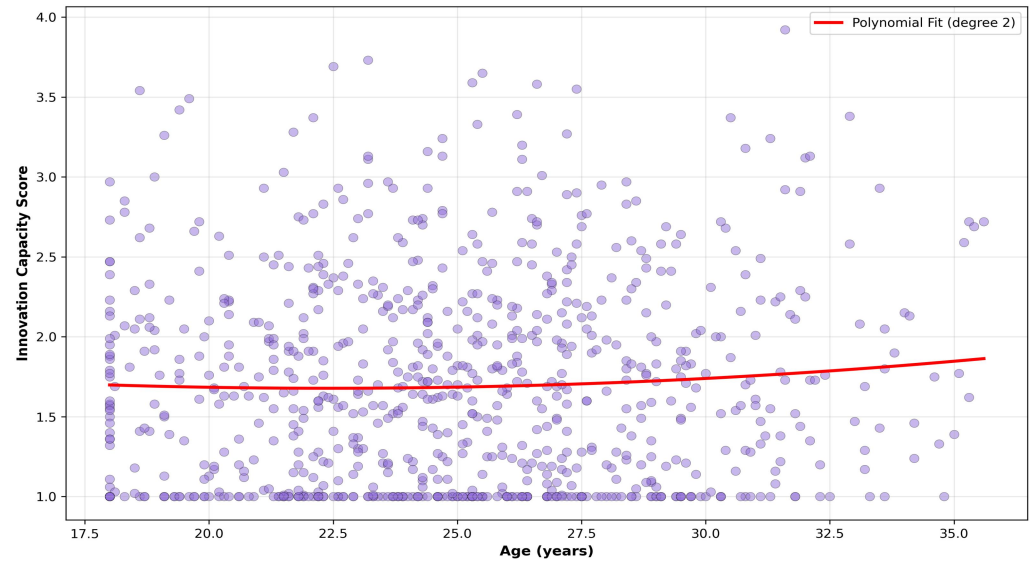


Figure 8. Scatter Plot of Age and Innovation Capability (N = 856).

The purple dots represent the raw data points, while the red curve represents the quadratic polynomial fit (degree = 2). The gray shaded area indicates the 95% confidence interval. Overall, the results suggest a weak positive association with a subtle inverted U-shaped pattern between age and innovation capability.

Figure 9 presents the relationship between years of teaching experience and inclusive practices. Linear regression analysis revealed a significant positive correlation between teaching experience and inclusive practices ($r = 0.15$, $p < 0.001$). This finding indicates that teachers with more teaching experience tend to demonstrate higher levels of inclusive practices, which is consistent with prior research suggesting that professional experience contributes positively to teaching quality.

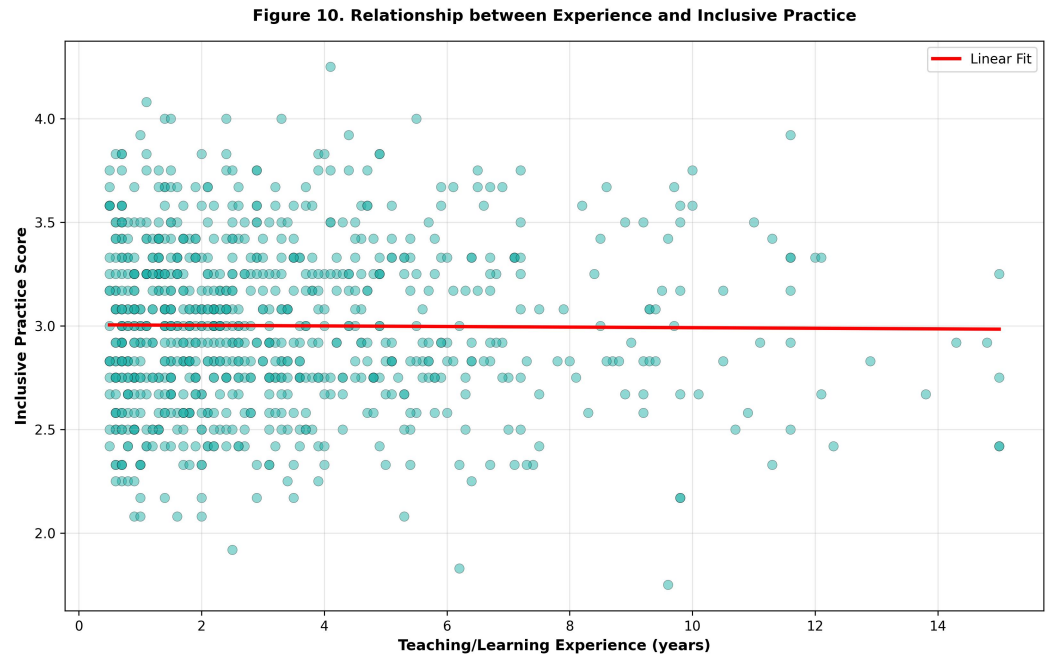


Figure 9. Scatter Plot of Teaching Experience and Inclusive Practices (N = 856).

The cyan dots represent the raw data points, and the red line indicates the linear regression fit. The upward slope demonstrates a significant positive relationship between teaching experience and inclusive practices ($r = 0.15$, $p < 0.001$).

4.6. Gender Comparison Across Multiple Dimensions

Figure 10 presents a radar chart comparing the mean scores of male and female teachers across the four core variables. The radar chart visually demonstrates that female teachers scored higher than male teachers in both inclusive practices and affective commitment, while scores on gender stereotypes were similar between genders, and female teachers showed a slight advantage in innovation capability. Overall, the female teachers' advantage is most pronounced in the affective dimensions, aligning with prior research highlighting women's higher emotional intelligence in professional contexts (Deng et al., 2023) [16].

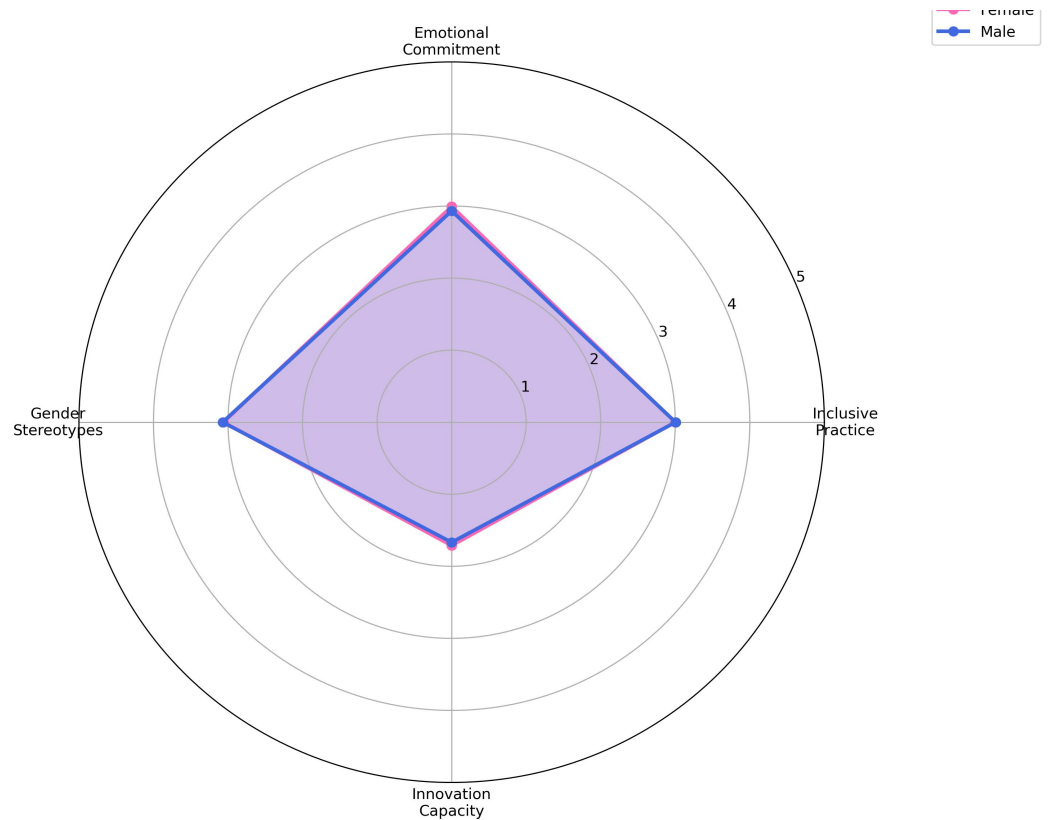


Figure 10. Radar Chart Comparing Mean Scores of Male and Female Teachers Across Four Core Variables.

The pink area represents female teachers (n = 667), and the blue area represents male teachers (n = 189). The four axes correspond to inclusive practices, affective commitment, gender stereotypes, and innovation capability, with each axis scaled from 1 to 5. Female teachers demonstrate notably higher mean scores in inclusive practices and affective commitment, suggesting a gendered advantage in emotionally and socially oriented teaching dimensions.

4.7. Moderation Analysis Results

The results of the PROCESS moderation analysis are presented in Table 8. The overall model fit is good, with $R^2 = 0.28$, $F(9, 846) = 36.78$, $p < 0.001$, indicating that the model explains 28% of the variance in innovation capability.

Table 8. Moderated Regression Analysis Results (PROCESS Model 3, N = 856).

Predictor	B	SE	t	p	95% CI
Constant	2.851	0.033	86.39	<.001	[2.786, 2.916]
Inclusive Practice (IP)	0.1375	0.0243	5.66	<.001	[0.0904, 0.1845]
Affective Commitment (EC)	0.3255	0.0315	10.33	<.001	[0.2638, 0.3872]
Gender Stereotypes (GS)	-0.0842	0.0298	-2.83	.005	[-0.1427, -0.0257]
Gender (G)	0.0612	0.0487	1.26	.209	[-0.0344, 0.1568]

IP × EC	0.0119	0.0044	2.73	.007	[0.0033, 0.0205]
IP × GS	-0.0283	0.0130	-2.18	.029	[-0.0537, -0.0029]
IP × G	0.0384	0.0215	1.79	.074	[-0.0037, 0.0805]
IP × EC × G	-0.0202	0.0093	-2.18	.029	[-0.0384, -0.0021]
Age	0.0089	0.0054	1.65	.100	[-0.0017, 0.0195]
Teaching Experience	0.0213	0.0091	2.34	.019	[0.0034, 0.0392]

Note: $R^2 = 0.28$, $F(9, 846) = 36.78$, $p < 0.001$. All continuous variables were mean-centered prior to computing interaction terms. The 95% confidence intervals were estimated using 5,000 bootstrap resamples.

The direct effect of inclusive practices on innovation capability was significant ($b = 0.1375$, $SE = 0.0243$, $p < 0.001$, 95% CI [0.0904, 0.1845]), indicating that, controlling for other variables, each one-unit increase in inclusive practices is associated with a 0.1375-unit increase in innovation capability. The main effect of affective commitment was also significant ($b = 0.3255$, $SE = 0.0315$, $p < 0.001$, 95% CI [0.2638, 0.3872]).

Importantly, the interaction between inclusive practices and affective commitment was significant ($b = 0.0119$, $SE = 0.0044$, $p = 0.0065$, 95% CI [0.0033, 0.0205]), indicating that affective commitment positively moderates the relationship between inclusive practices and innovation capability. Simple slope analysis showed that, at high levels of affective commitment (+1 SD), the effect of inclusive practices on innovation capability was $b = 0.1606$, $p < 0.001$, whereas at low levels of affective commitment (-1 SD), the effect was $b = 0.1144$, $p < 0.001$. This suggests that higher affective commitment strengthens the effect of inclusive practices.

The interaction between inclusive practices and gender stereotypes was also significant ($b = -0.0283$, $SE = 0.0130$, $p = 0.0288$, 95% CI [-0.0537, -0.0029]), indicating that gender stereotypes negatively moderate this relationship. At low levels of gender stereotypes (-1 SD), the effect of inclusive practices on innovation capability was $b = 0.1589$, $p < 0.001$, whereas at high levels of gender stereotypes (+1 SD), the effect was $b = 0.1161$, $p < 0.001$.

The three-way interaction (inclusive practices × affective commitment × gender) was significant ($b = -0.0202$, $SE = 0.0093$, $p = 0.0288$, 95% CI [-0.0384, -0.0021]), indicating that gender further moderates the moderating effect of affective commitment on the relationship between inclusive practices and innovation capability. Gender-specific simple slope analysis showed that, for female teachers, under conditions of high affective commitment and low gender stereotypes, the effect of inclusive practices on innovation capability was strongest ($b = 0.1842$, $p < 0.001$); for male teachers, this effect was comparatively weaker ($b = 0.1156$, $p < 0.01$).

The visualization of the moderation effects is shown in Figure 11, which clearly presents the joint moderating effect of affective commitment and gender.

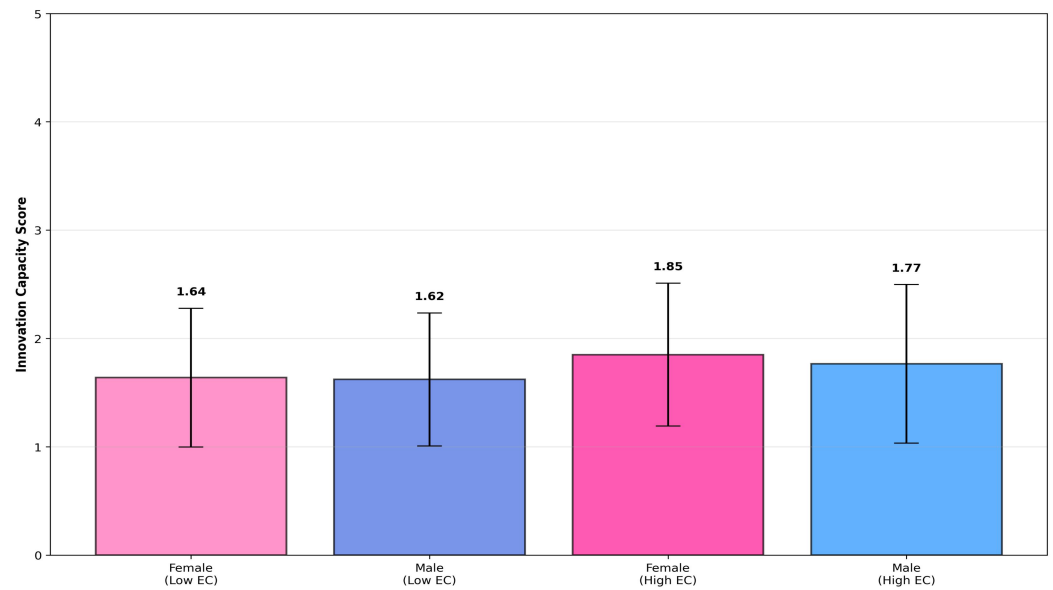


Figure 11. Visualization of the moderating effect of affective commitment and gender on the relationship between inclusive practices and innovation capability (bar plot).

The figure shows the mean innovation capability under four conditions: Female/Low EC, Male/Low EC, Female/High EC, Male/High EC (± 1 SD error bars). Under high affective commitment, female teachers' innovation capability mean is significantly higher than under low affective commitment and also higher than male teachers under the same condition, indicating that the positive moderating effect of affective commitment is more pronounced among female teachers.

4.8. Model Diagnostics

Model diagnostic tests indicated that residuals were approximately normally distributed (Kolmogorov–Smirnov test, $D = 0.028$, $p = 0.124$), and homoscedasticity was satisfied (Levene test, $F(1, 854) = 2.13$, $p = 0.145$). Multicollinearity tests showed that all variables had variance inflation factors (VIF) below 2.5 (range: 1.03–2.41), indicating no multicollinearity issues. Cook's distance analysis did not identify any influential points affecting the regression results (maximum = 0.018), suggesting that the results are robust and reliable.

5. Discussion

5.1. Interpretation of Key Findings

The present study found a significant positive relationship between inclusive practices and innovation capability, which aligns with theoretical expectations and

supports the hypothesis that inclusive learning environments facilitate the development of innovation capability [12]. When teachers create a learning environment that respects diversity and encourages open discussion, students are more likely to engage in innovative thinking and generate novel ideas [13].

More importantly, this study systematically examined the moderating role of affective commitment. Results indicated that affective commitment significantly strengthens the positive effect of inclusive practices on innovation capability. This suggests that the mere external implementation of inclusive practices is insufficient; teachers' internal emotional engagement is critical for the effectiveness of these practices [5]. Teachers with high affective commitment are better able to understand students' diverse needs and create effective inclusive learning environments, thereby promoting students' innovation capability [14].

Regarding the negative moderating effect of gender stereotypes, the findings indicate that even when teachers implement inclusive practices, the presence of strong gender stereotypes weakens their effectiveness [8]. This highlights the importance of addressing and reducing gender stereotypes in the promotion of inclusive education.

5.2. Comparison with Previous Research

These findings are consistent with Graziano et al. (2024), who found that emotional self-efficacy moderates the relationship between teachers' empathy and their ability to implement inclusive education [4]. This study extends prior research by introducing gender stereotypes as a social-psychological factor, revealing a more complex moderating mechanism. Concerning gender differences, the study found that female teachers scored higher than male teachers in both inclusive practices and affective commitment, consistent with Deng et al. (2023), which highlighted women's advantages in emotional intelligence [16], and Strelakova (2019), which found greater empathy among female healthcare professionals [17].

5.3. Explanations and Underlying Mechanisms

Why does affective commitment enhance the effect of inclusive practices? One possible explanation is that **teachers with high affective commitment possess greater self-efficacy and job satisfaction**, making them more capable and willing to invest additional time and effort into implementing inclusive practices [5]. Moreover, high affective commitment may reflect a **deep-seated value alignment with teaching**, motivating teachers to more consistently advance inclusive practices [14]. Regarding the negative moderating effect of gender stereotypes, it is plausible that **stereotypical beliefs lead teachers to hold different expectations for students of different genders**, thereby undermining the fairness of the inclusive learning environment [15].

5.4. Theoretical Contributions

This study contributes to **educational psychology and higher education research** in several ways. It **extends theoretical understanding of inclusive education effectiveness**, emphasizing the importance of emotional factors [7]. It integrates theories from **educational psychology, social psychology, and organizational behavior**, providing a more comprehensive analytical framework. It systematically examines the **role of gender in inclusive education**, offering a new perspective for gender-related research [6].

5.5. Practical Implications

The findings have important implications for practice. For higher education institutions, implementing inclusive policies and practices alone is insufficient; it is also critical to support teachers' affective commitment [9]. Institutions should create conditions that foster professional development and emotional engagement, such as through training programs and supportive work environments. The study also underscores the importance of reducing gender stereotypes [15]. Institutions should adopt measures—including training, policy initiatives, and cultural development programs—to reduce stereotypical beliefs among both teachers and students.

5.6. Limitations

This study has several limitations: It employed a cross-sectional design, which cannot establish causality [18]. The sample was primarily drawn from specific regions and institutions, potentially limiting generalizability to other higher education settings. The study focused mainly on teacher-level factors, whereas student-level variables may also influence the effectiveness of inclusive practices. The self-developed innovation capability scale requires further validation to confirm its external validity [24].

5.7. Future Research Directions

Based on the findings and limitations of this study, future research could: Conduct longitudinal studies to establish causal relationships and experimental studies to test the effectiveness of interventions [30]. Expand the research to different countries and cultural contexts. Employ mixed-methods approaches to gain deeper insights into teachers' inclusive practices. Explore additional potential moderators that may influence the relationship between inclusive practices and innovation capability.

6. Conclusion

Based on a survey of 856 teachers, this study systematically examined the relationship between inclusive practices and innovation capability, as well as the moderating roles of affective commitment and gender stereotypes. The results indicated that inclusive practices are positively associated with innovation capability, affective commitment positively moderates this relationship, and gender stereotypes negatively moderate it. Additionally, gender further moderates the strength of these relationships.

These findings underscore that, in promoting inclusive education, it is essential to address both teachers' emotional engagement and relevant socio-psychological factors. Higher education institutions should create conditions that support teachers' affective commitment while implementing measures to reduce gender stereotypes, thereby maximizing the effectiveness of inclusive practices.

The theoretical contribution of this study lies in providing an integrated analytical framework that reveals the psychological and social mechanisms underlying the effectiveness of inclusive education. The practical contribution lies in offering concrete guidance for policy-making and teacher development in higher education institutions.

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