

The Influence of School Climate on Preservice Teachers' Learning Engagement: A Chain-Mediation Model

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Abstract: To explore the mechanism by which school climate influences pre-service teachers' learning engagement, this study employed the school climate scale, learning engagement questionnaire, basic psychological needs scale, and teacher professional identity scale to survey 461 undergraduate students majoring in teacher education. The results show that the school climate not only directly influences pre-service teachers' learning engagement but also affects it through the mediating role of basic psychological needs satisfaction and teacher professional identity, as well as through the chain-mediated effect of basic psychological needs satisfaction → teacher professional identity. The findings of this study reveal the complex mechanisms through which school climate influences learning engagement, while also offering actionable recommendations for enhancing students' learning engagement.

Keywords: Teacher Education Students; School Climate; Learning Engagement; Satisfaction of Basic Psychological Needs; Professional Identity as Teachers

1. Introduction

The learning engagement of teacher education students has garnered significant attention as a crucial factor influencing their academic achievement [1-3]. It serves as a vital indicator for measuring the educational quality of teacher training institutions [4]. Learning engagement is particularly important for both students' individual professional development and the enhancement of educational quality in teacher education institutions.

Therefore, teacher training institutions must strengthen the cultivation of teacher candidates, particularly by enhancing their commitment to learning. Learning engagement refers to the degree of mental and behavioral activity an individual exhibits when participating in learning-related activities. It is primarily measured by the level of emotional and behavioral involvement [5]. Research indicates that learning engagement influences academic achievement, competency development, and learning satisfaction [6]. Specifically, the academic commitment of pre-service teachers during their studies is a prerequisite for achieving strong academic performance and enhancing professional competence. This commitment directly impacts the quality of teacher talent development [7]. Research on the factors influencing learning engagement has long been a focal point for scholars, particularly when exploring internal factors. Existing studies have identified associations between learning engagement and school belonging [2], teacher professional identity [3], and pre-service teachers' sense of professional mission [7]. Although a small number of scholars have examined external environmental factors such as school climate [8], no studies have investigated the impact of the interaction between these external environmental factors and internal factors on learning engagement. This indicates that the mechanism through which learning investment exerts influence remains incomplete. Therefore, this research aims to use school climate as the antecedent variable and teacher education students as the subjects to investigate whether school climate directly influences learning engagement or the mechanism by which its interaction with other internal variables affects learning engagement.

1.1 School climate and Academic Engagement

Bronfenbrenner proposed the ecological systems theory, positing that developing individuals exist within a series of nested environmental systems^[9]. An individual's learning engagement is influenced by environmental factors^[1]. As the primary environment for university students, the university setting inevitably impacts their learning engagement. Hoy posits that school climate represents a relatively stable and enduring psychological feature within the university environment^[10], which influences academic engagement.^[8] Research on school climate has long focused on student interactions, organizational systems, and campus culture. Some studies have also indicated that school climate can significantly predict students' learning engagement^[11]. Within the context of teacher education programs, it remains unproven whether the atmosphere at teacher training institutions influences student engagement. Based on the above review of existing research, this study proposes Hypothesis H1: School climate can directly predict pre-service teachers' learning engagement.

1.2 The Mediating Role of Basic Psychological Needs Satisfaction

Individual's motivated behavior can be continuously internalized as their basic psychological needs are met, which in turn triggers more proactive and positive learning behaviors^[8]. The fulfillment of basic psychological needs encompasses three types: autonomy needs, relationship needs, and competence needs. When basic needs are met in an ideal state, it stimulates an individual's potential and motivation, promoting external activities. Li found in her research on middle school students' learning engagement that basic psychological needs were significantly positively correlated with their learning engagement^[12].

Previous research has found that self-determination theory posits that individuals aspire for their basic psychological needs to be fulfilled, and the process of satisfying these needs requires the support of various external social factors^[13]. This theory also proposes a model of the mediating influence mechanism whereby the satisfaction of basic psychological needs operates within social environments and individual interactions^[12]. Based on the above, it can be inferred that school climate may influence learning engagement through the satisfaction of basic psychological needs. Therefore, this study proposes Hypothesis H2: The satisfaction of basic psychological needs mediates the effect of school climate on pre-service teachers' learning engagement.

1.3 The Mediating Role of Occupational Identity

Occupational identity refers to an individual's conscious identification with their chosen profession and willingness to embrace the corresponding occupational roles and societal expectations. Social identity theory posits that an individual's recognition of a specific social group can provide emotional value, and this recognition also influences personal behavioral choices and attitude changes^[14]. Research has found that teachers' professional identity influences pre-service teachers' learning engagement. Pre-service teachers with high professional identity exhibit stronger learning motivation and are more willing to invest time in acquiring specialized knowledge and enhancing their teaching competencies^[15]. An encouraging environment helps individuals fully tap into their internal resources and maintain positive attitudes and behaviors by enhancing their identification with and evaluation of the teaching profession^[14]. The school climate serves as an environmental factor influencing professional identity. Han Xinqiang et al. found that both the school climate and its dimensions were significantly and positively correlated with teachers' professional identity^[16]. This study hypothesizes that school climate may influence pre-service teachers' learning engagement by affecting their professional identity as teachers. Therefore, Hypothesis H3 is proposed: Professional identity mediates the effect of school climate on pre-service teachers' learning engagement.

1.4 The Mediating Role of Basic Psychological Needs Satisfaction in Professional Identity Formation

The satisfaction of basic psychological needs is positively correlated with the level of occupational identity, meaning that the better the satisfaction of basic psychological needs, the higher the level of occupational identity^[17]. Integrating ecosystem theory, self-determination theory, and social identity theory, the school environment—as a persistent and stable environmental factor^[10]—facilitates individuals' access to valuable information and promotes the fulfillment of their basic psychological needs. This further enhances individuals' emotional and affective identification with the teaching

profession^[18], and professional identity as a teacher positively predicts learning motivation^[19], stimulating individuals' engagement in learning activities. Therefore, this study proposes hypothesis H4: the satisfaction of pre-service teachers' basic psychological needs and teacher professional identity play a chain mediating role between school climate and learning engagement.

2. Research Methods

2.1 Research Subjects

A convenience cluster sampling method was adopted, and questionnaires were distributed to 481 normal major students from two higher normal universities in Guangxi. After excluding invalid questionnaires such as those with regular response patterns or incomplete answers, 461 valid questionnaires were retrieved, with an effective response rate of 95.8%. Among them, there were 77 males (accounting for 16.7% of the total) and 384 females (accounting for 83.3% of the total); 215 were freshmen (46.6% of the total), 206 were sophomores (44.7% of the total), and 40 were juniors (8.7% of the total).

2.2 Research Tools

2.2.1 School Climate Scale

This study employed the School Environment Scale developed by^[20], comprising nine items grouped into three factors: physical environment, teacher-student relationships, and peer relationships. In this study, the internal consistency coefficients for the physical environment, teacher-student relationships, and peer relationships were 0.63, 0.65, and 0.66.

2.2.2 Teacher Education Students' Professional Identity Scale

This study employed the Free Teacher Education Students' Professional Identity Scale developed by^[21], comprising 15 items and divided into three subscales: intrinsic value identity, extrinsic value identity, and behavioral-volitional identity. In this study, the internal consistency coefficients for intrinsic value identification, extrinsic value identification, and behavioral volitional identification were 0.85, 0.67, and 0.79.

2.2.3 Basic Psychological Needs Scale

This study employed the Basic Psychological Needs Scale revised by Liu Junsheng et al.^[22], comprising 21 items organized into three dimensions: belongingness needs, autonomy needs, and competence needs. In this study, the internal consistency coefficients for the need for belongingness, the need for autonomy, and the need for competence were 0.67, 0.60, and 0.74.

2.2.4 Learning Engagement Questionnaire

This study employed the Chinese version of the Study Engagement Questionnaire revised by Li et al.^[23]. Two subscales—Behavioral Engagement and Affective Engagement—were selected, with internal consistency coefficients of 0.77 and 0.81, respectively, comprising 11 items in total. In this study, the internal consistency coefficients for behavioral commitment and affective commitment were 0.82 and 0.83.

3. Results

3.1 Common Method Bias Test

The study employed Harman's single-factor method to examine common method bias. Results indicated that 12 factors with eigenvalues greater than 1 emerged from unrotated principal component analysis. The first factor explained 26.76% of the variance, falling below the critical threshold of 40%. This suggests no significant common method bias exists in this research.

3.2 Descriptive Statistics and Correlation Coefficients for Each Variable

Table 1 presents the descriptive statistics for each variable and the correlation coefficients between variables. Significant pairwise positive correlations were found among the dimensions of school climate,

fulfillment of basic psychological needs, teacher professional identity, and learning engagement, thereby satisfying the prerequisites for testing the mediating effect.

Table 1 Descriptive Statistics and Correlation Analysis of Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1Gender	-													
2Grade		-												
3Grade1	0.06	-												
4Grade2	0.14**	-0.28**	-											
5Physical Environment	.001	-0.13**	-0.24**	-										
6Teacher-Student Relationships	.033	0.01	-0.24**	0.65**	-									
7Peer Relationships	-0.11*	-0.03	-0.13**	0.57**	0.64**	-								
8Autonomy Needs	0.01	-0.14**	0.04	0.35**	0.32**	0.40**	-							
9Competence Needs	-0.03	-0.16**	0.01	0.35**	0.30**	0.37**	0.63**	1						
10Belongingness Needs	-0.09	-0.12*	-0.09	0.39**	0.36**	0.44**	0.57**	0.62**	-					
11Intrinsic Value Identification	-0.09*	-0.10*	-0.12*	0.44**	0.47**	0.47**	0.37**	0.38**	0.43**	-				
12Extrinsic Value Identification	-0.08	-0.09	-0.19**	0.40**	0.44**	0.44**	0.25**	0.27**	0.32**	0.63**	-			
13Behavioral Willpower Identification	-0.15**	-0.16**	-0.11*	0.39**	0.47**	0.60**	0.37**	0.37**	0.43**	0.72**	0.57**	-		
14Emotional Engagement	-0.15**	-0.16**	-0.16**	0.42**	0.46**	0.51**	0.43**	0.48**	0.45**	0.51**	0.37**	0.60**	-	
14Emotional Engagement	-0.14**	-0.13**	-0.18**	0.43**	0.47**	0.50**	0.48**	0.47**	0.49**	0.56**	0.42**	0.60**	0.81**	-
M	-	-	-	3.13	2.96	2.90	2.86	2.89	3.11	3.33	3.15	2.87	3.00	3.05
SD	-	-	-	0.60	0.60	0.65	0.44	0.47	0.47	0.51	0.59	0.64	0.56	0.56

Note: Gender is a dummy variable, with males = 0 and females = 1. Grade is a dummy variable: Grade 1 (Sophomore): Freshman = 0, Sophomore = 1; Grade 2 (Junior): Freshman = 0, Junior = 1. *p<0.05, **p<0.01, same below.

3.3 Testing for Mediating Effects

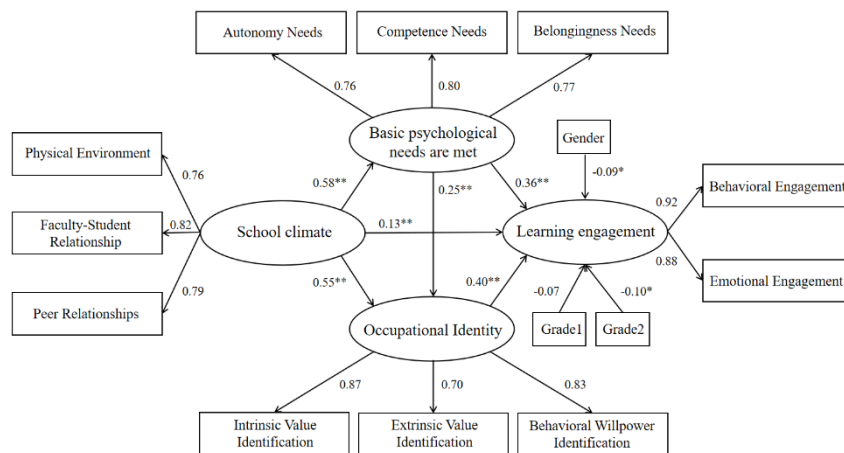


Figure 1: Structural Equation Model of School climate, Satisfaction of Basic Psychological Needs, Teacher Professional Identity, and Learning Engagement.

A structural equation model of latent variables was established with school climate as the independent variable, basic psychological needs fulfillment and teacher professional identity as mediating variables, and learning engagement as the dependent variable. Since gender and grade level showed significant correlations with the dependent variable, they were dummy-coded and included as control variables in the model (see Figure 1). Results from the AMOS 26.0 analysis indicate $\chi^2/df=3.317$, GFI=0.93, CFI=0.95, NFI=0.93, RMSEA=0.07, indicating good model fit.

Figure 1 shows the results. After controlling for gender and grade level, school climate exerts a positive predictive effect on learning engagement, meaning that the better the school climate, the higher the level of learning engagement among teacher education students. Furthermore, the school climate positively predicts the fulfillment of basic psychological needs and teachers' professional identity among teacher education students. The fulfillment of basic psychological needs positively predicts professional identity, while both the fulfillment of basic psychological needs and teachers' professional identity exert significant positive predictive effects on learning engagement.

This study further employed the Bootstrap method to test the mediating effect, with 5,000 resamples conducted and a 95% confidence interval established for the mediating effect. The results in Table 2 indicate that, after controlling for gender and grade level, the school climate has a significant direct effect on school engagement. Both the mediating pathways of "school climate → satisfaction of basic psychological needs → learning engagement" and "school climate → teacher professional identity → learning engagement" were confirmed, with mediating effects accounting for 33.66% and 35.44% respectively. In addition, the chain mediating pathway of "school climate → basic psychological need satisfaction → teachers' professional identity → learning engagement" is also valid. The results indicate that school climate not only directly affects the learning engagement of normal university students, but also indirectly influences their learning engagement through two separate pathways—basic psychological need satisfaction and teachers' professional identity—as well as via the sequential pathway of basic psychological need satisfaction → teachers' professional identity.

Table 2 Bootstrap Test Results for Mediating Effects.

Path	Effect	Boot SE	95% confidence interval		Total Effect Ratio(%)
			Lower Bound	Upper Bound	
Direct Effect	0.132	0.069	0.002	0.293	21.36%
School climate - Basic Psychological Needs Satisfaction - Learning Engagement	0.208	0.043	0.123	0.304	33.66%
School climate - Teacher Professional Identity - Learning Engagement	0.219	0.047	0.131	0.315	35.44%
School climate - Basic Psychological Needs Satisfaction - Teacher Professional Identity - Learning Engagement	0.059	0.017	0.032	0.100	9.54%
Total Effect	0.618	0.041	0.533	0.692	

4. Discussion

This study adopted a convenience cluster sampling method, with students majoring in normal education from two higher normal universities in Guangxi as the research subjects. It explored the influence mechanism of school climate on normal university students' learning engagement in the context of normal education program accreditation. The results revealed a chain-mediated relationship between school climate and teacher education students' learning engagement. Specifically, school climate satisfies students' basic psychological needs, thereby enhancing their professional identity as teachers and ultimately promoting their learning engagement.

This study found that school atmosphere has a significant positive predictive effect on normal students' learning engagement, which is consistent with the findings of Wang Feng^[11], Wu Xuefeng^[8] and others. It confirmed that the conclusion that school atmosphere affects students' learning engagement is also applicable to normal students, and also provides an empirical basis for ecosystem theory^[1]. This result also further supports that under the background of the national policy on the professional certification of normal students, normal colleges and teachers pay more attention to the cultivation of normal students' education and teaching skills, and the more teachers and students, students and students pay attention to and discuss the content of education and teaching, the more normal students' learning engagement can be promoted.

This study also identified a mediating effect between school climate and academic engagement. On the one hand, the school climate indirectly predicts pre-service teachers' learning engagement through the partial mediating effect of basic psychological needs satisfaction. This finding supports the influence mechanism model proposed by self-determination theory, which posits that basic psychological needs satisfaction mediates the interaction between social environments and individuals. Specifically, the high priority placed by schools and teachers on cultivating pre-service teachers' educational and teaching skills enables them to perceive behavioral support from significant others. This fulfills individuals' fundamental psychological needs for autonomy, competence, and belonging, thereby promoting positive learning development^[18] and fostering greater engagement in learning.

On the other hand, the school climate also indirectly affects teachers' learning engagement through

pre-service teachers' professional identity. More specifically, an encouraging school climate enhances individuals' identification with the teaching profession as a distinct social group within social environments and interactions. This, in turn, fosters students' learning motivation, stimulates their intrinsic drive to learn, and ultimately elevates pre-service teachers' level of learning engagement. This finding supports social identity theory, which posits that individuals' identification with specific social groups can promote positive behavioral choices and attitude changes.

The fulfillment of basic psychological needs and teachers' professional identity exert a chain-mediated effect on school climate and pre-service teachers' learning engagement. This fosters high levels of learning engagement among teacher education students. Additionally, peer support and interpersonal relationships within the university environment are significant factors influencing teacher education students' learning processes. Strong peer support and interpersonal bonds enhance the efficiency of student-to-student discussions on educational content, while also strengthening individuals' affirmation of the external and intrinsic value of the teaching profession and their behavioral commitment. This, in turn, fosters greater intrinsic motivation^[11]. Therefore, actively creating a positive school climate and striving to enhance pre-service teachers' professional identity as teachers are of great significance to their learning engagement. This result provides a new perspective for us to understand the complex mechanism underlying the relationship between school climate and college students' learning engagement.

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