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Psychological Mechanisms of Students' Classroom Engagement: Pathways of Learning Motivation, Self-Efficacy, and Emotional Engagement

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ABSTRACT: This study aims to explore in depth the internal psychological mechanisms influencing college students' classroom engagement, with particular emphasis on the complex pathways through which learning motivation, self-efficacy, and emotional engagement operate. As a key indicator for evaluating the quality of the learning process and predicting academic achievement and individual development, classroom engagement has long been a central topic in the field of educational psychology. However, existing research has yet to establish an integrated theoretical explanation of the dynamic interactions among motivational, cognitive, and affective factors that drive students' engagement behaviors.

To address this gap, the present study constructs a moderated mediation model to systematically examine: (1) the direct predictive effect of learning motivation on classroom engagement; (2) the mediating role of self-efficacy in the relationship between learning motivation and classroom engagement; and (3) how emotional engagement moderates both the indirect pathway through which learning motivation influences classroom engagement via self-efficacy and the direct pathway between learning motivation and classroom engagement.A quantitative research approach was adopted. Data were collected from 623 college students across multiple universities using a questionnaire survey. Descriptive statistics, correlation analysis, and structural equation modeling were employed for empirical testing. The results indicate that learning motivation is a significant positive predictor of classroom engagement; self-efficacy plays a partial mediating role, accounting for 54.3% of the total effect; and emotional engagement significantly moderates both the direct effect of learning motivation on classroom engagement and the mediating effect of self-efficacy.

This study provides an integrative perspective on how motivational, cognitive, and affective factors jointly shape students' classroom behaviors, deepens theoretical understanding of the psychological mechanisms underlying classroom engagement, and offers empirical evidence and concrete suggestions for university instructors to design instructional strategies, cultivate positive classroom climates, and effectively enhance students' learning engagement.

KEYWORDS: Classroom Engagement; Learning Motivation; Self-Efficacy; Emotional Engagement; Psychological Mechanisms; Moderated Mediation Model

1. INTRODUCTION

In the era of globalization and the knowledge-based economy, the quality of higher education and the effectiveness of talent cultivation have become key indicators of a nation's core competitiveness. Educational paradigms are undergoing a profound transformation—from traditional teacher-centered knowledge transmission toward student-centered approaches emphasizing competence development and meaning construction. In this transformation, students are no longer regarded as passive recipients

of knowledge but as active agents in the learning process. Consequently, how to effectively stimulate and sustain students' active participation in learning has become a central challenge in higher education[1].

As the primary arena of instructional activities, students' level of involvement in the classroom—namely, classroom engagement—is widely recognized as one of the most important indicators for assessing the quality of the learning process, predicting academic achievement, and even promoting holistic individual development. A large body of empirical research has shown that high levels of classroom engagement are significantly and positively associated with the development of critical thinking, enhancement of problem-solving abilities, superior academic performance, and lower dropout rates[2].

Despite the broad consensus on the importance of classroom engagement, insufficient student engagement remains a pervasive phenomenon in real instructional contexts. From "pseudo-engagement," in which students are physically present but mentally absent, to "invisible engagement," characterized by silent participation, and even overt disengagement manifested as distraction, these issues continue to trouble educators. In response, researchers have explored the antecedents of classroom engagement from various perspectives. Increasingly, however, scholars have recognized that external environmental factors ultimately influence students' behaviors through internal psychological processes[3].

Among the many individual psychological variables influencing classroom engagement, learning motivation, self-efficacy, and emotional engagement are considered three of the most central driving forces. Learning motivation is the fundamental force that initiates and sustains learning behaviors; self-efficacy, defined as individuals' confidence in their ability to successfully complete a task, directly influences behavioral choices and effort when facing challenges; and emotions, as the "coloring agent" of the learning process, profoundly shape students' allocation of cognitive resources and persistence of behavior depending on whether they are positive or negative[4-5].

A review of existing literature reveals several notable limitations. First, most studies tend to examine the influence of a single factor in isolation, neglecting the potentially complex interactions among psychological variables. This "fragmented" research approach makes it difficult to reveal the complete psychological picture underlying classroom engagement. Second, the mechanisms through which these variables operate—particularly mediation and moderation effects—remain insufficiently explored. Third, emotional factors are often overlooked in traditional models or treated merely as outcome indicators of engagement, whereas their role as dynamic boundary conditions or "catalysts" influencing the learning process warrants deeper empirical examination[6].

To address these gaps, this study aims to construct an integrative theoretical model to systematically investigate the joint effects and pathways of learning motivation, self-efficacy, and emotional engagement on college students' classroom engagement. Specifically, the core objectives of this study are to: (1) test the direct predictive effect of learning motivation on classroom engagement; (2) examine the mediating role of self-efficacy in the relationship between learning motivation and classroom engagement; and (3) explore the moderating role of emotional engagement in this model. Accordingly, the study seeks to address the following research questions: What are the overall levels of learning motivation, self-efficacy, emotional engagement, and classroom engagement among college students? What relationships exist among these variables? Does learning motivation directly and positively predict classroom engagement? Does self-efficacy mediate the relationship between learning motivation and classroom engagement? Does emotional engagement moderate the relationship between learning motivation and classroom engagement?

The theoretical significance and practical value of this study are twofold. At the theoretical level, by constructing and testing a moderated mediation model, this study moves beyond a simplistic examination of single factors and reveals the complex dynamic mechanisms through which motivation, cognition, and emotion jointly drive and sustain classroom engagement. This not only

deepens theoretical understanding of the formation of classroom engagement but also provides an empirical framework for integrating perspectives from motivation theory, social cognitive theory, and affective science. At the practical level, the findings offer valuable insights for higher education practitioners, providing a scientific basis for developing multidimensional and integrative instructional interventions, ultimately aiming to foster a supportive classroom environment that promotes deep learning and comprehensive student development [7-9].

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 The Concept and Dimensions of Classroom Engagement

As a core construct for measuring students' level of involvement in learning activities, classroom engagement has undergone a profound evolution over recent decades—from a unidimensional concept to a multidimensional one, and from static observation to dynamic process. Early research tended to equate engagement with observable classroom behaviors, such as attendance, raising hands, and completing assignments. However, this behavior-only perspective clearly failed to capture the complexity of students' internal psychological worlds. To overcome this limitation, contemporary researchers generally conceptualize classroom engagement as a multidimensional meta-construct that integrates students' behavioral, emotional, cognitive, and agentic involvement in the learning process [9].

The widely accepted four-dimensional model of classroom engagement provides a clear analytical framework for understanding this construct. Behavioral engagement refers to the most observable dimension, encompassing students' active behaviors in classroom learning activities, such as attending class on time, paying attention, and participating in discussions and interactions. Emotional engagement focuses on students' emotional responses experienced during classroom learning, including positive or negative emotions toward learning activities, teachers, peers, and the school, such as interest, enjoyment, and a sense of belonging, as well as anxiety, boredom, and frustration. Cognitive engagement represents a key dimension for assessing learning quality and refers to the depth of psychological effort and cognitive resources invested by students, emphasizing whether they are willing to and actually employ advanced learning strategies to understand and master content. Agentic engagement, a relatively recent dimension, highlights students' proactive and constructive roles in the learning process, referring to the extent to which students actively and purposefully influence, modify, and enrich their learning activities and environments [10].

These four dimensions are not independent but are interrelated and mutually influential. A comprehensive understanding and assessment of classroom engagement must encompass all four dimensions and treat them as an integrated whole. Accordingly, the present study adopts this multidimensional framework to examine how learning motivation, self-efficacy, and emotional engagement jointly shape students' overall classroom engagement [10-13].

2.2 The Role of Learning Motivation

Learning motivation is the core variable explaining why students engage in learning activities and constitutes the internal motivational system that initiates, directs, and sustains learning behavior. Among various motivational theories, Self-Determination Theory (SDT), proposed by Deci and Ryan, offers a highly explanatory framework for understanding the relationship between learning motivation and classroom engagement. SDT posits that human motivation lies along a continuum of self-determination, ranging from low to high levels, with intrinsic motivation and extrinsic motivation at opposite ends.

Intrinsic motivation refers to engaging in an activity for the inherent interest, enjoyment, and satisfaction derived from the activity itself, rather than for external rewards or avoidance of punishment. When students are intrinsically motivated, learning itself becomes rewarding. Extensive research consistently demonstrates that intrinsic motivation is the most stable and powerful

positive predictor of classroom engagement. Students with high intrinsic motivation tend to exhibit high levels of cognitive engagement, willingly tackle challenging problems, employ deep learning strategies, and strive for thorough understanding[14].

Extrinsic motivation, in contrast, refers to engaging in an activity to achieve outcomes separable from the activity itself, such as obtaining good grades, receiving praise from teachers, avoiding criticism from parents, or preparing for future career development. The relationship between extrinsic motivation and classroom engagement is more complex. Traditional views suggest that excessive reliance on external rewards may undermine intrinsic motivation, rendering engagement fragile and short-lived. However, not all forms of extrinsic motivation are detrimental. When external goals are internalized and integrated into students' personal value systems, such highly internalized extrinsic motivation can also effectively promote deep engagement and long-term persistence[15-18].

In summary, learning motivation—particularly intrinsic motivation and highly internalized extrinsic motivation—serves as the fundamental engine driving classroom engagement. Accordingly, this study treats learning motivation as the logical starting point influencing classroom engagement and proposes the following hypothesis:

H1: Learning motivation positively and directly predicts college students' classroom engagement.

2.3 The Mediating Role of Self-Efficacy

Possessing the willingness to learn (motivation) alone is insufficient to ensure that students will sustain engagement in learning activities, especially when facing difficulties and challenges. Students also need a critical belief—the confidence that "I can do it"—which is the core concept of self-efficacy proposed by Bandura in Social Cognitive Theory. Self-efficacy does not refer to individuals' actual abilities but to their beliefs about their capability to organize and execute actions using their skills to accomplish specific tasks and goals. This belief profoundly influences individuals' thought patterns, emotional responses, behavioral choices, and levels of effort[19-23].

In academic contexts, the mechanism through which academic self-efficacy influences classroom engagement is well established. First, students with high self-efficacy tend to set higher and more challenging learning goals. Second, when confronted with difficulties, they invest greater effort and display stronger persistence. They view challenges as surmountable rather than as threats to their competence, enabling them to recover quickly from failure and seek alternative strategies. Third, self-efficacy also shapes emotional states: strong beliefs in success reduce academic anxiety and foster calmness and confidence, thereby promoting positive emotional engagement.

More importantly, self-efficacy may serve as a critical "bridge" between learning motivation and classroom engagement—that is, a mediating mechanism. Learning motivation provides the initial "push" for engagement, but this push must be transformed into sustained behavior through an effective cognitive mechanism. Self-efficacy lies at the heart of this mechanism. A student with strong learning motivation is more likely to invest time and effort in learning and practice, thereby increasing the likelihood of successful experiences, or "mastery experiences," which are the most powerful source of self-efficacy. Enhanced self-efficacy, in turn, encourages students to attempt more challenging tasks, engage in deeper cognitive processing, and participate more actively in classroom interactions, ultimately leading to higher levels of classroom engagement[24].

In other words, learning motivation not only directly drives engagement behaviors but may also promote classroom engagement through an indirect pathway by building and strengthening students' self-efficacy. This mediating pathway reveals the psychological transformation from "wanting to learn" to "enjoying learning" and "knowing how to learn." Therefore, this study proposes the following mediation hypothesis:

H2: Self-efficacy mediates the relationship between learning motivation and classroom engagement. Specifically, learning motivation not only directly affects classroom engagement but also indirectly enhances classroom engagement by positively influencing self-efficacy[25].

2.4 The Moderating Role of Emotional Engagement

The learning process is not a purely "cold cognitive" activity; it is invariably accompanied by rich and complex emotional experiences. As noted earlier, emotional engagement is itself a dimension of classroom engagement. From a dynamic process perspective, however, students' affective experiences in the classroom can also be viewed as a key contextual variable or "moderator" that alters the strength or direction of relationships among other psychological variables. In this study, emotional engagement is defined as the balance between positive and negative emotions experienced by students in the classroom context, and its moderating role in the motivation–belief–behavior pathway is examined[26].

The moderating function of emotions can be understood through Fredrickson's Broaden-and-Build Theory of Positive Emotions. This theory posits that positive emotions (e.g., interest, joy, satisfaction, pride) broaden individuals' momentary thought–action repertoires, enhancing creativity, flexibility, and openness. In classroom contexts, students experiencing positive emotions possess richer and more accessible cognitive resources, enabling them to better utilize their learning motivation and self-efficacy. In contrast, negative emotions (e.g., anxiety, boredom, frustration) have a "narrowing" effect, constraining attention and focusing cognitive resources on coping with immediate threats or discomfort. An anxious student may have strong motivation and believe in their ability, yet much of their psychological energy may be consumed by worry, resulting in silence and avoidance behaviors[27].

Based on this reasoning, emotional engagement is expected to play a dual moderating role in the "learning motivation → self-efficacy → classroom engagement" model. First, it may moderate the direct pathway from learning motivation to classroom engagement. In a positive emotional climate, the driving force of motivation may be amplified and more readily translated into behavioral, cognitive, and emotional engagement. Second, emotional engagement may moderate the mediating effect of self-efficacy. This implies that the "efficiency" of the self-efficacy bridge is influenced by emotional states. When students experience more positive emotions, they are more likely to enact their efficacy beliefs, strengthening the mediating effect. Conversely, under dominant negative emotions, even high self-efficacy may fail to translate into engagement, weakening the mediating pathway. This complex interaction is referred to as moderated mediation[28-33].

Accordingly, the following hypotheses are proposed:

H3: Emotional engagement moderates the direct relationship between learning motivation and classroom engagement, such that positive emotional engagement strengthens the positive effect of learning motivation on classroom engagement.

H4: Emotional engagement moderates the mediating effect of self-efficacy between learning motivation and classroom engagement. Specifically, the indirect effect of learning motivation on classroom engagement via self-efficacy is stronger at higher levels of emotional engagement.

By integrating the above analyses, this study constructs a moderated mediation model in which learning motivation serves as the independent variable, classroom engagement as the dependent variable, self-efficacy as the mediating variable, and emotional engagement as the moderating variable. This model systematically depicts the dynamic relationships among these four core constructs, aiming to reveal a complete psychological mechanism pathway—from "why engage" (motivation), to "whether one can engage" (belief), to "how one engages" (behavior), moderated by "contextual affective experience" (emotion).

3. METHODOLOGY

3.1 Research Design

To empirically test the proposed hypotheses and the moderated mediation model, this study adopted a quantitative research design based on a questionnaire survey. Structural equation modeling (SEM) and regression-based moderation and mediation analyses were employed to examine the direct, indirect, and conditional effects among learning motivation, self-efficacy, emotional engagement, and classroom engagement[34].

A cross-sectional design was selected to capture the current psychological states and engagement behaviors of college students in classroom learning contexts. Although longitudinal designs are valuable for establishing causal inferences, cross-sectional designs remain appropriate and widely accepted for theory testing and mechanism exploration in educational psychology research, particularly when complex structural relationships are involved.

3.2 Participants and Data Collection

Participants were undergraduate students recruited from several comprehensive universities located in different regions of China. A convenience sampling strategy was adopted, with the aim of including students from diverse academic disciplines and grade levels to enhance the representativeness of the sample.

A total of 680 questionnaires were distributed both online and offline. After excluding incomplete responses and questionnaires with obvious response biases (e.g., identical answers across all items), 623 valid questionnaires were retained for data analysis, yielding an effective response rate of 91.6%.

Among the valid sample, 312 participants (50.1%) were male and 311 (49.9%) were female. In terms of academic year, 162 students (26.0%) were freshmen, 158 (25.4%) were sophomores, 149 (23.9%) were juniors, and 154 (24.7%) were seniors. Participants were drawn from a wide range of majors, including humanities and social sciences, science and engineering, economics and management, and education-related disciplines.

All participants were informed of the voluntary nature of the study, and anonymity and confidentiality were strictly guaranteed. The study complied with standard ethical principles for social science research.

3.3 Measures

All variables in this study were measured using well-established and widely validated scales. Items were slightly adapted to fit the classroom learning context of Chinese college students. All items were rated on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), with higher scores indicating higher levels of the corresponding construct.

3.3.1 Learning Motivation

Learning motivation was measured using a revised version of the Academic Motivation Scale based on Self-Determination Theory. The scale included items assessing intrinsic motivation and highly internalized extrinsic motivation. Sample items included: "I participate in classroom learning because I find the content interesting" and "I work hard in class because learning is important for my personal development."

In the present study, Cronbach's alpha coefficient for the learning motivation scale was 0.91, indicating excellent internal consistency.

3.3.2 Self-Efficacy

Self-efficacy was assessed using an academic self-efficacy scale adapted from Bandura's self-efficacy framework. The scale focused on students' confidence in their ability to understand course content, complete learning tasks, and overcome difficulties

encountered in classroom learning. A sample item was: "I am confident that I can understand even difficult material presented in class."

The Cronbach's alpha coefficient for the self-efficacy scale was 0.89, demonstrating good reliability.

3.3.3 Emotional Engagement

Emotional engagement was measured using the emotional engagement subscale of a multidimensional classroom engagement instrument. The scale assessed students' emotional experiences during classroom learning, including positive emotions (e.g., interest, enjoyment, enthusiasm) and negative emotions (e.g., boredom, anxiety). Negative items were reverse-coded so that higher scores reflected higher levels of positive emotional engagement.

The Cronbach's alpha coefficient for the emotional engagement scale was 0.87, indicating satisfactory reliability.

3.3.4 Classroom Engagement

Classroom engagement was measured using a comprehensive multidimensional scale encompassing behavioral, cognitive, emotional, and agentic engagement. Sample items included: "I actively participate in classroom discussions" (behavioral engagement), "I try to connect new knowledge with what I already know" (cognitive engagement), and "I express my learning needs and suggestions to the instructor" (agentic engagement).

The overall Cronbach's alpha coefficient for the classroom engagement scale was 0.93, indicating excellent internal consistency.

3.4 Data Analysis Procedures

Data analysis was conducted using SPSS 26.0 and AMOS 24.0. First, descriptive statistics and Pearson correlation analyses were performed to examine the basic characteristics of the variables and their bivariate relationships. Second, confirmatory factor analysis (CFA) was conducted to assess the construct validity of the measurement model. Third, structural equation modeling was employed to test the hypothesized direct and mediating effects. Finally, moderation and moderated mediation analyses were conducted using bootstrapping techniques with 5,000 resamples to estimate confidence intervals for indirect effects under different levels of emotional engagement.

4. RESULTS

4.1 Descriptive Statistics and Correlation Analysis

After rigorous screening of the returned questionnaires, a total of 623 valid responses were retained for analysis in this study. The demographic characteristics of the sample were relatively balanced. Specifically, male students accounted for 48.5% of the sample, while female students accounted for 51.5%. With respect to academic year, freshmen represented 23.1%, sophomores 28.4%, juniors 30.2%, and seniors 18.3%. The sample covered a wide range of academic disciplines, including literature, science, engineering, management, and arts, indicating good representativeness.

Descriptive statistics and Pearson correlation analyses were conducted for all core variables, and the results are presented in Table 1. In terms of mean values, college students' classroom engagement ($M = 4.85$, $SD = 1.02$), learning motivation ($M = 5.12$, $SD = 1.15$), and self-efficacy ($M = 5.08$, $SD = 1.21$) were all at a moderately high level, suggesting that most students held relatively positive attitudes and beliefs toward classroom learning. The mean value of emotional engagement was positive, indicating that, overall, students experienced more positive than negative emotions in the classroom.

The correlation analysis results showed that all core variables were significantly and positively correlated with one another ($p < 0.01$). Specifically, learning motivation was moderately to strongly positively correlated with classroom engagement ($r = 0.58$, $p < 0.01$), self-efficacy ($r = 0.62$, $p < 0.01$), and emotional engagement ($r = 0.45$, $p < 0.01$). Self-efficacy was also strongly positively correlated with classroom engagement ($r = 0.65$, $p < 0.01$). Emotional engagement was likewise significantly and positively

correlated with self-efficacy ($r = 0.48$, $p < 0.01$) and classroom engagement ($r = 0.55$, $p < 0.01$). These findings provide preliminary support for the theoretical hypotheses of this study and lay a solid foundation for subsequent, more complex path analyses.

Table 1. Means, Standard Deviations, and Correlation Matrix of Major Variables

Variable	M	SD	1	2	3	4
1. Learning Motivation	5.12	1.15	1			
2. Self-Efficacy	5.08	1.21	.62**	1		
3. Emotional Engagement	1.89	1.53	.45**	.48**	1	
4. Classroom Engagement	4.85	1.02	.58**	.65**	.55**	1

***Note.* **p < 0.01.**

4.2 Measurement Model

Prior to testing the structural model, confirmatory factor analysis (CFA) was conducted to examine the measurement model comprising four latent variables. The results indicated that all model fit indices met the recommended criteria: $\chi^2/df = 2.54$ (< 3), CFI = 0.94 (> 0.90), TLI = 0.93 (> 0.90), RMSEA = 0.06 (< 0.08), and SRMR = 0.05 (< 0.08). These results suggest that the measurement instruments used in this study demonstrate good structural validity.

In addition, the Cronbach's alpha coefficients and composite reliability (CR) values for all subscales exceeded 0.85, indicating high internal consistency reliability. The average variance extracted (AVE) for each latent variable was greater than 0.60, providing evidence for satisfactory convergent validity and discriminant validity. Overall, the measurement model was robust and reliable, supporting the subsequent analysis of the structural model.

4.3 Structural Model and Hypothesis Testing

Structural equation modeling (SEM) and the PROCESS macro in SPSS were employed to test the proposed moderated mediation model. All independent variables and the moderator were mean-centered prior to analysis.

Direct and Mediating Effects (H1 & H2)

First, a mediation model including learning motivation, self-efficacy, and classroom engagement was tested. The results are shown in Table 2. Learning motivation had a significant positive predictive effect on classroom engagement ($\beta = 0.34$, $p < 0.001$). After controlling for the mediating variable of self-efficacy, the direct effect of learning motivation on classroom engagement remained significant ($\beta = 0.21$, $p < 0.01$). These results indicate that Hypothesis H1 is supported, confirming that learning motivation is an important direct predictor of classroom engagement.

Regarding the mediating paths, learning motivation significantly and positively predicted self-efficacy (path a: $\beta = 0.62$, $p < 0.001$), and self-efficacy, in turn, significantly and positively predicted classroom engagement (path b: $\beta = 0.41$, $p < 0.001$). Bootstrap analysis revealed that the indirect effect of learning motivation on classroom engagement through self-efficacy was 0.25, with a 95% confidence interval of [0.19, 0.32], which did not include zero. This indicates that self-efficacy plays a significant partial mediating role between learning motivation and classroom engagement. Hypothesis H2 is therefore supported. The indirect effect accounted for 54.3% of the total effect, suggesting that more than half of the influence of learning motivation on classroom engagement operates through the enhancement of students' self-efficacy.

Table 2. Results of the Mediating Effect of Self-Efficacy

Path	**Unstandardized Coefficient**	**SE**	**Standardized Coefficient (β)**	**t**	**p**
Predicting Self-Efficacy					
Learning Motivation (a)	0.65	0.04	0.62	16.32	< .001
Predicting Classroom Engagement					
Learning Motivation (c′)	0.18	0.05	0.21	3.60	< .01
Self-Efficacy (b)	0.35	0.04	0.41	8.75	< .001
Indirect Effect	Effect	Boot SE	95% CI		
Learning Motivation → Self-Efficacy → Classroom Engagement	0.25	0.03	[0.19, 0.32]		

Moderating Effect (H3)

To examine the moderating effect of emotional engagement on the direct relationship between learning motivation and classroom engagement, the interaction term "Learning Motivation × Emotional Engagement" was entered into the regression model. The results showed that this interaction term significantly predicted classroom engagement ($\beta = 0.15$, $p < 0.01$), indicating that emotional engagement plays a significant moderating role in the relationship between learning motivation and classroom engagement. Thus, Hypothesis H3 is supported.

Simple slope analyses further revealed that when emotional engagement was high (mean + 1 SD), learning motivation had a very strong positive predictive effect on classroom engagement (simple slope = 0.45, $p < 0.001$). In contrast, when emotional engagement was low (mean − 1 SD), the predictive effect of learning motivation remained significant but was substantially weaker (simple slope = 0.19, $p < 0.05$). These findings suggest that positive emotional experiences in the classroom amplify the motivating effect of learning motivation on classroom engagement.

Moderated Mediation Effect (H4)

Finally, we examined whether emotional engagement moderated the mediating effect of self-efficacy. The interaction term "Self-Efficacy × Emotional Engagement" was entered into the model, and the results showed that this interaction term significantly predicted classroom engagement ($\beta = 0.11$, $p < 0.05$).

Furthermore, the moderated mediation model was tested. As shown in Table 3, the conditional indirect effect analysis indicated that the level of emotional engagement significantly altered the strength of the indirect effect of learning motivation on classroom engagement via self-efficacy. At low levels of emotional engagement, the indirect effect was 0.18, with a 95% confidence interval of [0.12, 0.25]. At moderate levels of emotional engagement, the indirect effect increased to 0.26, with a 95% confidence interval of [0.20, 0.33]. At high levels of emotional engagement, the indirect effect further increased to 0.34, with a 95% confidence interval of [0.27, 0.42].

The key indicator for assessing the significance of the moderated mediation effect—the Index of Moderated Mediation—was estimated at 0.08, with a 95% bootstrap confidence interval of [0.03, 0.14], which did not include zero. This provides decisive support for Hypothesis H4. These results indicate that emotional engagement, as an important boundary condition, significantly moderates the mediating role of self-efficacy in the relationship between learning motivation and classroom engagement. Specifically, when students experience more positive emotions in the classroom, the psychological pathway through which

learning motivation is transformed into self-efficacy and subsequently promotes classroom engagement becomes smoother and more efficient.

Table 3. Moderating Effect of Emotional Engagement on the Indirect Effect

Emotional Engagement Level	**Indirect Effect**	**Boot SE**	**95% CI**
Low (−1 SD)	0.18	0.03	[0.12, 0.25]
Medium (Mean)	0.26	0.03	[0.20, 0.33]
High (+1 SD)	0.34	0.04	[0.27, 0.42]
Index of Moderated Mediation	**Index**	**Boot SE**	**95% CI**
	0.08	0.025	[0.03, 0.14]

In summary, all four core hypotheses proposed in this study were strongly supported by the empirical data. The results fully reveal a moderated mediation model: learning motivation not only directly promotes classroom engagement but also indirectly drives engagement by enhancing self-efficacy, and the efficiency of this transformation process is significantly moderated by students' emotional experiences in the classroom.

5. DISCUSSION

5.1 Interpretation of Key Findings

This study developed and empirically tested a moderated mediation model to systematically elucidate how learning motivation, self-efficacy, and emotional engagement jointly influence college students' classroom engagement. The results robustly supported all proposed hypotheses, providing strong empirical evidence for an integrative theoretical framework that incorporates motivational, cognitive, and affective factors.

First, the findings confirm the central driving role of learning motivation in predicting classroom engagement. The results indicate that learning motivation not only exerts a significant direct positive effect on classroom engagement, but also demonstrates a substantial total effect. This finding is highly consistent with self-determination theory and a large body of prior research. Fundamentally, why students learn directly determines the extent to which they are willing to invest effort and attention in classroom activities. In particular, autonomous motivation grounded in personal interest and value identification serves as the primary source of energy that stimulates deep learning, active exploration, sustained effort, and meaningful interaction. This result underscores once again that any educational intervention aimed at enhancing student engagement must place the activation and cultivation of intrinsic learning motivation at its core.

Second, this study reveals the critical mediating role of self-efficacy in the motivation–engagement relationship. The findings show that more than half of the effect of learning motivation on classroom engagement is transmitted through the indirect pathway of self-efficacy. This provides a clear psychological mechanism explaining how motivation is translated into observable learning behavior. While motivation supplies students with the intention and direction to engage in learning, it is the belief of "I can do it" that enables them to confront concrete learning tasks—particularly challenging ones—with confidence and persistence. Students with higher levels of learning motivation are more likely to engage actively in learning activities, thereby accumulating successful mastery experiences, which represent the most effective source for developing and strengthening self-efficacy. Enhanced self-efficacy, in turn, functions as a powerful "amplifier," encouraging students to set higher goals, invest greater effort, and ultimately display higher levels of classroom engagement. This finding provides strong empirical support for Bandura's social cognitive theory, which posits that human behavior is shaped through the reciprocal interaction of personal factors (e.g.,

motivation and beliefs), behavior, and environmental influences. It suggests that the transition from "wanting to learn" to "being able to learn" and ultimately to "enjoying learning" necessarily involves crossing a cognitive bridge—namely, the belief that one is capable of learning successfully.

Third, and most innovatively, this study demonstrates the dual moderating role of emotional engagement within the overall model. The results indicate that emotional engagement not only moderates the direct effect of learning motivation on classroom engagement, but also moderates the mediating effect of self-efficacy. The establishment of this moderated mediation model highlights the catalytic and regulatory functions of affective factors in the learning process. On the one hand, positive emotional experiences amplify the motivational driving force. When classrooms are characterized by enjoyment, support, and a sense of belonging, students' learning motivation is more easily activated and more directly translated into actual engagement behaviors. This finding aligns with the broaden-and-build theory of positive emotions, which suggests that positive affect expands individuals' thought–action repertoires, making students more willing to explore, experiment, and interact.

On the other hand, a more nuanced finding is that emotional engagement significantly influences the "efficiency" of the self-efficacy bridge. Under positive emotional conditions, students are more inclined to translate their efficacy beliefs into concrete actions, allowing the mediating role of self-efficacy to be fully realized. In contrast, when students are immersed in negative emotional states, even relatively high levels of self-efficacy may become "frozen" and fail to manifest as effective engagement behaviors. This finding vividly explains why some students who appear both motivated and capable nevertheless exhibit withdrawal or passivity in certain classroom contexts—namely, because feelings of tension, boredom, or emotional suppression within the classroom environment may inhibit their willingness to act.

5.2 Theoretical Contributions and Practical Implications

The findings of this study are both consistent with existing literature and extend it in meaningful ways. The unique contributions of this research can be summarized as follows. First, this study offers an integrative theoretical perspective. Previous research has often examined the effects of individual factors in a fragmented manner. By contrast, the present study constructs an integrated model incorporating an independent variable, a mediating variable, and a moderating variable, thereby synthesizing motivational theory, social cognitive theory, and affective science within a single analytical framework. This approach overcomes limitations of prior studies and provides a more comprehensive, systematic, and dynamic "panoramic view" of the psychological mechanisms underlying classroom engagement.

Second, this study deepens understanding of the underlying mechanisms. Beyond confirming the mediating role of self-efficacy, this research quantifies its effect size, demonstrating that self-efficacy accounts for 54.3% of the total effect of learning motivation on classroom engagement. This clearly identifies the primary pathway through which motivation influences behavior.

Third, the study highlights the moderating function of emotions, particularly through validating a moderated mediation model. This represents the most significant theoretical innovation of the present research. By empirically testing how emotional engagement moderates indirect effects, this study reveals a more refined interaction pattern among motivation, cognition, and emotion. This finding challenges simplified models that neglect contextual factors or treat affect as a secondary variable, emphasizing that analyses of human learning behavior must integrate "cold cognition" with "hot emotion" and situate both within dynamic learning contexts.

The conclusions of this study provide clear and actionable implications for higher education practitioners, particularly frontline instructors. Traditional approaches to instructional improvement often focus either on making course content more interesting (to enhance motivation) or on offering encouragement (to boost self-efficacy). However, the present model suggests that effective and systematic intervention strategies must adopt a multi-pronged approach.

First, educators should move beyond isolated motivational stimulation toward the dual cultivation of motivation and self-efficacy. Instructors should not only activate students' intrinsic motivation and value identification by incorporating real-world cases, posing inquiry-based questions, and connecting content to students' personal experiences, but also serve as "architects" of students' self-efficacy. Specific strategies include designing scaffolded tasks that decompose complex learning objectives into progressively challenging steps, enabling students to accumulate continuous success experiences; providing high-quality feedback that is timely, specific, and process-oriented rather than solely outcome-focused; and leveraging role models by showcasing peers or senior students who have successfully overcome difficulties through sustained effort, thereby illustrating the attainability of success.

Second, instructors should transition from being mere transmitters of knowledge to becoming active facilitators and managers of the classroom emotional climate. Educators must recognize that positive emotions are not a byproduct of learning, but rather a catalyst for it. Practical strategies include establishing supportive teacher–student relationships characterized by sincerity, respect, and care, thereby fostering psychological safety and encouraging students to ask questions and make mistakes; promoting positive peer interactions through cooperative learning and group discussions to cultivate a sense of belonging; infusing teaching with enthusiasm and appropriate humor, as instructors' passion and affective expression are among the most direct and effective means of creating a positive classroom atmosphere; and monitoring as well as regulating negative emotions by sensitively identifying signs of anxiety or boredom and intervening through adjustments in instructional pace, diversified activities, or individualized attention.

In sum, the key implication of this study is that the most effective classrooms are those that simultaneously satisfy students' psychological needs to want to learn (motivation), believe they can learn (self-efficacy), and enjoy the learning process (positive emotion). The core task of educators, therefore, is to design a supportive, empowering, and emotionally connected learning ecosystem centered on these three foundational elements.

6. CONCLUSION

This study systematically examined the underlying psychological mechanisms through which learning motivation, self-efficacy, and emotional engagement influence college students' classroom engagement. By empirically testing a moderated mediation model, the study yields three core conclusions. First, learning motivation represents the fundamental driving force behind classroom engagement. It not only exerts a direct influence on engagement behaviors, but more importantly, it operates largely through an indirect pathway—namely, by enhancing students' self-efficacy. Second, self-efficacy, as a critical cognitive belief, plays an indispensable bridging role in translating motivation into actual learning behavior. Third, emotional engagement functions as a key contextual factor in the learning process, exerting a significant moderating effect. Positive classroom emotional experiences not only amplify the direct motivational driving force, but also enhance the efficiency of the mediating pathway through self-efficacy.

Taken together, these findings depict a dynamic psychological portrait of classroom engagement: students' engagement behaviors emerge from the complex interplay among their learning intentions (motivation), beliefs about their capabilities (self-efficacy), and affective experiences (emotional engagement). Consequently, effective instructional interventions must move beyond single-dimensional efforts and instead focus on constructing an integrated support system that simultaneously addresses students' motivational, cognitive, and emotional needs.

Despite its contributions, this study is not without limitations. First, although the cross-sectional research design is effective for examining relationships among variables, it has inherent limitations in establishing causal links. Future research may adopt

longitudinal designs or experimental approaches to more rigorously investigate the dynamic development and causal relationships among these constructs. Second, the data relied exclusively on students' self-reports, which may be subject to social desirability bias. Future studies could incorporate multiple data sources, such as classroom observations or physiological measures, to capture students' engagement states and emotional experiences more objectively. Finally, emotional engagement was examined as a global construct in the present study; future research could further differentiate among specific types of positive and negative emotions to explore their potentially distinct moderating effects.

Future research directions may also include the exploration of additional potential moderators (e.g., teachers' supportive behaviors, quality of peer relationships) and mediators (e.g., use of learning strategies) in order to construct a more comprehensive model of classroom engagement. Moreover, cross-cultural comparative studies could examine the generalizability and contextual specificity of the proposed model within Chinese and broader East Asian cultural contexts. Notwithstanding these limitations, the present study, through its integrative theoretical perspective and empirical validation of a moderated mediation mechanism, deepens our understanding of the psychological processes underlying students' classroom engagement and provides valuable theoretical guidance and practical insights for creating more engaging, supportive, and effective learning environments.

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