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Investigating the Influence of classroom atmosphere Types on Learning Engagement Among Junior High School Students: A Case Study of a Selected Junior High School

Jiarui Li[1, *]

[1]School of Education, Beijing Sport University, Beijing, China
*Corresponding author: 2022011517@bsu.edu.cn

Abstract:

The classroom atmosphere is one of the most important external factors influencing adolescents' academic engagement. Current research regarding the relationship between academic engagement and classroom atmosphere predominantly concentrates on specific populations and the mediating function of classroom atmosphere. However, investigations into the typologies of classroom atmosphere remain relatively scarce. This study utilized the 'My Classroom' and Academic Engagement scales, in conjunction with SPSS' s quick cluster analysis method, to collate and analyze the valid data gathered from Year 8 and Year 9 students at a middle school in Liaoning Province. The findings reveal a significant correlation between the five dimensions of junior high school classroom atmosphere and academic engagement. Classroom atmosphere can be classified into four distinct types: positive competitive, harmonious coexistent, ordinary, and problematic. In future educational endeavors, the 'positive competitive' model can be implemented for classroom management in light of specific conditions, thus enhancing the quality of teaching.

Keywords: Class atmosphere type; learning engagement; fast clustering analysis

1. Introduction

In recent years, China has carried out a series of educational and instructional reforms centered on issues such as reducing students' academic burden and improving educational evaluation. Among these initiatives, the "Double Reduction Policy" is the most representative. Its implementation has transformed the previous misconception of "score-centered" education in China, leading to significant changes in the

educational evaluation system and a restructuring of classroom dynamics. Schools no longer regard academic performance as the sole criterion, and students have shifted from passive recipients of knowledge to active inquirers in the learning process. These interrelated transformations have collectively shaped and influenced a new classroom ecological environment.

The classroom atmosphere is a critical component of the school's psychological environment, and it profoundly influences the learning experiences and developmental trajectories of junior high school students [1]. The junior high stage represents a pivotal period for students' psycho-physical development and a critical juncture for academic performance divergence. During this period, the classroom ambiance assumes a particularly significant role.

At the same time, the changes in school education brought about by the new policy have provided new directions and constraints for the construction of classroom climate. This phenomenon merits in-depth exploration and research, as it can further promote junior high school students' learning engagement and academic development.

1.1 Learning Engagement

Student engagement refers to a relatively enduring, active, and comprehensive state of emotion and cognition that a student displays toward his/her academic achievement. It has been found to be a relatively good predictor of academic achievement, psychological adjustment and overall development [2].

This is reflected in students' ability to engage in deep cognitive processing, proactively address various learning difficulties and challenges, and experience positive emotional states throughout the learning process [3].

Student engagement is important in several ways. Firstly, it aids in assessing developmental status and predicting academic outcomes. Secondly, it serves as a crucial metric for evaluating the quality of educational instruction within schools [4].

1.2 Class Atmosphere

As shown in the research results of Fredricks, student engagement is influenced by the interaction between individual and environment [5-6].

The concept of the ability to overcome adversity, which refers to an individual' s ability to withstand adversity, is a crucial factor in this paradigm. In addition to psychological resilience, external factors, such as the classroom climate, familial environment, and situational elements, play a pivotal role in shaping an individual's response to challenges [7].

Therefore, in recent years, research in educational psychology and classroom management has increasingly focused on classroom climate as one of the important contextual variables that influence students' engagement [8]. A positive classroom climate can provide students with emotional support, improve teacher-student interaction and enhance students' self-efficacy, which can promote higher levels of student engagement [9]

1.3 Research Gap And Justification

Classroom climate constitutes the most immediate learning environment perceived by students within school education. It encompasses five key dimensions-teacher-student relationships, peer relationships, competition, classroom order, and discipline, all of which jointly shape students' learning experiences.

A positive teacher-student relationship exerts multifaceted beneficial effects on students' sense of belonging and learning engagement. The stronger the teacher-student relationship, the higher the level of student engagement in learning [10].

Empirical studies have also confirmed that peer relationships directly affect middle school students' learning engagement. This influence primarily stems from the fact that peer relationships, by shaping adolescents' self-esteem, enable students to experience a greater sense of accomplishment in their learning [11].

Research has also shown that effective classroom organization and management contribute to fostering a strong class atmosphere and maintaining classroom order, thereby exerting a significant positive effect on students' learning engagement [12].

Regarding the impact of competition within the classroom on students' learning engagement, scholars hold divergent views. Some researchers argue that competitive relationships in the classroom environment negatively affect students' learning engagement [13].

In contrast, some scholars have argued that a competitive atmosphere in the classroom can help strengthen students' learning motivation, thereby prompting them to allocate more attentional resources to their studies [14].

Other studies have examined the relationship between overall classroom climate and student engagement.Wei Xueyan and colleagues found a significant positive correlation between classroom climate and junior high school students' learning engagement [15]. Zhang Wei and colleagues also confirmed that individuals in a positive classroom climate tend to develop a stronger sense of belonging, recognize the value of learning, and consequently exhibit higher levels of learning engagement [16]. At present, most studies on the relationship between classroom

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climate and learning engagement adopt a unidimensional approach, examining the influence of a single attribute of classroom climate on learning engagement. However, there remains a lack of comprehensive classification and synthesis of overall classroom climate types. In the context of the new education environment shaped by current policy reforms, teachers face a shortage of practical guidance. It is therefore essential for teachers to understand the directions in which classroom climate can be improved to achieve optimal levels of student learning engagement.

By examining specific combinations across multiple dimensions and drawing on the case of the particular school context discussed herein, the classroom climate is categorized into several representative "types", from which the most suitable type of classroom climate is identified.

1.4 Research Objectives And Questions

1.4.1 Research Objectives

The current study discusses the interaction between environmental and personal factors in shaping human development. The aim of this study is to explore different typologies of classroom atmosphere dimensions and elucidate their impact on learning engagement. By selecting the junior high school students, the pool of subjects for domestic studies on learning engagement has been expanded, which provides practical reference for future research for developmental research in this field.

1.4.2 Research Questions

(1) How do multiple dimensions of classroom atmosphere combine to form distinct typical patterns?

(2) Do students in different classroom atmosphere types exhibit significant differences in academic engagement? Which type is most conducive to fostering deep engagement?

2. Method

2.1 Participants

The research sample for this study was drawn from a middle school in Liaoning Province, with 250 students from 16 classes in the second and third grades of junior high school selected as the subjects of investigation. A total of 250 questionnaires were distributed.

Following the exclusion of invalid responses (i.e.incomplete answers or patterned responses), 242 valid data sets were obtained. Of these, 121 were male and 121 were female.

2.2 Instruments

2.2.1 Learning Engagement Scale

The learning engagement scale, revised by Li Xiying and Huang Rong based on the UWES-S scale, was employed in this study. The scale under consideration conceptualizes learning engagement into three dimensions: motivation, energy, and focus. The scale comprises a total of 17 items (6 for motivation, 6 for energy, and 5 for focus). The scale this study uses ranks responses on a 7-point Likert scale from 1 (never) to 7 (always). Scores on this scale are positively correlated with academic engagement [17].

2.2.2 Classroom Atmosphere Scale

The measurement of the perceived class atmosphere of the junior high school students was facilitated by using the "My Classroom" questionnaire developed by Jiang Guangrong [18]. The questionnaire this study refers to here consists of five dimensions: teacher-student relationships, peer relationships, order and discipline, competition, and academic workload. The scale this study uses rank responses on a 5-point Likert scale from 1 (never) to 5 (always).

2.3 Data collection and analysis techniques

Various analytical methods were employed, including descriptive and correlational analyses, which were conducted using SPSS on the 242 valid datasets collected. This methodological approach permitted the examination of the relationship between perceived classroom climate types and learning engagement among junior high school students.

3. Results and Discussion

3.1 Presentation of Data

3.1.1 Descriptive statistics for variables

The statistical data for the demographic variables and related variables in this study can be seen in Table 1.

Gender: The numerical values "1" and "2" are used to denote mate and female respectively.

Grade Level: The integer "1" is indicative of the performance of a class officer role, whereas "2" signifies the absence of such a role.

Class Officer Status: "1" denotes serving as a class officer, "2" denotes not serving as a class officer.

The total number of valid cases for descriptive statistics is 242.

Table 1. Descriptive Statistics Table of Variables

	Minimum	Maximum	Mean	SD
Gender	1	2	1.50	0.501
Whether to serve as a class officer	1	2	1.67	0.470
Grade Level	1	3	2.17	0.411
Teacher-student relationship	1.63	5.00	4.66	0.65957
Classmate relationship	2.13	5.00	3.73	0.46743
Order and discipline	2.50	5.00	3.51	0.35460
academic workload	1.00	5.00	2.30	0.68060
competition	1.14	5.00	4.00	0.87154
Learning engagement	1.00	7.00	5.65	1.60044

3.1.2 Junior secondary pupils' perceptions of classroom atmosphere and academic engagement

The findings of this study can be seen in table 2. It demonstrates that there are no statistically significant differences between genders across the five dimensions of teacher-student relationships, peer relationships, disciplinary order, competition, and academic workload. This finding may be due to the evolution of educational philosophies in the modern era, which has led to more equitable resource distribution for both male and female students in both familial and academic settings. Furthermore, educators operating under these contemporary pedagogical principles are likely providing equal opportunities and treatment to students of all genders within schools. Consequently, these factors contribute to a relatively consistent experience of teacher-student relationships, peer interactions, and disciplinary order for both male and female students.

Table 2. Gender Differences in Classroom Atmosphere and Academic Engagement

		Classmate relationship	Teacher-student relationship	Order and discipline	competition	academic workload	Learning engagement
Gender	Correlation coefficient	-.043	-.015	-.049	-.016	104	-.042
	Significance (two-tailed)	503	812	449	806	107	512

In the contemporary socio-educational context, characterized by intense competition and a phenomenon frequently referred to as "involution" , competitive pressures and academic stress are prevalent among junior high school students, with gender-based disparities exhibiting a downward trend. Consequently, the differences in academic engagement between genders are not statistically significant.

Grade-level differences in classroom atmosphere and academic engagement can be seen in table 3. Across all dimensions of classroom atmosphere, grade level did not exhibit significant differences in teacher-student relationships, disciplinary order, academic workload, peer relationships, or competition. However, no significant differences were found in learning engagement either.

Table 3. Grade-level differences in classroom atmosphere and academic engagement.

		Classmate relationship	Teacher-student relationship	Order and discipline	competition	academic workload	Learning engagement
Year Group	Correlation coefficient	158	005	-.023	025	-.117	075
	Significance (two-tailed)	014	943	720	698	070	247

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Differences in classroom atmosphere and academic engagement based on whether students hold class officer positions can be found in table 4. Across a range of dimensions of classroom atmosphere, the possession of a class officer position has been demonstrated to exhibit a significant positive correlation with perceived academic workload and a significant negative correlation with academic engagement. This finding suggests that junior high school students who serve as class officers may experience an elevated sense of responsibility to excel academically, which may result in an augmented perception of academic burden. Conversely, the time and energy demands of these leadership roles may slightly diminish their overall academic engagement.

Table 4. Differences in classroom atmosphere and academic engagement based on whether students hold class officer positions.

		Classmate relationship	Teacher-student relationship	Order and discipline	competition	academic workload	Learning engagement
Whether to serve as a class officer	Correlation coefficient	-.111	-.080	-.084	-.097	157*	-.190**
	Significance (two-tailed)	084	216	191	131	015	003

**At the 0.01 level (two-tailed), the correlation is significant.

3.1.3 Adolescent perceptions of classroom climate

The clustering analysis revealed four distinct types, as detailed in the table below. The Classroom Atmosphere Scale has a theoretical mean of 2 across all dimensions and scores range from 1 to 5. Based on these scores, students' perceptions of their classroom atmosphere are categorized into the following four types which can be seen in table 5:

Type 1: Positive Competitive is characterized by excellent teacher-student (M=4.95); and peer (M=3.95)relationships, order and discipline (M=3.57), the highest level of competitive atmosphere (M=4.64); and the lowest academic workload (M=1.87).

Type 2: Harmonious Coexistence, is defined by good teacher-student relationships (M=4.82), good peer relationships (M=3.72), good order and discipline (M=3.45), a weaker competitive atmosphere (M=3.05), and a moderate academic workload (M=2.01).

Type 3: General, features relatively good teacher-student relationships (M=4.82), peer relationships (M=3.70), and order and discipline (M=3.57), but also a higher level of competitiveness (M=4.42) and a greater academic workload (M=3.08), the highest among the categories.

Type 4: Problematic, is marked by average teacher-student relationships (M=3.31), average peer relationships (M=3.15), and average order and discipline (M=3.34), as well as a higher sense of competition (M=3.46) and the highest academic workload (M=2.97).

Table 5. Class Atmosphere Types

	Competitive type (1)	Harmonious coexistence type (2)	Standard Type (3)	Problem Type (4)
Teacher-student relationship	4.95	4.82	4.82	3.31
Classmate relationship	3.95	3.72	3.70	3.15
Order and discipline	3.57	3.45	3.57	3.34
competition	4.64	3.05	4.42	3.46
academic workload	1.87	2.01	3.08	2.97

3.1.4 Investment in learning across diverse classroom atmosphere typologies

As shown in the table 6, students' learning engagement is significantly associated with all dimensions of the classroom environment. Specifically, learning engagement demonstrates a moderate positive correlation with peer relationships, teacher-student relationships, and the atmosphere of competition, indicating that active social interaction and healthy competition are key factors in promoting learning engage-

ment.

Learning engagement exhibits a relatively strong negative correlation with academic burden, suggesting that excessive academic pressure may significantly suppress students' learning motivation and engagement. More specifically, the higher the level of perceived academic burden, the lower the degree of learning engagement. From the perspective of motivation theory, the root cause of this negative relationship lies in the nature of "academic burden," which typically refers to externally imposed and excessive task pressure. In contrast, high-quality learning engagement depends on intrinsic motivation and internalized extrinsic motivation. Therefore, an excessive academic burden may undermine students' sense of autonomy and competence, leading to inefficient or superficial engagement.

Learning engagement shows a weak positive correlation with order and discipline, indicating that they serve as fundamental conditions for ensuring effective learning.

Table 6. The relationship between perceived classroom climate types and academic engagement among junior high school students

		Classmate relationship	Teacher-student relationship	Order and discipline	competition	academic workload
Learning engagement	Correlation coefficient	410**	373**	168**	355**	-.485**
	Significance (two-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001

**At the 0.01 level (two-tailed), the correlation is significant.

Table 7 presents the descriptive statistics of learning engagement across the four types of classroom climate.

Based on the mean levels of learning engagement, The ranking of learning engagement levels across the four types, from highest to lowest, is as follows: Competitive (6.3836) > Harmonious coexistence (5.7167) > Standard (5.2003) > Problem (4.1073).

As shown in Table 8, the results of the one-way analysis of variance (One-Way ANOVA) showed extremely significant differences in learning engagement among different clustering groups, $F(3, 238) = 23.78$, $p < .001$. This F-value indicates that between-group variance is 23.78 times the within-group variance. This confirms that the clustering structure has a significant statistical explanatory power for learning engagement.

Since the data in Table 8 violated the assumption of homogeneity of variance ($p < .001$), the study employed Welch's ANOVA for testing.

The results, presented in Table 9, indicated a highly significant difference in learning engagement among students of different cluster types ($F(3, 90.319) = 19.988$, $p < .001$).

The Games-Howell post hoc test (Table 10) further revealed that the levels of learning engagement exhibited a clear hierarchical structure.

Specifically:

Type 1 demonstrated a significantly higher level of learning engagement than all other types.

Type 4 exhibited a significantly lower level of learning engagement than all other types.

No significant difference in engagement levels was found between Type 2 and Type 3 ($p = .317$).

These results confirm the validity of the clustering model constructed in this study, indicating its effectiveness in distinguishing student groups with varying levels of learning engagement. In particular, it provides a clear empirical basis for identifying Type 4 students, who require targeted support, and Type 1 students, whose learning characteristics may be further explored in future teaching practices.

Table 7.

Description								
Learning investment								
	N	mean	SD	Standard Error	95% confidence interval for the mean		Minimum	Max
					Lower limit	Upper limit		
1	96	6.3836	99582	10164	6.1818	6.5854	2.00	7.00
2	65	5.7167	1.45309	18023	5.3567	6.0768	1.18	7.00
3	47	5.2003	1.64123	23940	4.7184	5.6821	1.00	7.00
4	34	4.1073	1.92021	32931	3.4373	4.7773	1.00	7.00

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Total	242	5.6548	1.60044	10288	5.4522	5.8575	1.00	7.00

Table 8.

ANOVA					
Learning investment					
	Sum of squares	Degrees of freedom	Mean square	F	Sig
Between groups	142.373	3	47.458	23.782	000
Within the group	474.927	238	1.995		
Total	617.300	241			

Table 9.

Robustness Test of Equality of Means				
Multiple comparisons				
	Statistics a	Degrees of Freedom 1	Degrees of Freedom 2	Sig
Welch	19.988	3	90.319	000
Asymptotic F-distribution				

Table 10.Post-hoc test

Multiple comparisons						
Dependent variable: Multiple comparisons						
Gaines-Howell						
(I) Case Clustering Number	(J) Case Clustering Number	Mean difference (I-J)	Standard Error	Significance	95% confidence interval	
					Lower limit	Upper limit
1	2	66684*	20692	009	1266	1.2071
	3	1.18333*	26008	000	4970	1.8696
	4	2.27631*	34464	000	1.3520	3.2006
2	1	-.66684*	20692	009	-1.2071	-.1266
	3	51649	29966	317	-.2676	1.3006
	4	1.60948*	37541	000	6139	2.6051
3	1	-1.18333*	26008	000	-1.8696	-.4970
	2	-.51649	29966	317	-1.3006	2676
	4	1.09298*	40714	045	0191	2.1668
4	1	-2.27631*	34464	000	-3.2006	-1.3520
	2	-1.60948*	37541	000	-2.6051	-.6139
	3	-1.09298*	40714	045	-2.1668	-.0191
*. The significance level of the mean difference is 0.05.						

4. Discussion

According to the self-determination theory of motivation proposed by American psychologists Deci and Ryan, the support for individuals' healthy development and optimal functioning derives from the fulfillment of three basic psychological needs: Autonomy, Competence, Belonging. The varying degrees of influence exerted by the four

identified types on learning engagement in this study can also be interpreted and explained through the lens of this theory [19].

As shown in Table 5, the "Active Competition" type exhibits the highest theoretical mean scores across the four dimensions of classroom climate—teacher-student relationship, peer relationship, order and discipline, and competition at —4.95, 3.95, 3.57, and 4.64, respectively. In contrast, it records the lowest theoretical mean score in the dimension of learning burden, at only 1.87.

This type integrates "high competition" with "positive teacher-student and peer relationships," thereby creating a high-quality, supportive competitive environment. The sense of competition enhances students' competence by providing clear and challenging standards, while strong interpersonal relationships offer a sense of security that reinforces this competence. Support from teachers and peers further strengthens students' sense of belonging within both learning and classroom contexts. Meanwhile, the relatively light learning burden reduces external pressure, ultimately fostering a positive and internalized form of learning engagement. Therefore, the atmosphere of "positive competition" yields the highest level of learning engagement.

In contrast, the "harmonious coexistence" type, places second among the four types, with values of 4.82 and 3.72, respectively. It is noteworthy that this type records the lowest theoretical mean in the "competition" dimension, only 3.05.

This indicates that the "harmonious coexistence" type (high relationship, low competition) demonstrates lower learning engagement than the "positive competition" type (high relationship, high competition). The underlying reason is that, although the former satisfies students' sense of belonging, it falls short in stimulating their sense of competence and autonomy.

Because the "harmonious coexistence" type exhibits the weakest competitiveness, students tend to lack learning motivation and the autonomy to pursue challenging goals. Their potential remains underdeveloped as they stay within their comfort zone, leading to a lower level of learning engagement under this type.

5. Conclusion

5.1 Summary of Findings

The classroom atmosphere perceived by the junior high school students can be classified into the following four types: actively competitive type, harmoniously interactive type, general type and problem type.

The classroom atmosphere perceived by junior high school students significantly exhibits a substantial correlation with their level of academic engagement. It is evident that a high-quality classroom atmosphere experienced by junior high school students fosters a positive learning state and enhances academic engagement.

It is evident that the greatest influence on academic engagement comes from actively competitive type of class atmosphere, which is the class atmosphere that is most conducive to academic engagement. Although the actively competitive type is beneficial to academic engagement, it may not be applicable to all students. Therefore, when implementing pedagogical practices, this model can be adapted according to the actual situation in the interest of students, so as to improve the quality of teaching.

5.2 Limitations

The students in this study were only from the second and third grades of junior high school in a single school. In the future, the sampling range of the school can be expanded to include schools in different geographical locations and different degrees of development, including urban areas, suburbs and rural areas. The survey can also be extended to first grade of junior high school students.

5.3 Future Research directions

The statistical analysis of classroom atmosphere in study was limited to individual level of students. In the future, the relationship between class level of classroom atmosphere and academic engagement can be examined as a research topic. In addition, in the future, it may be desirable to examine the mediating mechanisms between classroom atmosphere and academic engagement more closely. For example, it may be an interesting research topic to investigate the moderating effects of variables such as gender and grade level.

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