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The influence of perceived classroom environment on the learning effectiveness of the association of southeast Asian international students studying in China: The mediating role of learning engagement

Fuzhen Fu[1], Youzhong Xie[1*]
[1]China International Language and Culture College, Krirk University,3 Ram Inthra Rd, Anusawari, Bang Khen, Bangkok 10220, Thailand.

Abstract: This study aims to analyze and comprehend the influence of the classroom environment on the learning effectiveness of the Association of Southeast Asian (ASEAN) students in China especially the significance of learning engagement. Confirmatory factor analysis, descriptive analysis, reliability analysis, correlation analysis and regression analysis were used in this study. 503 useful questionnaires were analyzed through SPSS 22 and AMOS. Both classroom environment cognition and learning engagement could improve ASEAN students' learning effectiveness and learning engagement played a certain mediating effect. The classroom environment and learning engagement are the two primary factors that need to be taken into consideration if ASEAN students in China are to increase their learning efficacy. The more welcoming the classroom environment, the more they can concentrate on participating in various learning activities and the better their learning effectiveness will be. The research object is the ASEAN students in Guangxi Province using the quantitative analysis method of a questionnaire survey. Such as interview methods and other means to further grasp the classroom environment, learning engagement and learning effectiveness of each ASEAN student in China. No studies were conducted on students from ASEAN in other provinces. The cognitive classroom environment can fully affect the learning effectiveness of students from ASEAN countries in China which brings certain theoretical conditions for improving the teaching quality of global students. This study finds out the relationship between classroom environment, learning effectiveness and learning engagement and understands that learning engagement can show a mediating effect which provides certain support for the subsequent in-depth analysis.

Keywords: *ASEAN students, Development, Learning effectiveness, Learning engagement, Learning motivation, Perceived classroom environment.*

1. Introduction

1.1. Research Background

The quality of education provided to international students in China is put to the test as the number of foreign students studying there is increasing. Cultural and educational policy differences as well as other factors will have an impact on how well foreign students from ASEAN countries learn in China. Therefore, how to improve the performance of international students is an extremely critical research issue [1]. In 2018, the Ministry of Education's "Higher Education Quality Regulations" specifically explained how international students in China can receive a unified education. This not only provides excellent institutional norms for ASEAN students to study better in China but also provides a new standard for improving their learning efficiency [2]. Due to the further implementation of the "Belt and Road" strategy, communication between ASEAN countries in various aspects is becoming more frequent. With the rapid development of the number of foreign students from ASEAN countries in

* Correspondence:

China, the relevant educational development is also booming and the education of foreign students has become a very key element in China's higher education. In addition, it can assist in further communication between ASEAN and China in various aspects [3].

1.2. Research Questions

This paper mainly studies the influence of the cognitive classroom environment on the learning effectiveness of ASEAN students in China and analyzes how learning engagement affects these two elements.

2. Literature Review

2.1. Core Concepts

2.1.1. Classroom Environment

Fraser [4] defines the classroom environment as the student's or teacher's perception or experience of the classroom. There are certain differences in the psychological characteristics of individuals and certain differences in the understanding and experience of a certain thing or event that will have a profound impact on students' learning. Fan and Tian [5] deeply reflected on the analysis of classroom environment and learned that there are three kinds of classroom environment: physical environment, social environment and psychological environment. This paper focuses on the definition of classroom environment proposed by Fraser [4] and regards it as the combination of various physical, social and psychological elements that appear in classroom teaching and interact with each other. Such elements will have certain impacts on the development of teaching work and are not conducive to the improvement of teaching efficiency.

2.1.2. Learning Engagement

The term "learning engagement" originated from work engagement [6] and has gradually developed into a key analytical content in the education industry. Astin [7] believes that learning engagement refers to students' physical and mental participation in learning certain knowledge or skills. This input involves not only the students' time but also the various kinds of assistance provided by educational institutions such as schools Kuh [8]. Pianta, et al. [9] pointed out that learning engagement refers to students' initiative to carry out academic learning and various teaching activities organized by schools which reflects an attitude towards learning. Wang and Huang [10] point out that learning engagement includes students' active learning, the interaction between teachers and students further understanding and passion for learning. Learning engagement reflects the various situations that students present when learning combined with the introduction of these scholars. This paper uses the definition of learning engagement given by Pianta, et al. [9] pointing out that learning engagement refers to students' active acceptance of educational activities which reflects a recognition of learning.

2.1.3. Learning Effectiveness

The term "learning effectiveness" was coined in the 1990s. It is a key indicator often used in evaluating the quality and effectiveness of higher education and it covers not only the knowledge gained by students during their university years but also the learning of students during this period [11]. Here, we define learning effectiveness as a reflection of various qualities and abilities such as students' ability to deal with problems, ability to think alone, team spirit and creativity acquired through the study and application of subject knowledge. This paper defines the learning effectiveness of ASEAN students studying in China as the benefits these students receive from using the educational environment and coursework throughout their study abroad experience.

2.2. Research on the Relationship between Classroom Environment, Learning Engagement and Learning Effectiveness

2.2.1. Research on the Relationship between Classroom Environment and Learning Effectiveness

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Numerous studies have found that students' learning effectiveness is closely related to their feelings about the classroom environment. In addition, researchers analyzed the *relationship* between the classroom environment and student learning primarily analyzing the impact of the classroom environment on students' classroom participation, motivational behavior and selection of learning strategies Dorman, et al. [12] and Fraser [13]. Rice, et al. [14] found that classrooms with emotional and learning support from teachers can encourage students to seek help more actively. Anderman and Anderman [15] found that students' learning motivation will change when the classroom environment is changed. Patrick, et al. [16] also confirmed that a positive environment helps to increase students' learning motivation. Goh, et al. [17] found that cohesion contributes to improving students' learning effectiveness. Fast, et al. [18] confirmed that students who think that the classroom environment is warm and more testing perform better in mathematics. Cochran-Smith [19] pointed out that teachers' professional knowledge and teaching skills have an impact on students' academic outcomes. Not only students' own characteristics but also students' personal ideas about the classroom environment will have a greater impact on their studies Yang, et al. [20]. Carini, et al. [21] found that a positive classroom environment facilitates cognitive thinking outcomes for students. Based on these studies, a good classroom environment is conducive to better learning effectiveness for students. Therefore, the below hypothesis is given in this paper:

H_1: The perceived classroom environment of ASEAN students studying in China has a significant influence on learning effectiveness.

2.2.2. Research on the Relationship between Classroom Environment and Learning Engagement

A good classroom environment can positively influence students' attitudes towards teachers, other friends and materials. Anderson, et al. [22] studied the significant relationship between five dimensions of classroom environment and students' classroom participation and learning engagement. Zeidan [23] analysis pointed out that there is a close relationship between students' involvement in biology learning and the classroom environment and students who feel a good classroom environment are more active in learning biology knowledge. Communication between teachers and students will have a great impact on students' learning attitudes in class. When teachers offer help and show interest in interacting with students, students tend to engage more and learn better. Bao and Zhang [24] divided learning input in China's higher education environment into three aspects: regulatory engagement, process engagement and self-determined engagement and examined the relationship between classroom environment, study engagement and academic outcomes. They found that interactive teaching methods in the classroom such as group discussions, case analyses and class presentations have a positive impact on student study which will influence student learning effectiveness. According to the aforementioned studies, it is inferred that a good classroom environment is conducive to better learning effectiveness for students. Therefore, the below hypothesis is given in this paper:

H_2: The perceived classroom environment of ASEAN students studying in China has a significant impact on learning engagement.

2.2.3. Research on the Relationship between Learning Engagement and Learning Effectiveness

Learning participation refers to students' active participation in teaching which is a major factor influencing students' learning and progress in higher education. From the theories of individual and environmental interaction in student development and the college impact model, it can be inferred that the longer students invest in educational activities and the more effort they exert, the greater their gains will be. Daumiller, et al. [25] pointed out in their research that individual level learning engagement has a significant influence on the development of college students among factors influencing college student development. Learning engagement can positively affect learning effectiveness [26, 27]. The more time and effort students put into their studies, the better their learning results will be. Participating in learning activities, social activities and collective activities can significantly increase students' learning gains by reducing negative learning participation and

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increasing positive learning participation [28]. Combining the aforementioned research analysis and discussion, it is inferred that learning engagement significantly impacts learning effectiveness for international students. Therefore, the below hypothesis is given in this paper:

H_3: The learning engagement of ASEAN students studying in China has a significant influence on learning effectiveness.

2.2.4. Research on the Relationship between Classroom Environment, Learning Engagement and Learning Effectiveness

Existing research told us that learning engagement will influence learning effectiveness through mediating variables such as psychological resilience [29], professional commitment and social support [30]. Most studies tend to view learning engagement as a mediating variable, showing its mediating function in the effects of variables such as teacher support [31], social support [30], self-efficacy [32], learning experiences [33] and occupational identity [34] on learning effectiveness.

Teaching and learning are among the most critical aspects of the classroom environment. A positive classroom atmosphere can enhance students' learning abilities, help students to work better together, develop team unity, respect and trust [35, 36]. Furthermore, the influence of a positive classroom atmosphere not only contributes to immediate achievements but can also have long-lasting effects for years. Patrick, et al. [16] also argued that perceiving a good classroom environment helps enhance learning motivation and classroom participation. The more harmonious the classroom environment, the higher the students' enthusiasm for learning, motivation, participation and learning engagement leading to better learning effectiveness. Based on the analysis and discussion of the above studies, it is inferred that international students' perceptions of the classroom environment may indirectly affect learning effectiveness through learning engagement. Therefore, the below hypothesis is given in this paper:

H_4: The perceived classroom environment of ASEAN students studying in China indirectly affects learning effectiveness through the mediating effect of learning engagement.

At present, there are quite a few studies analyzing classroom environment, learning participation and learning effectiveness [20, 37, 38] that focus on the pin-two relationship. There is no literature to directly prove whether global students' learning engagement plays a mediating role between classroom environment and learning effectiveness. Moreover, ASEAN students studying in China are regarded as special objects and their views on the classroom environment in the cross-cultural environment are not uniform. Therefore, this paper mainly aims to supplement the shortcomings in this aspect and investigate the relationship between classroom environment, learning engagement and learning effectiveness for ASEAN students. With classroom environment as the independent variable and learning effectiveness as the dependent variable, this paper analyzes whether learning input plays a mediating role between them so as to better understand the relationship between them.

3. Research Design

3.1. Conceptual Model

This study examines the impact of the perceived classroom environment and learning engagement on learning effectiveness among ASEAN students studying in China. Perceived classroom environment is considered the independent variable, learning engagement is the mediating variable and learning effectiveness is the dependent variable. According to the research hypothesis, the research framework depicted in Figure 1 is proposed.

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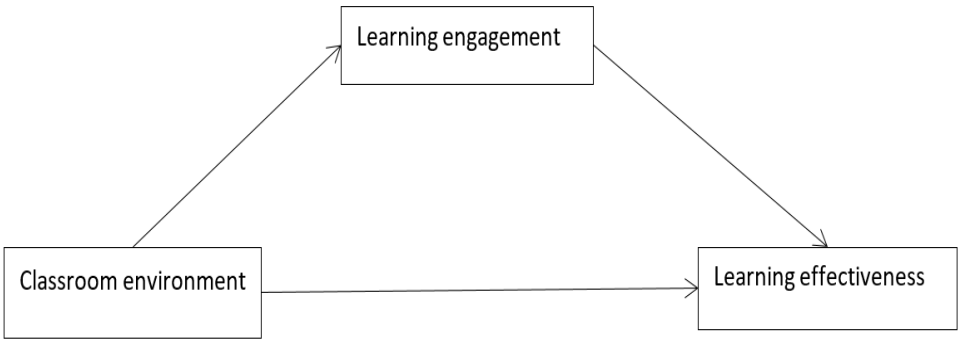

Figure 1.
Hypothesized conceptual model.

3.2. Study Participants

This study discusses the ASEAN students in China, Guangxi University, Guangxi Normal University and Guilin University of Technology, three famous universities in Guangxi. The convenient sampling method was used to conduct a specific survey of 600 ASEAN students. We collected 555 questionnaires and among them 503 were valid for an effective rate of 90.6%. The reason for choosing such students is that Guangxi has made great contributions to promote the development between China and ASEAN countries. Guangxi has unique location advantages and diversified educational resources which can better promote the development of China and ASEAN countries. Guangxi is one of the provinces with the largest number of ASEAN students. This paper further grasps the problems and tests faced by ASEAN students in our country to assist our country and the development of ASEAN education which has a certain value. Although the respondents are only ASEAN students from Guangxi, their cultural gaps, major of study and gender of students are quite different which can provide corresponding support to better grasp the overall situation of ASEAN students in China.

3.3. Research Instruments

Learning Engagement Scale: ASEAN students' learning engagement scale is examined using the learning engagement table compiled by Liao [39]. This table covers one level, 1 indicator, 11 levels and 2 indicators.

Learning Effectiveness Scale: This paper uses the National Student Participation Survey Scale (NSPSS) to assess the learning effectiveness of students in ASEAN countries. This table consists of 1 primary indicator and 10 secondary indicators.

Classroom Environment Scale: This table prepared by Zhu, et al. [40] is designed to measure ASEAN students' perceptions of classroom environments. The scale consists of one primary indicator and 12 secondary indicators.

The above table is based on a 5-point Likert scale to calculate the score.

3.4. Reliability and Validity Analysis

3.4.1. Reliability Analysis

The function of Cronbach's alpha coefficient is to weigh the uniformity of the variable across the various test items. Combined with Nunnally [41] study, if the reliability of all variables in the study is estimated to be above 0.7, it indicates that the study is stable.

In Table 1, Cronbach's alpha coefficients for the learning effectiveness form, the learning engagement form and the classroom environment form were 0.871, 0.879 and 0.901 respectively. We find that each result exceeds the average value of 0.7 which means that the internal unity and reliability of the variables are good.

Table 1.

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Reliability analysis results of the scale.

Variables	Questions	Cronbach's alpha
Classroom environment	12 questions in total.	0.901
Learning engagement	11 questions in total.	0.879
Learning effectiveness	10 questions in total.	0.871

3.4.2. Validity Analysis

Factor analysis (CFA) was performed with SPSS version 22 and AMOS software to weigh the reliability and validity of this scale (see Table 2 for specific results).

Table 2.
The fit indices of confirmatory factor analysis.

Fit indices	Ideal value	Classroom environment	Learning engagement	Learning effectiveness	Fit goodness
χ^2/ df	< 3	1.751	2.274	2.153	Good
GFI	> 0.8	0.910	0.900	0.910	Good
AGFI	> 0.8	0.862	0.839	0.854	Good
RMR	< 0.05	0.049	0.049	0.044	Good
RMSEA	< 0.08	0.069	0.070	0.073	Good
NFI	> 0.9	0.904	0.925	0.912	Good
CFI	> 0.9	0.956	0.925	0.925	Good
RFI	> 0.9	0.916	0.933	0.928	Good
IFI	> 0.9	0.957	0.926	0.927	Good

Note: GFI=Goodness of fit index, AGFI=Goodness of fit index, RMR=Root of the mean square residual, RMSEA=Root mean square error of approximation, NFI=Normal of fit index, CFI=Comparative fit index, RFI= Relative fit index, IFI= Incremental fit index.

We can see that the fit degree of the whole table is relatively good. The result of χ^2/df is 1.751 which is lower than the average of 3. The results of AGFI, GFI, NFI, IFI and CFI were all ≥0.9, and the RMSEA was 0.047, lower than 0.08. The RMR is 0.047, down from 0.05. These results all meet the conventional research regulations indicating that the model construction effect is relatively good.

Composite reliability (CR) is an index to evaluate the internal unity of structural indicators and can evaluate comprehensive reliability well. According to Hair, et al. [42] convergence validity is evaluated by factors such as factor load greater than 0.5, CR greater than 0.6 and mean variance extraction (AVE) greater than 0.45 for each item. In Table 3, the factor loads of classroom environment, learning engagement and learning effectiveness are all above 0.5. The CR values of these structures are 0.852, 0.835 and 0.815 which are all greater than 0.6. The AVE values are 0.539, 0.596 and 0.528 which are all greater than 0.45. These data tell us that the convergence validity of this table is relatively good.

Table 3.
Confirmatory factor analysis results of the scale.

Variables	Constructs	Factor loadings	CR	AVE
Classroom environment	HJ1	0.693	0.852	0.539
	HJ2	0.717		
	HJ3	0.707		

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	HJ4	0.784		
	HJ5	0.752		
	HJ6	0.777		
	HJ7	0.734		
	HJ8	0.751		
	HJ9	0.671		
	HJ10	0.737		
	HJ11	0.695		
	HJ12	0.719		
Learning engagement	TR1	0.646	0.835	0.596
	TR2	0.717		
	TR3	0.705		
	TR4	0.746		
	TR5	0.729		
	TR6	0.652		
	TR7	0.851		
	TR8	0.800		
	TR9	0.678		
	TR10	0.690		
	TR11	0.650		
Learning effectiveness	CX1	0.649	0.815	0.528
	CX2	0.789		
	CX3	0.646		
	CX4	0.642		
	CX5	0.837		
	CX6	0.767		
	CX7	0.624		
	CX8	0.736		
	CX9	0.650		
	CX10	0.708		

4. Research Findings

4.1. Analysis of Demographic Variables in International Students

According to the perspective of gender distribution, there were 258 female students with 13 fewer male students than female students accounting for 51.3 percent and 48.7 percent respectively. As for academic disciplines, 449 students (89.3%) were enrolled in the humanities and social sciences while only 54 students (10.7%) were in engineering. Thus, the majority of ASEAN students choose engineering disciplines for their studies. In terms of educational levels, the majority of students were pursuing undergraduate degrees with 344 students accounting for 68.4% of the sample. Additionally, there were 159 students pursuing master's degrees, comprising 31.6% of the total sample. Consequently, most ASEAN students come to China to pursue master's degrees.

4.2. Analysis of Variance

Table 4 shows that there were huge gender differences in learning effectiveness ($t=2.005$, $p<0.05$). Female students exhibited higher learning effectiveness compared to male students. Furthermore, significant differences in learning effectiveness were found across academic disciplines ($t=2.066$, $p<0.05$). Specifically, students in the humanities and social sciences demonstrated significantly higher learning effectiveness than those in engineering disciplines. Similarly, there were significant differences

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in learning effectiveness when students had different educational backgrounds (t=2.110, p<0.05). Undergraduate students showed significantly higher learning effectiveness compared to master's students.

Table 4.
Differences in learning effectiveness with background variables.

Background variables	Category	N	M	SD	t-value	Compare
Gender	Male	245	3.886	0.846	2.005*	F>M
	Female	256	4.026	0.718		
Discipline	Liberal arts	449	4.018	0.779	2.066*	LA>EC
	Engineering course	54	3.862	0.914		
Education	Undergraduate	344	4.055	0.744	2.110*	U>M
	Master	159	3.900	0.889		

Note: N=503
*p<0.05.

4.3. Pearson Correlation Analysis

The average score of the classroom environment table was about 3.97 points which was more than the median (3 points) showing that ASEAN students perceive the classroom environment in China relatively positively. The average score of the learning engagement table was about 3.96 points which was more than the median (3 points) suggesting that the level of learning engagement among ASEAN students in China is moderately high. Similarly, the average score of the learning effectiveness table was 3.958 which was more than the median (3 points) again indicating that the learning effectiveness of ASEAN students is at a moderately high level.

According to Table 5, it can be observed that a good classroom environment can fully improve learning engagement (r=0.534, p<0.001). Additionally, the classroom environment is significantly positively related to learning effectiveness (r=0.523, p<0.001) similar to learning engagement and learning effectiveness (r=0.511, p<0.001). The correlation coefficient varies between 0.511 and 0.534 showing a moderate to low level of correlation. Therefore, multicollinearity is not present.

Table 5.
Descriptive statistics and correlation matrix of the variables.

Variables	M	SD	CN	LEN	LEF
CN	3.974	0.780	1		
LEN	3.963	0.784	0.534***	1	
LEF	3.958	0.785	0.523***	0.511***	1

Note: 1.N=503 ***p<0.001.
2.CN: Classroom environment, LEN: Learning engagement LEF: Learning effectiveness

4.4. The Mediating Role of Learning Engagement in the Perception of Classroom Environment and Learning Effectiveness among ASEAN Students in China

Based on Table 6, hierarchical regression analysis was conducted on the classroom environment, learning engagement and learning effectiveness. The data is presented below:

Table 6.
Stepwise hierarchical regression analysis.

Variables	Model (1)	Model (2)	Model (3)
	LEF	LEN	LEF
	B	β	β
CE	0.530***	0.523***	0.213***

LEN	—	—	0.715***
R2	—	—	27.60%
△R2	26.90%	26.10%	55%
F	29.021***	28.052***	45.410***

Note: 1.N=503. ***p<0.001.
2.CE: Classroom environment, LEN: Learning engagement LEF: Learning effectiveness.
3.Reference group: Gender (Female).

In model 1, the perception of the classroom environment among ASEAN students in China was regarded as the independent variable and the learning effectiveness as the dependent variable. The data shows a standardized regression coefficient (β) of 0.530 ($p < 0.001$) explaining 26.9% of the variance. This indicates a significant and positive influence of the perception of the classroom environment on learning effectiveness, thus supporting hypothesis 1.

In model 2, the perception of the classroom environment among ASEAN students in China was analyzed as the independent variable and the learning engagement as the dependent variable. The results revealed a standardized regression coefficient (β) of 0.523 ($p < 0.001$) explaining 26.1% of the variance. These findings demonstrate a significant and positive influence of the perception of the classroom environment on learning engagement supporting hypothesis 2.

In model 3, the study participation of ASEAN students in China is regarded as the independent variable and the study efficiency as the dependent variable. The results show a standardized regression coefficient (β) of 0.715 ($p < 0.001$) explaining 55% of the variance. This means that engaging in learning can significantly improve learning effectiveness supporting hypothesis 3.

In model 4, after incorporating the learning engagement variable, the standardized regression coefficient (β) for the perception of classroom environment on learning effectiveness decreased from $\beta = 0.530$ ($p < 0.001$) to 0.213 ($p < 0.001$). This explained the variance of 27.6% indicating that learning engagement partially mediated the influence of the perceptions of the classroom environment on learning effectiveness. Thus, hypothesis 4 is supported.

5. Conclusion and Discussion

5.1. Discussion of Research Findings

5.1.1. Gender

The results of this paper show that students of different genders have great differences in learning effectiveness. The study efficiency of male students is far less than that of female students. This conclusion is not different from the analysis results of other scholars [43, 44]. The reason is that female students can usually study in a variety of learning situations and can better learn a variety of knowledge. In a supportive learning environment, female students are more likely to participate in teacher-student communication and learn together with their classmates which can lead to greater growth [45].

5.1.2. Discipline

The study points out that student in each major have a big difference in learning effectiveness. The study efficiency of science and engineering majors is far less than that of humanities majors. This conclusion is consistent with various empirical analyses. The reason is that humanities students focus on reading, speaking and writing while engineering students may focus on problem-solving techniques first. This difference may lead humanities students to perform better on tests that measure theoretical knowledge [46, 47].

5.1.3. Education Level

The analysis of this paper points out that student with different degrees have great differences in learning effectiveness. The learning effectiveness of master's students is far less than that of undergraduates. This result is consistent with the analysis of many scholars [48, 49]. The reason is that undergraduates often enjoy learning knowledge, are enthusiastic about learning and can actively participate in classroom exchanges, practical projects, academic analysis and other activities. Comparatively speaking, master's students spend more time on the topics they analyze and tend to be less involved in related subjects. Therefore, undergraduates' learning attitude is very good [50]. Some master's students may have to deal with more stress in academic analysis because they have to deal with richer projects and have greater academic analysis responsibilities. Comparatively speaking, undergraduate students are more relaxed in learning so they are more efficient in learning [51].

5.1.4. The Impact of Classroom Environment on Learning Effectiveness

A warm classroom environment can fully improve learning effectiveness which is the same as the previous conclusion [52, 53]. In this paper, the perception of the classroom environment of ASEAN students in China can predict the variance of learning effectiveness at 26.9%. Teachers thoroughly investigate topics before classes, prepare lessons based on students' prior knowledge, and then offer new material to engage students in learning an extensive variety of subjects. Moreover, the use of rich teaching strategies can make students think that learning is particularly interesting; they can see problems in two aspects and communicate with other students in their teaching work. Furthermore, students can develop excellent thinking skills, so that they can improve their cognitive gains.

5.1.5. The Influence of Classroom Environment on Learning Engagement

The classroom environment can better motivate students to participate in learning which is the same as the previous conclusion [54]. In this paper, perceptions of the classroom environment among ASEAN students can predict 26.1% of the variance of learning engagement. The reason is that individual psychology and cognition can fully affect the effects of the classroom environment. Students' self-participation in learning activities shows that teaching has shown its due value. Teachers can help students better understand their own learning and actively participate in various classroom activities by fostering a teacher-student relationship.

5.1.6. The Impact of Learning Engagement on Learning Effectiveness

Learning engagement has a great influence on learning effectiveness. There is no difference from the previous conclusions [33, 55]. In this study, the learning engagement of ASEAN students in China can forecast 55% of the variance of learning effectiveness. This means that the way students collect and apply knowledge should be further improved. This includes motivating students to engage in deep learning activities, to gain value from knowledge, to make students fall in love with their subject, to make students better understand the meaning of education, to ensure that they can participate in learning in a timely manner, to deal with various assignments on time, and to stimulate discussion among groups. In addition, questioning, classroom discussion, and group communication can be used to improve students' speaking and thinking abilities.

5.1.7. The Mediating Role of Learning Engagement

Chinese ASEAN students' cognition of the classroom environment can fully affect the learning effectiveness by using the learning engagement [33, 56] because students' cognition of the school environment has a greater impact on their learning engagement. Students have a variety of preferences, belonging and perceived educational significance in combination with their classroom experience. If students really enjoy their current courses and majors and feel that the knowledge they have acquired in school is crucial to their future development in society, they will have a greater chance to carry out deep learning and learn more esoteric knowledge and related definitions. At the same time, they are more enthusiastic about learning. Otherwise, if students think that the learning material is boring or that the

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learning content does not matter to them, they will not further study and at the same time, they will have a poor learning attitude.

5.2. Research Conclusion

In this paper, SPSS 22 and AMOS were used to make various analyses for all questionnaires collected. It has been found that every hypothesis is confirmed.

6. Research Limitations and Recommendation

6.1. Research Limitations

6.1.1. Limitations of Research Subjects

This paper uses less funds and lags behind in the time of information collection. It only surveyed ASEAN students at three universities in Guangxi. If information can be collected from ASEAN students in our provinces, the results of the study can be more generalized.

6.1.2. Limitations of Research Methods

This paper focuses on the use of the questionnaire survey method for analysis but this approach also has its own shortcomings. Other methods such as interviews or researcher observation can be introduced to further understand how ASEAN students affect the classroom environment, learning engagement and learning effectiveness.

6.2. Recommendations

Firstly, there is a need to transform the educational teaching mode. The generation of learning effectiveness is a process of transitioning from ambiguity to clarity, from non-existence to existence and from existence to excellence in thinking, cognition and abilities. This process is complex, dynamic and fraught with uncertainties. Therefore, while encouraging self-construction and active participation among international students, teachers should transform their roles and functions from controllers, admonishers and imposers to facilitators of learning. Teachers should prepare for international students' learning activities, guide and support their development, actively explore new teaching models with deep interaction and comprehensively use various teaching methods such as problem guidance, role-playing, case studies, group discussions, multimedia, etc. Teachers should always focus on the key and difficult issues of teaching content and carefully design and prepare practical teaching content to highlight the scaffolding role of teachers in students' learning and development. Therefore, teachers can enhance international students' learning engagement by creating scenarios and tasks and implementing measures and methods to promote their learning involvement.

Secondly, it is crucial to strengthen international students' self-discipline and motivation. Adopting a 'student-centered' approach means treating international students as beneficiaries of learning activities rather than subjects to be managed, fully respecting their wishes, and maximizing their potential. This shift also transforms international students from 'audience' to 'protagonists ' promoting interaction between teachers and students, mutual learning and enabling international students to truly achieve active, proactive and autonomous learning. Therefore, it is necessary to enhance international students' self-management and make timely adjustments according to changes in learning content and environment while leveraging the support of teachers and other stakeholders. Strengthening international students' self-management in the learning process can enhance their self-discipline and sense of responsibility, thereby promoting their ability for independent learning and exploration.

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