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The Influencing Factors of School Environment on Student Sustainable Development

Jianye Su [1,2], Zhongwu Li [1+]

[1] International College, National Institute of Development Administration, Bangkok 10700, Thailand

[2] Yulin Normal University, Yulin 537599, China

[+]*zhongwu.li@nida.ac.th (corresponding author)*

Abstract. Nowadays, universities are carrying out a comprehensive reform of the school teaching environment to improve teaching quality and promote student development in China. More and more evidence show that the teaching environment is closely related to student development. Based on Engagement Theory and 3P Learning Process Theory, this paper will sample of undergraduate students in Guangxi Zhuang Autonomous Region of China. Using the method of literature review, questionnaire and structural equation model for data collection and analysis the following conclusions. School environment, deep learning methods, surface learning methods, student engagement and student development all have significant impact. Among them, the surface learning method has a negative influence on student development. In the relationship between school environment and student development, deep learning method and engagement play a mediating role, and exist partial mediation effect. Through data analysis, the study will provide a direction for the reform of school teaching environment and prove that school environment, deep learning and engagement have a significant impact on student development. Therefore, in order to achieve the best education plan, the reform can focus on the change of school environment, the promotion of deep learning and the increase of students' engagement.

Keywords: pedagogy, teaching reform, sustainable development, SEM, teaching practice.

1. Introduction

After more than 20 years of enrollment expansion policy, higher education in China has gradually shifted from elite education to mass education. However, with the expansion of college enrollment, the quality of higher education has declined. Therefore, how to improve the quality of education becomes the key point to the reform and development of higher education (Li, 2016). The nine-year follow-up report of the "tracking research on the learning and development of Chinese college students" (CCSS, 2011-2018) which had been carried out by the Education Research Institute of Tsinghua University in China points out that in the Chinese University environment (or school environment hereafter), the undergraduate teaching practice environment fails to reflect the requirements and training of learners' multi-level cognitive ability, moreover, the students' learning motivation and Engagement are insufficient. According to these results, Chinese universities must require students to use more efficient learning methods and enhance cognitive abilities at the personal level, and strengthen learning engagement. At the school level, universities need to improve the curriculum teaching practice, and carry out deep curriculum teaching reform in improving students' cognitive training level and promoting students' high-order thinking.

As for how the reform should be carried out, there are no successful cases for schools to learn from. Problems such as radical methods and deviations in requirements make the reform results unsatisfactory. More and more people have begun to pay attention to whether students can adapt to the changes in the school environment and gain different benefits from the changes. Previous experience has shown that school environmental changes caused by reforms may have positive effects on students, such as promoting teachers' classroom teaching practices. However, the opposite effect can also occur, such as more onerous and stricter management academic demands that can lead to burnout and decreased engagement of students, also this school environment change may lead to surface learning and ultimately affect academic performance (Entwistle, 1988; Everaert et al., 2017). Therefore, how effectively students can cope with school environmental change will affect their success in college (Collie et al., 2017).

As mentioned above, Chinese university students are in a reformed and changing school environment, and students’ development is the ultimate goal of the reform. It is necessary to study the experience and views on the whole school environment from the perspective of students so as to understand students' learning psychology, learning methods, degree of engagement and achievement of self-evaluation, and reflect on the problems of school education and teaching environment in all aspects (Cha, 2016; Chi, 2017; Huan et al. 2021). Therefore, this study will discuss the impact of these factors on students’ development from the perspective of students' perceived school environment and its impact on learning methods and engagement.

2. Literature Review

Traditional teaching theory regards individual students as "black box". The input side of the black box is the school environment, which includes various policies and teaching methods, and the output side is the various measures of student academic performance. People ignore some factors transfer the educational plans and policies into students' personal development. Astin (1984) believes that the ignored factor might be students' engagement, and pointed out that students' engagement refers to the degree of time and energy invested in learning.

2.1. School environment, Deep learning methods and Surface learning methods

Astin (1984) argues that the school environment (or named in Chinese, Xue Xiao Huan Jing, XXHJ) includes the school's own rules and the atmosphere of relationships: both pedagogical and academic. Biggs (1987) believed that the school environment consists of subject areas, teaching methods, task time and curriculum structures. The National Survey of Student Engagement (NSSE) defines the school environment as three aspects that students perceive and experience, named: 1) the quality of interpersonal interactions; 2) academic support; 3) Teaching practice, containing teachers' teaching methods, organization, the logic of the lecture, student learning feedback, learning assignment, etc. This study adopts the NSSE definition of the school environment and focuses only on the teaching practice environment.

Biggs (1987) believes that there are deep and superficial learning methods. Deep learning methods (or named in Chinese, Shen Du Xue XI Fang Fa, SCXXFF) refer to students who think that what they need to learn meets their personal needs and generates interest and tends to understand. The content you are learning and the learning style that maximizes the meaning of the learning. Surface learning method (or named in Chinese, Biao Mian Xue XI Fang Fa, BCXXFF) refers to students who think that the learning knowledge points might not meet their needs and hobbies, and worry about that they can not learn these unlike knowledge points and deviate from the teaching goals. Different levels of learning quality are due to different learning motivations and strategies. Since then, this definition has been widely used, and this study adopts it.

Marton and Säljö (1976) found that specific school environments could induce and shape the learning methods adopted by students, because learning methods are not inherent cognitive characteristics. Biggs (1987) further verified the relationship between learning tasks, teaching methods and learning methods in the school environment. Learning method is the response generated by students' perception of school environment, while learning tasks and teaching methods are the factors included in school environment. Therefore, heavy learning tasks are related to surface learning methods, and good teaching methods are significantly related to deep learning methods (Entwistle and Ramsden, 2015). A school environment with good

teaching methods will lead students to adjust their learning methods and promote them to adopt more deep learning methods and less surface learning methods (Wang et al., 2013). Teaching environments that support students, provide positive feedback, allow students to learn freely, and clarify goals for relevant professional practice. All these are associated with students' deep learning strategies (Gozalo et al., 2020). To sum up, many researchers believe that the school environment is positively related to deep learning methods and negatively related to surface learning methods. Therefore, the following assumptions are listed in this paper:

H1: School environment is positively correlated with deep learning methods

H2: School environment is negatively correlated with surface learning methods

2.2. School environment and student development

Astin (1984) believes that students' development (or named in Chinese, Xue Sheng Fa Zhan, XSFZ) refers to the emotional and cognitive, psychological and behavioral gains of students in the process of university study. External performance and internal self-perceived benefits are two important connotations of student development (Biggs, 1987), which include self-setting goals and self-concept. Students' development, also known as learning outcomes, refers to the knowledge and skills that students acquire directly or indirectly in school educational practice activities (Zhao, 2013). Based on the above statements, this study believes that students' development refers to students' self-perceived gains in knowledge and skills, behaviors and emotions in the learning process.

Pascarella (1985) found that the direct influence of various factors in school environment on students' development was very weak, but this did not mean that the influence of school environment on students' development could be ignored, and such influence might be generated through other factors. Various factors contained in school environment affect students' academic performance (Henderson et al., 2000; Tian, 1993). Students' perception of school environment directly or indirectly affects learning outcomes, positive perception directly affects the improvement of students' knowledge, academic performance, and skills develop best in a school environment with good teaching methods (Lizzio et al., 2002). In fact, school environmental factors can directly or indirectly affect students' academic performance, not only because of their impact on students' overall performance, but also because they directly and indirectly affect and reflect the quality of classroom teaching and learning, which in turn have an impact on the factors that contribute to learning outcomes (Hallinger and Heck, 2011). The literature shows that many researchers believe that the school environment has a direct or indirect impact on student development. Therefore, the following assumptions are obtained:

H3: School environment is positively related to student development

2.3. School environment and engagement

Astin (1984) defined engagement (or named in Chinese, Can Yu Du, CYD) as the amount of time and energy students devote to the academic experience. Kuh (2009) believed that "Engagement" is a more reasonable indicator of education quality than "investment", and formally proposed the concept of student "Engagement". Kuh (2009) describes engagement as the time and energy spent in educationally purposeful activities that are critical to learning and student success. One of the theoretical foundations of the National Student Participation Survey (NSSE) is engagement, which has been used by researchers to this day This study adopts Kuh (2009) definition of engagement.

Spending a lot of time on school activities, investing a lot of energy in their studies, and being actively involved in various community organizations and interpersonal interactions are characteristics of highly engagement students. Students with low engagement are on the contrary. The school environment should encourage students' active engagement, always focus on students' behavior related to learning and the degree of motivation, and promote students to invest more energy and time in learning process, finally, maximize the development of student.

As mentioned earlier, this study focuses on the pedagogical practice aspects of the school environment. Teaching practice is the most important part of the school environment, which involves aspects such as learning task time, organization, curriculum teaching methods, learning feedback, and so on. Organizing pre-class discussion can reduce students' hesitation caused by fear of not understanding in class (Neer and Kircher, 1989). The teacher's organization of the class, the clarity of the class, and the students' learning feedback affect the students' development and learning engagement (Pascarella and Terenzini, 2005). Students demonstrate greater behavioral engagement in academic tasks when teachers well know about the students' expectations, provide consistent responses, and adjust instructional strategies based on students' levels (Skaalvik and Federici, 2016). Appropriate evaluation of students will increase student engagement, while teachers' clear explanation of courses’ objectives and learning activity expectations, formulation of learning rules, and a well-designed teaching program designed to significantly reduce students' rebellious feelings toward active learning will also significantly affect students' engagement (Tharayil et al., 2018). In a word, teaching practice environment is positively correlated with students' learning engagement.

H4: School environment is positively related to engagement

2.4. Deep learning methods, Surface learning methods and School development

In the process of students' learning, surface learning methods are associated with low-quality learning outcomes, while deep learning methods are associated with positive learning benefits (Saljo, 1984). Biggs (1987) found that students with deep learning

or learning methods had significant differences in test scores, complexity of writing structure, self-setting goals and self-concept. Interestingly, Meyer et al. (1990) believes that when students cross use deep learning methods and surface learning methods, that is to say, the two learning methods exist at the same time and depend on each other, or they do not use both, their academic performance is often not ideal. Students who used one of the methods alone did better than they who used both two methods did. This shows that the combination or use of learning methods alone has a complex and multifaceted impact on academic performance. After years of discussion, more and more scholars believe that deep learning methods have a positive impact on learning results, which is reflected in that deep learning methods can improve students' desire for autonomous learning of learning materials, and improve their logical thinking ability and analytical ability (Hall et al., 2004). Deep learning motivation has a positive correlation with students' study ability development, while surface learning motivation has no significant impact on students' study ability development (Chan and Yeung, 2020).

To sum up, learning methods affect students' gains in cognition, emotion, behavior and other aspects. People generally agree that deep learning methods play a better role in students' individual development than surface learning methods. Therefore, this paper puts forward the following hypothesis.

H5: Deep learning methods are positively correlated with student development

H6: Surface learning methods are negatively related to student development

2.5. Engagement and student development

Pascarella (1985) believed that the higher the frequency of students' engagement, the greater the probability of their success in college. Engagement in co-learning plays an important role in the development of university students. Co-learning could promote the development of friendships, gain knowledge of others acquired cooperatively, learn the learning methods used by others that are different from one's own, and broaden the understanding of differences (Bowden and Marton, 1988). Student engagement is closely related to learning outcomes (Sirin and Rogers-Sirin, 2004). There are many factors involved in participation, and these factors affect the development of students at all levels to varying degrees. For example, students with excellent learning outcomes show higher motivation than students with poor learning outcomes (Konold et al., 2018). Students who are less engaged in the classroom perform significantly differently on exams than those who are more engaged (Precourt and Gainor, 2019). Taken together, adequate engagement can have a positive impact on students' knowledge and skills, emotions, and behavior. The following hypotheses are given for research purposes.

H7: Engagement is positively correlated with student development

2.6. Mediation effect

The 3P learning theory comes from the research results of Professor Biggs (1987) of the University of Hong Kong on student learning for nearly 20 years. Biggs (1987) believed that in the process of students' learning, the school environment composed of subject areas, teaching methods, task time and curriculum structure, as a predictor of Presage factors, would affect students' learning methods (Process) and ultimately affect learning outcomes (Product). Therefore, this paper assumes that the following mediating effects exist and are significant.

H8: Deep learning approaches mediate the relationship between school environment and students' development

H9: Surface learning approaches mediate the relationship between school environment and students' development

The school environment should encourage students' active engagement, always focus on students' behavior related to learning and the degree of motivation, and promote students to invest more energy and time in learning process, finally, maximize the development of student. Engagement theory discusses the relationship between school environment, engagement and students' development, and believes that engagement plays an intermediary role between school environment and students' development.

H10: Engagement mediates the relationship between school environment and students' development

2.7. Research model

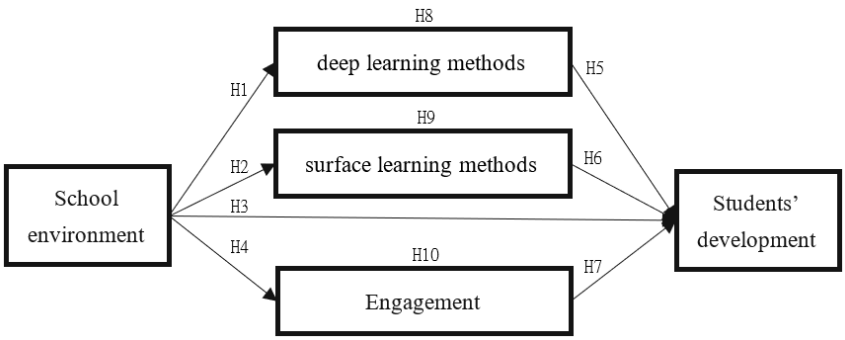

Fig. 1: Conceptual framework.

The research model of this study is based on Astin (1984) engagement theory and Biggs (1987) "3P" learning process theory. According to the previous discussion, the conceptual framework of this research is obtained, as shown in Figure 1.

3. Methods

3.1. Sampling method

The target population of this study is undergraduate students in universities in the Guangxi Zhuang Autonomous Region of China, and the results of the study can be referred to schools of the same type. According to the data released by the official website of the Education Department of Guangxi Zhuang Autonomous Region, China, as of September 8, 2021, there were a total of 522,722 undergraduate students in ordinary universities in Guangxi Zhuang Autonomous Region (data source: http://jyt.gxzf.gov.cn/zfxxgk/fdzdgknr/xjfb/gxjysjvb/2020sj/t10045683.shtml).

According to the sample calculation formula provided by Yamane (1967): n=N/[1+N(e)]2, where N refers to the total number of subjects in this study, e is the maximum acceptable error range (5%), N For the number of samples, the calculated sample size is approximately equal to 400 copies. As a result, a total of 651 questionnaires were distributed to students using the convenience sampling method, and 400 valid samples were finally obtained.

3.2. Data processing method

This study uses the American IBM SPSS Statistics 24 (referred to as: SPSS 24) to conduct reliability analysis and validity test on the questionnaire data to verify the validity and reliability of the questionnaire. Next, the structural equation model of this study uses IBM SPSS AMOS 25 (AMOS 25 for short) to analyzed in depth, including model fit analysis and path analysis (hypothesis testing). Finally, through the overall interpretation of the analysis data, the corresponding research conclusions are drawn.

3.3. Scale

The school environment subscale in the 2016 version of the NSSE in the United States measures school environment. The scale consists of 12 items, with options modified to a Likert 5-point scale. Engagement was measured using the Utrecht Work Engagement Scale—Student Version-9 item version (referred to as: UWES-S-9) developed by Schaufeli et al. (2002). The scale consists of 9 items, with options modified on a 5-point Likert scale. Two subscales of the two-factor Learning Process Scale (R-SPQ-2F) revised by Biggs et al. (2001) were used to measure deep learning methods and surface learning methods, respectively. Each subscale consists of 10 items, with options modified to a 5-point Likert scale. Student development was measured using the Personal Development Scale in the 2016 version of the NSSE, which includes eight items, with options modified to a Likert 5-point scale.

On this basis, a questionnaire for the cost study was made.

4. Results analysis

4.1. Reliability analysis

In order to understand the reliability of the questionnaire more clearly, it is necessary to conduct reliability analysis on the questionnaire data. The results are shown in Table 1. The overall reliability of the questionnaire was high, and the Cronbach's Alpha coefficient was 0.919, which was higher than the standard 0.7. However, the Cronbach's Alpha coefficient after deleting the items was between 0.907 and 0.913, which was lower than the total Cronbach's Alpha coefficient of 0.919, indicating that all the items in the questionnaire had high credibility, and there was no need to delete any item.

Table 1: Reliability level analysis.

Dimension	Dimensions' Cronbach's Alpha	Overall Cronbach's Alpha
School Environment (XXHJ)	0.926	0.919
Deep Learning Methods (SCXXFF)	0.896	
Surface Learning Method (BCXXFF)	0.814	
Engagement (CYD)	0.883	
Students' Development (XSFZ)	0.952	

4.2. Exploratory factor analysis (EFA)

The results of exploratory factor analysis can be used to understand the structural validity of the questionnaire data. Table 2 presents the Kaiser-Meyer-Olkin (KMO) test and Bartlett test results of each dimension and the overall dimension of the questionnaire data. These results show that in the overall validity test, the KMO value is 0.924, which is higher than the standard requirement of 0.7, indicating that there is a strong correlation between the variables. At the same time, the significance of Bartley's sphericity test is less than 0.01, which indicates that this data is suitable for factor analysis.

Table 2: Validity analysis.

Variables	KMO and Bartlett test	
	KMO Value	Significance Level
Overall validity	0.924	.000
School Environment (XXHJ)	0.887	.000
Deep Learning Methods (SCXXFF)	0.901	.000
Surface Learning Method (BCXXFF)	0.841	.000
Engagement (CYD)	0.875	.000
Students' Development (XSFZ)	0.935	.000

When the number of limiting factors is 5 and the exclusion factor is less than 0.5, a better rotation component matrix is obtained. The total variance explanation table shows that the cumulative variance contribution rate of the five extractable components is 60.084%, indicating that the five components explain most of the information of the original data. As shown in Table 3.

Table 3: Total variance explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.995	30.939	30.939	12.995	30.939	30.939	6.567	15.636	15.636
2	4.469	10.640	41.579	4.469	10.640	41.579	5.453	12.982	28.619
3	3.488	8.305	49.885	3.488	8.305	49.885	5.318	12.662	41.280
4	2.552	6.077	55.962	2.552	6.077	55.962	4.035	9.608	50.889
5	1.731	4.122	60.084	1.731	4.122	60.084	3.862	9.195	60.084

The five factors extracted were consistent with the dimension and conceptual framework of the scale design in this study, and the load of each item under the variable was between 0.507 and 0.871, meeting the requirement of greater than 0.5. Therefore, according to the corresponding relationship between the factor and the measurement term, it can be obtained.

- Component (factor) 1 explains the items in the school environment dimension (XXHJ).
- Component (factor) 2 explains the deep learning method (SCXXFF) item.
- Component (factor) 3 explains the items on the surface learning method dimension (BCXXFF).
- Component (factor) 4 explains the Engagement dimension (CYD) items.
- Component (factor) 5 explains the student development dimension (XSFZ) items.

The explanatory power of SCXXFF9 and BCXXFF1 in any factor cannot exceed 50%. Therefore, consider removing it. In conclusion, the questionnaire data has good construct validity. The specific data is shown in Table 4:

Table 4: Rotated component matrix[a]

Component 1		Component 2		Component 3		Component 4		Component 5	
XXHJ10	0.871	SCXXFF3	0.734	BCXXFF7	0.744	CYD3	0.748	XSFZ5	0.832
XXHJ8	0.860	SCXXFF6	0.723	BCXXFF6	0.730	CYD2	0.733	XSFZ6	0.820
XXHJ9	0.850	SCXXFF4	0.702	BCXXFF8	0.708	CYD5	0.723	XSFZ7	0.818
XXHJ11	0.841	SCXXFF5	0.676	BCXXFF9	0.672	CYD1	0.682	XSFZ3	0.818
XXHJ12	0.828	SCXXFF8	0.672	BCXXFF3	0.604	CYD8	0.652	XSFZ2	0.808
		SCXXFF1	0.641	BCXXFF10	0.580	CYD6	0.644	XSFZ4	0.785
		SCXXFF7	0.635	BCXXFF4	0.519	CYD4	0.638	XSFZ1	0.754
		SCXXFF2	0.624	BCXXFF2	0.515	CYD9	0.594	XSFZ8	0.733
		SCXXFF10	0.560	BCXXFF5	0.507	CYD7	0.582		

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.

4.3. Confirmatory factor analysis (CFA)

Confirmatory factor analysis (CFA) can be used to understand the convergent and discriminant validity of questionnaire data. The factor loading coefficient value shows the correlation between the latent variable and the measurement item. If the loading coefficient value is greater than 0.7, it means that there is a strong correlation. After excluding items whose coefficient value is less than 0.7, the final factor loading coefficient situation is obtained, as shown in Table 5.

Table 5: Factor loading factors table.

Factor (latent variable)	measurement item (explicit variable)	non-standard load factor (Coef.)	standard error (Std. Error)	z (CR value)	p	standard load factor (Std. Estimate)
XXHJ	XXHJ8	1	-	-	-	0.842
	XXHJ9	1.055	0.051	20.673	0.000	0.837
	XXHJ10	1.186	0.052	22.811	0.000	0.889
	XXHJ11	1.207	0.058	20.886	0.000	0.842
	XXHJ12	1.146	0.058	19.771	0.000	0.814
SCXXFF	SCXXFF1	1	-	-	-	0.62
	SCXXFF4	1.288	0.116	11.09	0.000	0.706
	SCXXFF8	1.295	0.11	11.746	0.000	0.772
	SCXXFF6	1.241	0.107	11.56	0.000	0.752
BCXXFF	BCXXFF6	1	-	-	-	0.63
	BCXXFF7	1.366	0.136	10.044	0.000	0.83
	BCXXFF8	1.181	0.117	10.103	0.000	0.67
CYD	CYDD7	1	-	-	-	0.669
	CYDD2	1.173	0.085	13.853	0.000	0.772
	CYDD6	1.212	0.085	14.254	0.000	0.798
	CYDD5	1.314	0.086	15.25	0.000	0.865
	CYDD4	1.201	0.083	14.452	0.000	0.811
	CYDD3	1.311	0.089	14.663	0.000	0.825
	CYDD8	1.033	0.081	12.8	0.000	0.705

XSFZ	XSFZ2	1	-	-	-	0.836
	XSFZ3	0.95	0.047	20.106	0.000	0.817
	XSFZ4	0.979	0.05	19.548	0.000	0.803
	XSFZ5	1.04	0.046	22.407	0.000	0.873
	XSFZ6	1.1	0.048	22.987	0.000	0.886
	XSFZ7	1.078	0.047	22.73	0.000	0.88
	XSFZ8	1.011	0.05	20.11	0.000	0.817

Note: XXHJ: School Environment, SCXXFF: Deep Learning Methods, BCXXFF: Surface Learning Method, CYD: Engagement, XSFZ: Students' Development.

The average variance extraction (AVE) and combined reliability (CR) values of the above dimensions were greater than 0.5 and greater than 0.7, respectively, indicating that the questionnaire data had high convergent validity. As shown in Table 6:

Table 6: Model AVE and CR metrics results.

Factor	Average variance extracted AVE value	Combined reliability (CR value)
XXHJ	0.715	0.926
SCXXFF	0.511	0.806
BCXXFF	0.512	0.756
CYD	0.609	0.916
XSFZ	0.714	0.946

Note: XXHJ: School Environment, SCXXFF: Deep Learning Methods, BCXXFF: Surface Learning Method, CYD: Engagement, XSFZ: Students' Development.

Table 7: Discriminant validity: Pearson correlation and AVE square root value.

	XXHJ	SCXXFF	BCXXFF	CYD	XSFZ
XXHJ	0.845				
SCXXFF	0.307	0.716			
BCXXFF	-0.024	0.153	0.715		
CYD	0.240	0.612	-0.000	0.782	
XSFZ	0.348	0.472	-0.151	0.604	0.846

Note: The diagonal blue number is the square root value of AVE.
XXHJ: School Environment, SCXXFF: Deep Learning Methods, BCXXFF: Surface Learning Method, CYD: Engagement, XSFZ: Students' Development.

Table 7 shows the Pearson correlation and AVE square root value of each dimension. The AVE square root value (value on the diagonal of the table) of each dimension is greater than the maximum absolute value of the correlation coefficient between factors, which means that the questionnaire data has good discriminant validity.

4.4. Hypothetical test

According to the above research conceptual framework, reliability and validity test and model modification, the structural equation model (SEM) on the impact of school environment (xxhj) on student development (xxfz) is finally obtained, as shown in Figure 2. On this basis, the relationship between variables is verified.

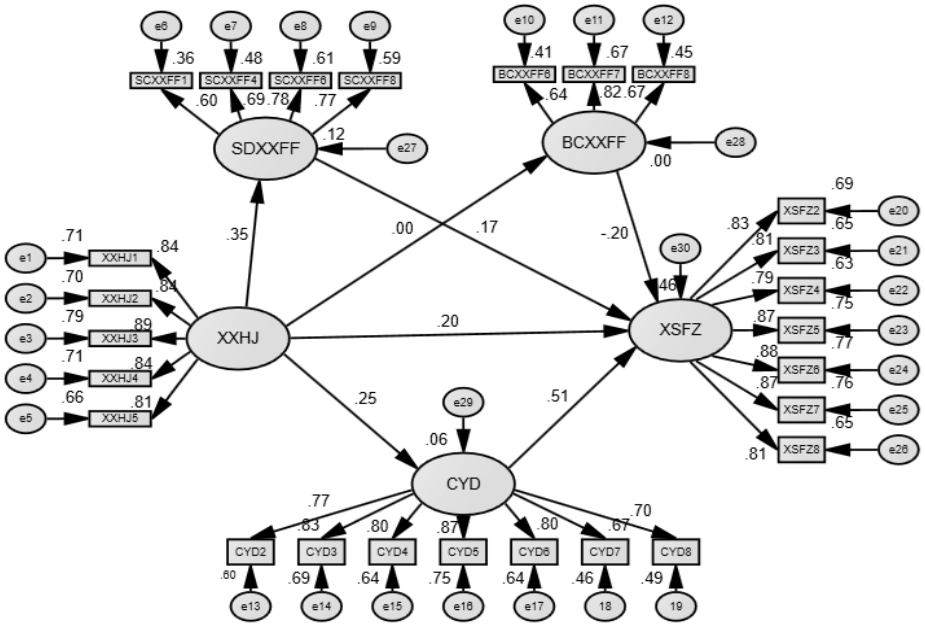

Fig. 2: SEM model.

The analysis results of the overall fitting degree of SEM model (Table 8) by AMOS 24 software show that Cmin = 846.37, degree of freedom (DF) = 225, Cmin / DF = 2.899 < 3, indicating that the fitting between the hypothetical model and sample data is acceptable. Root mean square error of approximation (RMSEA) = 0.069 < 0.08, indicating that the fitting degree of the model is acceptable. Although root mean square residual (RMR) = 0.067 < 0.08, goodness of fit index (GFI) = 0.867, normed fit index (NFI) = 0.848, all greater than 0.8, and comparative fit index (CFI) = 0.922, incremental fit index (IFI) = 0.922, Tuck-Lewis index (TLI) = 0.913, all greater than 0.9, which further indicates the goodness of fit of the model.

According to the p value of significance level in regression weight Table 9, school environment (xxhj) has a significant positive impact on deep learning method (scxxff), Engagement (CYD) and student development (xsfz) at the level of 0.001. At the same time, Engagement (CYD) has a significant positive impact on student development (xxfz) at the level of 0.001. Deep learning method (scxxff) has a significant positive impact on student development (xsfz) at the level of 0.01. Surface learning method (bcxxff) has a significant negative impact on student development (xsfz) at the level

of 0.001. The school environment (xxhj) has no significant effect on the surface learning method (bcxxff). Based on the above results, the previous hypotheses H1, H3, H4, H5, H6 and H7 on the relationship between variables in this study are supported, but the exception is that the results show that the school environment has little impact on surface learning methods, and the hypothesis H2 is not supported.

Table 8: Fitting index.

Fitting index	Acceptable range	Measured value
Cmin	-	846.37
DF	-	225
Cmin/DF	＜3	2.899
RMSEA	＜0.08	0.069
RMR	＞0.08	0.076
GFI	＞0.08	0.867
NFI	＞0.08	0.848
CFI	＞0.09	0.922
IFI	＞0.09	0.922
TLI	＞0.09	0.913

Table 9: Regression weights: (group number 1 - default model).

			Estimate	S.E.	C.R.	P	Label
SCXXFF	<---	XXHJ	0.242	0.043	5.624	***	par_1
CYD	<---	XXHJ	0.208	0.045	4.585	***	par_2
BCXXFF	<---	XXHJ	-0.001	0.051	-0.029	0.977	par_3
XSFZ	<---	SCXXFF	0.225	0.083	2.725	0.006	par_4
XSFZ	<---	CYD	0.582	0.07	8.35	***	par_5
XSFZ	<---	BCXXFF	-0.22	0.054	-4.058	***	par_6
XSFZ	<---	XXHJ	0.191	0.043	4.401	***	par_

XXHJ: School Environment, SCXXFF: Deep Learning Methods, BCXXFF: Surface Learning Method, CYD: Engagement, XSFZ: Students' Development.

Table 10: Summary of mediation test results.

item	c total effect	a	b	a*b Mediating effect size	a*b (Boot SE)	a*b (z)	a*b (p)	a*b (95% BootCI)	c' direct effect	Effect ratio
XXHJ =>SCXXFF =>XSFZ	0.350**	0.290**	0.167**	0.049	0.019	2.5	0.012	0.014 ~ 0.091	0.185**	13.888%
XXHJ =>BCXXFF =>XSFZ	0.350**	-0.028	-0.152**	0.004	0.009	0.445	0.656	-0.014 ~ 0.024	0.185**	0%
XXHJ =>CYD =>XSFZ	0.350**	0.233**	0.479**	0.111	0.032	3.442	0.001	0.051 ~ 0.178	0.185**	31.856%

*Note: * p<0.05 ** p<0.01*
XXHJ: School Environment, SCXXFF: Deep Learning Methods, BCXXFF: Surface Learning Method, CYD: Engagement, XSFZ: Students' Development.

The Table 10 show that the corresponding 95% bootci (excluding 0) value and the significance of a, b and c', a * b is the same as c', it can be judged that the deep learning method (SCXXFF) has a partial mediating effect between the school environment (XXHJ) and student development (XSFZ), and the mediating effect accounts for 13.888%. The research hypothesis H8 is supported. In addition, according to the 95% confidence interval (95% bootci) of the effect value is -0.014 ~ 0.024, including 0, and the corresponding a is not significant, b, c'is significant, so the mediating effect of surface learning method (BCXXFF) between school environment (XXHJ) and students' development (XSFZ) is not significant, and the mediating effect should account for 0%. The research hypothesis H9 is not supported. Result shows that students in Chinese University environment have different learning behavior and results. The same situation shows that Engagement (CYD) plays a partial mediating role between school environment (XXHJ) and student development (XSFZ), accounting for 31.856%. Thus, the research hypothesis H10 is supported.

5. Discussion

Through the above empirical analysis, this study found that school environment, deep learning methods, surface learning methods, and engagement are all significant factors that affect students' development, and surface learning methods have a negative impact. At the same time, it is found that the perceived good school environment can promote more engagement behaviors and deep learning methods of students, and the mediating effect of engagement and deep learning can bring significant good results to students' own development. These findings are supported by the conclusions of numerous previous studies. Cleveland-Innes and Emes (2005) pointed out that the importance of the school environment is reflected in its influence not only on students' learning outcomes, but also on students' learning methods. A good teaching practice environment plays a great role in reducing students' rebellious feelings towards active learning, and affects the level of students' engagement (Tharayil et al., 2018). Indeed, the factors which belong to school environment have both direct and indirect effects on student outcomes, not only on student achievement, but also on learning and engagement, which have been shown to have a significant impact on learning outcomes (Hallinger and Heck, 2011). Entwistle and Ramsden (2015) believe that a good school environment promotes students to adopt deep learning methods, on the contrary, it leads to surface learning methods. It is worth noting that Entwistle and Ramsden (2015) share the same view as many researchers, which shows that Chinese students may have different learning psychological mechanisms.

This study also found that school environment variables did not have a significant effect on surface learning methods, which is inconsistent with the conclusions of most previous studies. The research (Campbell et al., 2001) shown that the perceived school environment would affect students' learning methods, and the students tended

to be associated with traditional teaching methods, and students focus on superficial learning by copying knowledge. But Chinese students are more accustomed to the superficial learning method of rote memorization, which is a habit they have developed from the beginning of their study career, and is less affected by the environment.

6. Conclusion

Based on the above research conclusions and the reality of the current reform of teaching environment in colleges and universities in China, the following suggestions are put forward:

Research shows that a good teaching practice environment can promote students' deep learning and engagement, and ultimately affect students' development (Biggs, 1987). Therefore, the top-level design of teaching environment reform in colleges and universities and the planning at the school level should include the teacher retraining plan in the reform focus, effectively improve the teaching practice level of teachers, change the traditional teacher centered teaching concept, and create a learning environment centered on students' active Engagement and independent learning.

Studies have shown that deep learning methods have a significant positive effect on students' development, while surface learning methods have a negative impact. Therefore, in teaching, teachers should provide more self-inquiry learning content and subjective topics to promote students' in-depth understanding of the content and reduce the surface learning of simply copying the answers from existing materials. This should also be the main point of the current teaching reform. Reflecting on the fact that the school environment has no effect on surface learning also demonstrates the need for reform in this aspect, as the current school environment does not encourage students to abandon surface learning.

Studies have shown that engagement has a significant positive effect on student development (Sirin and Rogers-Sirin, 2004), so the school environment, including teaching practices, should encourage greater student Engagement. A large number of other studies have confirmed that the task completion method of group cooperation can give full play to the Engagement of students, which also provides an idea for the ongoing teaching reform practice.

Finally, although research has confirmed the important role of school environment, learning methods and Engagement in student development, it cannot be ignored that student development is directly or indirectly affected by many factors, such as learning pressure, interpersonal pressure, learning In-depth understanding of these contents will help to provide more useful basis for China's current teaching reform or other improvements in the future.

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