Education Reform and Development, 2024, Volume 6, Issue 2
https://ojs.bbwpublisher.com/index.php/ERD
Online ISSN: 2652-5372
Print ISSN: 2652-5364

Examining the Interplay of Classroom Learning Environment, Support, and Acquisition: Insights from Applied Undergraduate Education in China

Xiaorong Wei[1,2], Shike Ding[3], Songfeng Gao[2]*

[1]Graduate School, Lyceum of the Philippines University, Batangas 4200, Batangas Province, Philippines
[2]Henan University Urban of Construction, Pingdingshan 467000, Henan Province, China
[3]Pingdingshan No. 1 Senior High School, Pingdingshan 467000, Henan Province, China

***Corresponding author:** Songfeng Gao, 965808788@qq.com

Abstract: The classroom learning environment aids students in acquiring knowledge and improving their abilities, with learning acquisition serving as the cornerstone of curriculum evaluation. Traditional approaches to curriculum assessment predominantly rely on explicit indicators like university reputation, resource allocation, and academic performance, often neglecting the implicit measure of learning acquisition. A shift towards a student-centered perspective suggests that curriculum evaluation should prioritize students' subjective experiences. In line with this perspective, this study endeavors to investigate the interplay among the classroom learning environment, learning support, and learning acquisition within applied undergraduate universities in China. Employing a descriptive research methodology through a survey, participants responded to a questionnaire. A total of 411 students majoring in law, art, and engineering from Henan CJ University in China were included in the study. Findings revealed no significant correlation between respondents' gender, age, major, and the classroom learning environment, learning support, and learning acquisition. However, notable associations were identified between the classroom learning environment and learning support, the classroom learning environment and learning acquisition, as well as learning support and learning acquisition. This research underscores that an enhanced classroom learning environment corresponds to better learning support, resulting in improved learning outcomes.

Keywords: Classroom learning environment; Learning support; Learning acquisition; Curriculum quality evaluation

Online publication: February 27, 2024

1. Introduction

Since China implemented the national strategy of reform and innovation, higher education in China has developed rapidly. According to the 2022 National Education Development Statistical Bulletin released by the Ministry of Education of China, as of the end of 2022, the total number of higher education institutions in China was 3,013, with a total enrollment of 19.6564 million undergraduate students [1]. From the perspective of the number of college students, China has become a major country in higher education in the world.

However, in terms of education quality, international status, and international competitiveness, China's higher education has not yet reached the world's advanced level [2]. Therefore, to improve the quality of education, the Chinese government has released "China Education Modernization 2035," which is the first initiative to propose high-quality development of education. The most important issue now is how to achieve this goal. It is evident that curriculum quality is the foundation of education quality. In order to improve curriculum quality, the Chinese Ministry of Education has issued the "Implementation Opinions on Building First-Class Undergraduate Courses," with the goal of building about 10,000 national first-class undergraduate courses within five years, and more than 10,000 provincial-level first-class undergraduate courses within five years

How to improve the quality of courses has attracted high attention from the Chinese government. In 1998, UNESCO held the World Conference on Higher Education in Paris, which proposed a new perspective and model of student-centered higher education. It called on international higher education decision-makers to pay attention to students and their needs and consider students as the main participants in educational reform. In recent years, an increasing number of education managers and researchers believe that student experience and feedback should be an important source of information for evaluating the quality of course teaching [3]. Under the influence of the student-centered teaching philosophy, valuing the learning experience of students and listening to their voices has become one of the trends for countries and well-known universities around the world to evaluate the quality of course teaching [4].

In addition to professional standards, the evaluation of course teaching quality should also consider students' learning experiences, learning engagement, and gains, to reflect the most authentic impact on students. Therefore, many countries and universities are increasingly valuing the evidence provided by student surveys. At the national level, multiple national university teaching quality standards frameworks use student surveys as the data source. For example, the National Student Participation Survey (NSSE) in the United States and the Teaching Excellence Framework (TEF) in the United Kingdom used data from the National Student Survey (NSS), while the Australian National Standard Framework used data from the Curriculum Experience Questionnaire (CEQ) and the University Experience Survey (UES) [4], and so on. At the school level, the curriculum quality evaluation systems of many famous universities in China also use student evaluations as an important basis. In the field of research, research literature related to curriculum quality evaluation based on student evaluation is constantly emerging.

However, in the existing theoretical and practical research results, there is still confusion about the concepts and methods of curriculum quality evaluation based on student surveys [4]. As to the relationship between classroom learning environment, learning support, and learning acquisition, there is no clear research result yet. Previous studies have not found any research on the relationship between the classroom learning environment, learning support, and learning acquisition in Chinese universities. This research fills the gap in previous research. Currently, Henan CJ University in China is implementing curriculum evaluation and reform. Therefore, this research took Henan CJ University as an example, and the results found will be beneficial to curriculum planners. The students and teachers of this university will participate in a more successful and high-quality educational experience journey. The significance of this study is not only to provide valuable classroom teaching improvement plans for Henan CJ University but also to provide inspiration for other similar universities in China.

2. Study objectives

This study investigated the classroom learning environment, learning support, and learning acquisition at Henan CJ University from a student-centered perspective. The aim was to contribute to a deeper understanding of the

challenges in evaluating and enhancing undergraduate courses at Henan CJ University, and to offer effective solutions and improvement methods for enhancing the quality of undergraduate education at the institution.

Specifically, the objectives were as follows:

(1) To describe the demographic profile of the respondents in terms of sex, age, and major.
(2) To assess the classroom learning environment, focusing on factors such as student cohesion, teacher support, engagement, innovation, task orientation, cooperation, and equity.
(3) To identify learning support provided to students, considering aspects such as reliability, responsiveness, guarantee, and care.
(4) To evaluate learning acquisition across cognitive, emotional, and skill domains.
(5) To examine differences in responses regarding classroom learning environment, learning support, and learning acquisition based on demographic variables.
(6) To explore the relationships among the three variables: classroom learning environment, learning support, and learning acquisition,
(7) To propose a teaching improvement plan tailored to the needs of Henan CJ University.

3. Methods

3.1. Research design

The study employs a comprehensive method combining descriptive research, literature analysis, and a questionnaire survey. Thus, the researcher utilized a descriptive research method. Descriptive statistics serve as a method for elucidating and validating existing phenomena, rules, and theories, with a particular emphasis on past occurrences. After synthesizing and analyzing prior literature, in conjunction with the research objectives, this study selected suitable research subjects for in-depth investigation, ultimately determining that the three variables under study are classroom learning environment, learning support, and learning acquisition. By taking Henan CJ University as a case study, this research explores the relationship among these variables through the distribution, collection, organization, and analysis of survey questionnaires.

3.2. Participants of the study

The study was conducted among undergraduate students majoring in Law, Art, and Engineering at CJ University in Henan Province, China. All students are full-time and reside on campus, continuously engaging in course learning. This study randomly distributed 430 questionnaires among students across 30 classes and collected 411 valid questionnaires, yielding a response rate of 95.6%.

3.3. Data gathering instruments

To collect data, this study utilized a questionnaire comprising four parts. The first part encompasses basic information about the respondents, while the second part focuses on the classroom learning environment. The third part assesses learning support, and the fourth part evaluates learning acquisition. To ensure accurate comprehension among Chinese students, a bilingual questionnaire was employed during the data collection process.

The first part consists of a survey questionnaire gathering basic information about the respondents, including their gender, age, and profession.

The second part comprises a questionnaire assessing the classroom learning environment, aiming to gauge students' perceptions of the teaching atmosphere during classroom learning. Adapted from the course teaching scale designed by Fraser, Fisher, and McRobbie in 1996, this questionnaire aims to reflect students' actual sentiments toward the classroom learning environment. It comprises 40 questions divided into seven subscales:

student cohesiveness, teacher support, engagement, innovation, task orientation, cooperation, and equity. For respondents' convenience, a Likert four-level scale ranging from "1 = never" to "4 = frequently" was utilized for each question.

The third part consists of a questionnaire on learning support, aiming to ascertain students' perceptions of support during the learning process. Adapted from the 2003 "Specification for Quality Management System of Online Education Services" by the Information Technology Standards Committee of the Ministry of Education of China and the scale designed by Wei in 2022 based on the perceived quality of learning support services, this questionnaire comprises 21 questions divided into four subscales: reliability, response, guarantee, and care. Again, a Likert four-level scale ranging from "1 = strongly disagree" to "4 = strongly agree" was used for each question.

The fourth part comprises a questionnaire on learning acquisition, aiming to evaluate students' acquisition of knowledge and abilities during the course learning process. Adapted from the Resource Perception Scale, Practice Perception Scale, and Effect Perception Scale designed by Howard in 1977 and Guo in 2023 based on perceived learning outcomes of college students, this questionnaire comprises 23 questions divided into three subscales: acquisition of cognition, acquisition of emotion, and acquisition of ability. Similarly, a Likert four-level scale ranging from "1 = strongly disagree" to "4 = strongly agree" was used for each question.

The questionnaire underwent reliability and validity analysis, with all Cronbach Alpha coefficients above 0.92, indicating good internal consistency and stability across all subscales. This suggests that participants understood the questions and provided appropriate answers, affirming the reliability and consistency of the questionnaire used in this study.

3.4. Procedure

The researcher initiated the process by drafting a formal request letter addressed to the leaders of Henan CJ University, seeking authorization for the participation of the target respondents. Upon receiving approval, the researcher personally distributed the questionnaires to each class on the designated date. The purpose and instructions were thoroughly explained to ensure the accuracy and clarity of responses. Additionally, a cover letter outlining the research objectives was provided to the participants. Data collection was facilitated through the online platform Questionnaire Star, with the questionnaire link directly sent to students either by the researcher or through other faculty members via WeChat. To ensure comprehension of each questionnaire item, the researcher communicated the requirements and details to other faculty members, enlisting their assistance in guiding students from other universities to effectively and accurately complete the questionnaire.

Following approval, the researcher sought input from experts within her department and conducted a pilot study involving 30 respondents to validate the instrument.

Upon obtaining satisfactory results from the pilot study, the researcher proceeded to administer the formal large-scale questionnaire with the consent of all respondents. Subsequently, the finalized results provided by the students were downloaded from Questionnaire Star. The researcher meticulously examined, translated, and encoded the data into Excel format before submitting it to the research center for encoding using SPSS software.

3.5. Data analysis

To uphold the confidentiality of respondents at a high level, this study refrained from including any identifying information such as names. Throughout the research process, participant identities were safeguarded. The researcher ensured fairness by solely presenting information and results based on collected data and abstaining from disclosing any personal privacy information.

4. Results and discussion

Table 1 lists the sex, age, and major of 411 respondents in this survey.

Table 1. Percentage distribution of the respondents' profile

	Frequency	Percentage (%)
Gender		
Male	176	42.8
Female	235	57.2
Age		
Under 17 years	12	2.9
18 to 25 years	395	96.1
26 to 30 years	4	1.0
Major		
Law	121	29.4
Engineering	129	31.4
Art	161	39.2

In terms of sex, 42.8% are males while 57.2% are females. Henan CJ University is an applied undergraduate university in Henan Province, China. The university mainly focuses on science and engineering majors, with male students accounting for about two-thirds of the total number of students. This is because it is generally believed that females are suitable for studying humanities and males are suitable for studying science and engineering [5], so it is reasonable for the number of male respondents to be more than female respondents. However, more females participated in this study due to several reasons. The first reason is that there are more females than males in the arts and law majors at the university. The second reason may be that girls are more inclined to cooperate with teachers and are more interested in the tasks assigned by teachers, while male students may be busy with other things they are interested in, such as doing part-time jobs. The result is that male students do not have time to participate in the survey.

In terms of age, 2.9% are below 17 years old, 96.1% are from 18 to 25 years old, and 1% are from 26 to 30 years old. The respondents are all undergraduate students and the vast majority of students are between the ages of 18 and 25, which is reasonable. Article 11 of the 2018 Standing Committee of the Chinese People's Congress stipulates that children and adolescents who have reached the age of six shall enter schools, receive and complete compulsory education. In areas where conditions are not met, enrollment can be postponed until the age of seven. Chinese schools follow a 6-year primary school system, a 3-year secondary school system, a 3-year high school system, and a 4-year undergraduate system. This means that under normal circumstances, students from the first to fourth year of university should be between the ages of 22 and 25.

In terms of majors, 29.4% are in law, 31.4% are in engineering, and 39.2% are in art. The proportion of art majors is slightly higher because, during the distribution of questionnaires, art majors have more spare time and fill out and receive more valid questionnaires, resulting in a slightly higher proportion of art majors.

Table 2 summarizes the subdomains of the classroom learning environment. The composite mean of 3.09 indicates that the respondents consistently rated it as often. Teacher support got the highest weighted mean of 3.35. Among the other indicators, except for student cohesiveness, their weighted means are all greater than 3.02. However, the lowest weighted mean item is student cohesiveness at 2.87.

Table 2. Summary table on the classroom learning environment

Indicators	Weighted mean	Verbal interpretation	Rank
Student cohesiveness	2.87	Often	7
Teacher support	3.35	Often	1
Involvement	3.06	Often	4.5
Innovation	3.02	Often	6
Task orientation	3.06	Often	4.5
Cooperation	3.13	Often	3
Equity	3.18	Often	2
Composite mean	3.09	Often	

Score interpretation: 3.50–4.00, always; 2.50–3.49, often; 1.50–2.49, sometimes; 1.00–1.49, never.

Teacher support with a weighted mean of 3.35 indicates the various assistance and support provided by the teachers to students during their learning and growth process. This support is not limited to imparting knowledge, but covers various aspects such as psychology, emotions, and behavior, aiming to help students overcome difficulties, improve self-confidence and learning ability, and create a good classroom learning environment.

Among the other indicators, except for student cohesiveness, their weighted means are all greater than 3.02. On the one hand, these indicate that teachers provide students with equal opportunities, and clear learning tasks, and encourage cooperation and innovation in the classroom teaching process. On the other hand, these also indicate that students have a high level of collaborative learning ability and confidence in innovation.

The lowest weighted mean is student cohesiveness with a weighted mean of 2.87. A class cannot succeed without unity or cohesion. If it were like scattered sand, the class would lose its meaning. In other words, cooperation is essential for a class. Helping each other among classmates is a manifestation of cohesion. Striving for the class is a manifestation of class cohesion. The students in a class are completely obedient to the teacher's command, making it a cohesive class. After the class won the award, all students applauded and cheered for their class, which is also a cohesive class.

This finding reinforces Sun's research showing that the class is one of the main environments for the growth and development of college students, and their worldview, outlook on life, and values are influenced by the class environment. Therefore, the strength of class cohesion affects the educational role of the class in students. Strengthening freshman education, formulating class conventions, actively carrying out class activities, valuing student mental health, and group inquiry learning can enhance class cohesion [6].

Table 3 presents the respondents' assessment of learning support. The composite mean of 3.31 indicates that the respondents consistently rated it as "often." Among the items cited, care got the highest weighted mean of 3.33, followed by response weighted mean of 3.31, and reliability weighted mean of 3.30. The lowest weighted mean is the guarantee weighted mean at 3.28.

Table 3. Summary table on learning support

Indicators	Weighted mean	Verbal interpretation	Rank
Reliability	3.30	Agree	3
Response	3.31	Agree	2
Guarantee	3.28	Agree	4
Care	3.33	Agree	1
Composite mean	3.31	Agree	

Score interpretation: 3.50–4.00, strongly agree; 2.50–3.49, agree; 1.50–2.49, disagree; 1.00–1.49, strongly disagree.

The highest rank is care with a weighted mean of 3.33. This indicates that teachers pay more attention to caring for the learning and development of students. When teachers use care and love to help students, they will feel valued and appreciated, which will make them more willing to study and grow seriously. This finding confirms the research of Li *et al*. showing that the actions taken by teachers in the education process, such as caring, listening, understanding, caring, and encouraging students, are called teacher support. It can also be seen as the perceived supportive behavior of teachers toward students in their learning and daily life. Teacher support can be divided into types such as tool support, emotional support, learning support, and ability support. The impact of different teacher support on student performance and development may vary [7].

Response and reliability had weighted means of 3.31 and 3.30, respectively. These indicate that Henan CJ University can respond and support students promptly according to their needs. During this process, teachers can treat every student fairly, so students believe that teachers are reliable. This finding confirms the research of Lei *et al*. showing that trust is the bridge between teachers and students, and based on trust, teachers and students have more possibilities for emotional communication. Through repeated emotional interactions, teachers and students collide and blend in. Students trust teachers due to their care, while teachers are pleased by their responses. Bilateral care can generate strong chemical reactions in teacher-student interactions, stabilize teacher-student relationships, and continuously provide nutrients for the cultivation of classroom security.

The lowest rank is guarantee, with a weighted mean of 3.28. One possible reason is that Henan CJ University is a newly established undergraduate university with a history of only 40 years. Due to limited funding and a relatively short history, the various guarantee conditions of the university are not yet sound. In the future, further improvement is needed according to the learning needs of students.

Table 4 presents the respondents' assessment of learning acquisition. The composite mean of 3.29 indicates that the respondents consistently rated it as "often." Among the items, the acquisition of cognition got the highest weighted mean of 3.32, followed by the acquisition of emotion, 3.29. The lowest weighted mean item is the acquisition of ability, 3.27.

Table 4. Summary table on learning acquisition

Indicators	Weighted mean	Verbal interpretation	Rank
Acquisition of cognition	3.32	Agree	1
Acquisition of emotion	3.29	Agree	2
Acquisition of ability	3.27	Agree	3
Composite mean	3.29	Agree	

Score interpretation: 3.50–4.00, strongly agree; 2.50–3.49, agree; 1.50–2.49, disagree; 1.00–1.49, strongly disagree.

The highest rank is they feel that they have gained the most scientific theories and knowledge in their major with a weighted mean of 3.32. This indicates that the students believe that their ideological concepts and knowledge levels have greatly improved. The possible reason is that Henan CJ University focuses on classroom teaching, monitors student attendance in class, provides early warning for student academic performance, and strictly manages student exams, resulting in a general improvement in students' cognitive abilities.

Next, they feel that a significant gain is in their relationship with teachers and classmates with a weighted mean of 3.29. This indicates that students believe that they have a good relationship with teachers and classmates. The reason may be that Henan CJ University requires all teachers to adopt a "caring service work method," which means that all teachers must treat students as their children, love students as they do, and help them grow and become successful.

The lowest rank is they feel that the least gain is practical ability and other comprehensive abilities in their major with a weighted mean of 3.27. The rank of this item is the lowest, but its value exceeds 3.2, which is at a relatively high level. This indicates that Henan CJ University has done a lot of work in cultivating students' abilities and has achieved good results. However, compared to the needs of students, there is still a need to further strengthen their ability development in the future.

Table 5 presents the comparison of responses on the classroom learning environment when grouped according to profile. It was observed that there was no significant difference since all the computed *P*-values were greater than 0.05. This means that the responses do not differ statistically and reveals that the responses are the same across the respondents' profiles.

Table 5. Difference in responses on classroom learning environment when grouped according to profile

	***F*-value**	***P*-value**	**Interpretation**
Gender			
Student cohesiveness	19091.5	0.180	Not significant
Teacher support	20553.5	0.915	Not significant
Involvement	19929	0.525	Not significant
Innovation	19873.5	0.494	Not significant
Task orientation	20596	0.943	Not significant
Cooperation	20054.5	0.593	Not significant
Equity	19932	0.523	Not significant
Age			
Student cohesiveness	3.078	0.215	Not significant
Teacher support	2.697	0.260	Not significant
Involvement	6.658	0.236	Not significant
Innovation	4.337	0.114	Not significant
Task orientation	4.275	0.118	Not significant
Cooperation	3.031	0.220	Not significant
Equity	2.308	0.315	Not significant
Major			
Student cohesiveness	2.49	0.288	Not significant
Teacher support	0.198	0.906	Not significant
Involvement	0.358	0.836	Not significant
Innovation	1.988	0.370	Not significant
Task orientation	1.96	0.375	Not significant
Cooperation	2.854	0.240	Not significant
Equity	0.753	0.686	Not significant

Significant at *P*-value < 0.05

In terms of gender, the results of this study are consistent with previous research. Huang *et al*. surveyed 465 high school students from H Middle School in Hainan Province and S Middle School in Qinghai Province, and the findings revealed that there was no statistically significant difference in the overall perception of the

classroom learning environment among students of different genders [8].

In terms of age, the results of this study are consistent with previous studies. Xu *et al*. conducted a survey on 3,506 middle school students from 9 provinces in eastern, central, and western China, and the results showed that there was no significant difference in classroom environment among students of different ages [9].

In terms of major, the results of this study are consistent with previous research findings. Wang *et al*. guided by big data thinking, used 203 classroom teaching behaviors of 174 teachers from 62 schools in China as big data and studied students from 9 subjects. The results showed that there were no significant differences in teaching phenomena such as critical questions, creative questions, encouraging students to ask questions, reporting after discussion, and creative responses in primary, middle, and high school classrooms [10].

Table 6 presents the comparison of responses on learning support when grouped according to profile. It was observed that there was no significant difference as all the computed *P*-values were greater than 0.05. This means that the responses do not differ statistically and reveals that the responses are the same across the respondents' profiles.

Table 6. Difference in responses on learning support when grouped according to profile

	***F*-value**	***P*-value**	**Interpretation**
Gender			
Reliability	20399.5	0.805	Not significant
Response	20241.5	0.698	Not significant
Guarantee	19858.5	0.461	Not significant
Care	20152	0.635	Not significant
Age			
Reliability	3.877	0.144	Not significant
Response	2.132	0.344	Not significant
Guarantee	1.568	0.457	Not significant
Care	1.951	0.377	Not significant
Major			
Reliability	0.516	0.773	Not significant
Response	1.034	0.596	Not significant
Guarantee	0.916	0.632	Not significant
Care	0.125	0.940	Not significant

Significant at *P*-value < 0.05

In terms of gender, this study is consistent with previous studies. Wang conducted a questionnaire survey on N university students to study learning support services in an efficient and smart campus environment, including humanities and social sciences, science, engineering, art, and other disciplines. A total of 1,750 questionnaires were distributed and 1,398 valid questionnaires were collected. The results indicate that there is no significant gender difference in the quality evaluation of learning support services at N University [11].

In terms of age, this study is consistent with previous studies. Zhao and Zhu used TongLing College as an example to study the online learning support service system for college students and its satisfaction model construction. 450 questionnaires were distributed and 426 valid questionnaires were collected. Research has shown that there is no significant difference between the age of college students and learning support services

such as management support services, resource support services, environmental support services, and emotional support services [12].

In terms of major, this study is consistent with previous research. Hu and Zhao studied the impact of learning support service quality on the satisfaction and sense of belonging of online learning students in open universities. Taking Guangdong Open University in China as an example, a total of 1,085 valid questionnaires were collected. The study showed that the quality of online learning platforms, management and support services, curriculum quality, teacher quality, and the quality of management and support services among college students in different majors were different There is no significant difference in the quality of learning support services such as homework and testing [13].

Table 7 presents the comparison of responses on learning acquisition when grouped according to profile. It was observed that there was no significant difference since all the computed *P*-values were greater than 0.05. This means that the responses do not differ statistically and reveals that the responses are the same across the respondents' profiles.

Table 7. Difference in responses on learning acquisition when grouped according to profile

	***F*-value**	***P*-value**	**Interpretation**
Gender			
Acquisition of cognition	19735	0.406	Not significant
Acquisition of emotion	19913.5	0.502	Not significant
Acquisition of ability	19735	0.404	Not significant
Age			
Acquisition of cognition	0.958	0.619	Not significant
Acquisition of emotion	2.055	0.358	Not significant
Acquisition of ability	0.656	0.720	Not significant
Major			
Acquisition of cognition	0.999	0.607	Not significant
Acquisition of emotion	0.367	0.832	Not significant
Acquisition of ability	0.375	0.829	Not significant

Significant at *P*-value < 0.05

In terms of gender. May *et al.* conducted a questionnaire survey on 523 undergraduate students to investigate the impact of classroom teaching on student learning outcomes. The research results indicate that there is no significant difference between gender and learning acquisition among undergraduate students [14].

In terms of age, this study is consistent with previous studies. Xiao studied the impact of teacher classroom teaching behavior on primary school student learning outcomes in a primary school in S city. A total of 791 valid questionnaires were collected. The research results indicate that the older the grade, the less significant the difference in learning outcomes among students [15].

In terms of major, this study is consistent with previous research. Han focused on college students majoring in ideological and political courses in four cities in southern Xinjiang, China, and collected a total of 1036 survey questionnaires. The survey results showed that differences in majors did not affect students' sense of learning achievement, that is, there was no significant difference [16].

Table 8 presents the association between classroom learning environment and learning support. The computed ρ-values indicate strong direct correlations and the resulting *P*-values were less than 0.05. This means

that there was a significant relationship exists and implies that a better classroom learning environment leads to better learning support.

Table 8. Relationship between classroom learning environment and learning support

	ρ-value	*P*-value	Interpretation
Student cohesiveness			
Reliability	0.565**	0.000	Highly significant
Response	0.562**	0.000	Highly significant
Guarantee	0.556**	0.000	Highly significant
Care	0.551**	0.000	Highly significant
Teacher support			
Reliability	0.738**	0.000	Highly significant
Response	0.695**	0.000	Highly significant
Guarantee	0.682**	0.000	Highly significant
Care	0.684**	0.000	Highly significant
Involvement			
Reliability	0.727**	0.000	Highly significant
Response	0.694**	0.000	Highly significant
Guarantee	0.679**	0.000	Highly significant
Care	0.680**	0.000	Highly significant
Innovation			
Reliability	0.730**	0.000	Highly significant
Response	0.690**	0.000	Highly significant
Guarantee	0.689**	0.000	Highly significant
Care	0.687**	0.000	Highly significant
Task orientation			
Reliability	0.772**	0.000	Highly significant
Response	0.753**	0.000	Highly significant
Guarantee	0.714**	0.000	Highly significant
Care	0.723**	0.000	Highly significant
Cooperation			
Reliability	0.780**	0.000	Highly significant
Response	0.753**	0.000	Highly significant
Guarantee	0.728**	0.000	Highly significant
Care	0.719**	0.000	Highly significant
Equity			
Reliability	0.822**	0.000	Highly significant
Response	0.768**	0.000	Highly significant
Guarantee	0.729**	0.000	Highly significant
Care	0.736**	0.000	Highly significant

Significant at *P*-value < 0.01

Li used a questionnaire survey method to study students from eight junior high schools in southwestern China (Sichuan Province, Chongqing City, Yunnan Province, and Guizhou Province). Using SPSS, he analyzed 1704 collected survey questionnaires and found a significant correlation between the mathematics classroom learning environment and mathematics learning attitudes, classroom learning environment and mathematics learning methods, and mathematics learning methods and learning attitudes, The better students perceive the learning environment in mathematics classrooms, the more likely they are to choose deep learning methods, leading to a positive learning attitude and a strong interest in learning. That is to say, the better the classroom learning environment, the better the learning support [17].

Henan CJ University has implemented unified management of its classroom learning environment, ensuring the standardization and standardization of the classroom learning environment. Under the concept of "teaching-centered," the school focuses on the construction of information technology, standardization, and standardization in the classroom learning environment, providing a good classroom learning environment for students. Therefore, learning support is also getting better and better.

Table 9 illustrates the association between the classroom learning environment and learning acquisition. The computed ρ-values indicate strong direct correlations and the resulting *P*-values were less than 0.05. This means that there was a significant relationship exists and implies that a better classroom learning environment leads to better learning acquisition.

Table 9. Relationship between classroom learning environment and learning acquisition

	ρ-value	***P*-value**	**Interpretation**
Student cohesiveness			
Acquisition of cognition	0.535**	0.000	Highly significant
Acquisition of emotion	0.543**	0.000	Highly significant
Acquisition of ability	0.537**	0.000	Highly significant
Teacher support			
Acquisition of cognition	0.662**	0.000	Highly significant
Acquisition of emotion	0.645**	0.000	Highly significant
Acquisition of ability	0.629**	0.000	Highly significant
Involvement			
Acquisition of cognition	0.686**	0.000	Highly significant
Acquisition of emotion	0.662**	0.000	Highly significant
Acquisition of ability	0.661**	0.000	Highly significant
Innovation			
Acquisition of cognition	0.693**	0.000	Highly significant
Acquisition of emotion	0.675**	0.000	Highly significant
Acquisition of ability	0.676**	0.000	Highly significant
Task orientation			
Acquisition of cognition	0.730**	0.000	Highly significant
Acquisition of emotion	0.697**	0.000	Highly significant
Acquisition of ability	0.698**	0.000	Highly significant
Cooperation			

Table 9. (Continue)

	ρ-value	*P*-value	Interpretation
Acquisition of cognition	0.742**	0.000	Highly significant
Acquisition of emotion	0.726**	0.000	Highly significant
Acquisition of ability	0.687**	0.000	Highly significant
Equity			
Acquisition of cognition	0.736**	0.000	Highly significant
Acquisition of emotion	0.711**	0.000	Highly significant
Acquisition of ability	0.686**	0.000	Highly significant

Significant at *P*-value < 0.01

Zang selected a total of 591 students from universities in Tianjin, China, including Tianjin University, Nankai University, Tianjin University of Finance and Economics, and Hebei University of Technology, as the research subjects to investigate the relationship between professional identities and learning outcomes in the classroom learning environment of college students. The research results indicate that there is a significant correlation between content preparation, learning interaction, learning evaluation, and learning outcomes in the classroom learning environment. This indicates that the better the classroom learning environment, the better the learning outcomes [18].

Henan CJ University has built a unified smart classroom for all students, which is equipped with modern equipment such as multimedia equipment, air conditioning, LED display screens, professional computers, and software. In addition to attending classes, it is open to students for free in their spare time, and many students study independently in the classroom. In addition, the school also has a learning material website, where teachers regularly update content, and students can download learning materials they are interested in for free. So a good classroom learning environment has enhanced the learning experience of the university students.

Table 10 presents the association between Learning support and Learning Acquisition. The computed ρ-values indicate strong direct correlations and the resulting *P*-values were less than 0.05. This means that there was a significant relationship exists and implies that better learning support leads to better learning acquisition.

Table 10. Relationship between learning support and learning acquisition

	ρ-value	*P*-value	Interpretation
Reliability			
Acquisition of cognition	0.816**	0.000	Highly significant
Acquisition of emotion	0.797**	0.000	Highly significant
Acquisition of ability	0.766**	0.000	Highly significant
Response			
Acquisition of cognition	0.844**	0.000	Highly significant
Acquisition of emotion	0.827**	0.000	Highly significant
Acquisition of ability	0.783**	0.000	Highly significant
Guarantee			
Acquisition of cognition	0.865**	0.000	Highly significant
Acquisition of emotion	0.818**	0.000	Highly significant
Acquisition of ability	0.816**	0.000	Highly significant

Table 10. (Continue)

	ρ-value	*P*-value	Interpretation
Care			
Acquisition of cognition	0.886**	0.000	Highly significant
Acquisition of emotion	0.848**	0.000	Highly significant
Acquisition of ability	0.830**	0.000	Highly significant

Significant at *P*-value < 0.01

Ding and Yang selected students from different universities in Yunnan Province, China as research subjects and used a questionnaire survey method to collect 428 valid questionnaires. Research has found that there is a significant correlation between behaviors such as friendly assistance, understanding, support, care, and cooperation between teachers and students, as well as between students and students, and the learning outcomes of students. That is, the better the learning support, the better the learning acquisition [19].

Henan CJ University requires teachers to adopt the "caring service work method" in the teaching process, which means that teachers must treat students with the same respect and care as their children. This method greatly improves the learning support level of the school, so overall, the students at the school also have good learning and acquisition.

5. Conclusion

More than half of the respondents are female undergraduate students majoring in Law, Art, and Engineering at Henan CJ University in Henan Province, China. Regarding the classroom learning environment, the overall evaluation by respondents is relatively high, while cohesion and innovation in classroom teaching receive comparatively lower ratings. In terms of learning support, respondents generally rate it positively, although there are lower ratings for the guarantee and reliability of learning support. Concerning learning acquisition, respondents generally rate it positively, with relatively lower ratings for ability acquisition. There is a significant correlation between classroom learning environment, learning support, and learning acquisition, suggesting a potential positive impact of each variable on the others. Tests grouped based on demographic profiles show no significant differences in student responses to the classroom learning environment, learning support, and learning acquisition, indicating no significant correlation between respondents' gender, age, and major, and these variables. Based on the questionnaire survey and analysis results, a teaching improvement plan for Henan CJ University is proposed to enhance the quality of curriculum teaching at the university.

6. Recommendations

(1) Suggestions for professors: In daily classroom teaching, professors should pay attention to students with low cohesion and encourage their active participation in collective activities. Additionally, organizing learning activities involving all students and using praise methods can boost the courage and confidence of students with poor cohesion.

(2) Suggestions for managers: Managers should establish a service philosophy, viewing students as the focal point of service. Regular investigation of student needs and continuous optimization of management strategies based on these needs are essential.

(3) Suggestions for students: Students should cultivate trust in the university and professors, and be open

to their suggestions. Moreover, they should actively express their needs and ideas to professors to facilitate better improvement in classroom teaching.

(4) Suggestions for future researchers: To enhance the diversity of research subjects, future researchers can expand the sample range to include other universities and even collect nationwide data. Furthermore, besides gender, age, and major, researchers should delve into additional demographic factors such as family income, hometown, and family members.

Disclosure statement

The authors declare no conflict of interest

References

[1] Ministry of Education of the People's Republic of China, 2019, Implementation Opinions on the Construction of First Class Undergraduate Courses, viewed October 28, 2023, https://www.gov.cn/gongbao/content/ 2020/ content_5480494.htm

[2] Zhu Q, 2020, Research on Improving the Quality of Classroom Teaching of Public Basic Courses in Chinese Universities Under the Background of "First Class Undergraduate Education", thesis, Wuhan University.

[3] Crisan AN, Pop GM, 2019, Creative, Quality Oriented Rethinking of the Assessment Strategy at the University Level Courses. A Case Study. In: Advances in Design, Simulation and Manufacturing II. DSMIE 2019. Lecture Notes in Mechanical Engineering. Springer, Cham.

[4] Huang Y, Zhou X, Shi J, 2021, How is the Teaching Quality of Undergraduate Courses in China – A Ten-Year Exploration Based on the "Tracking Research on Learning and Development of Chinese College Students". Journal of East China Normal University (Education Science Edition), 2021(1): 35–39.

[5] You X, 2022, Analysis of the Causes of Gender Differences in Major Selection in Universities. University, 2022(7): 89–92.

[6] Sun S, 2022, Problems and Suggestions for Building Cohesion in University Classes. Paper Equipment and Materials, 51(1): 226–228.

[7] Liu D, Guo Y, Zhang X, 2023, Research on the Influencing Factors of Academic Emotions on Cognitive Engagement in Blended Learning Environments. Digital Education, 2023(3): 49–56.

[8] Huang L, Chen J, Qu P, 2023, The Relationship between Classroom Environment Perception and Academic Self-Efficacy among High School Students: Taking Hainan H Middle School and Qinghai S Middle School as Examples. Educational Measurement and Evaluation, 2023(6): 101–109.

[9] Xu R, Pei C, Song N, 2022, Research on the Relationship between Constructivist Classroom Environment and Mathematics Learning Motivation of Middle School Students – Based on Survey Data from 9 Provinces (Cities) in the East, Central, and West. Journal of Southwest University (Natural Science Edition), 2022(4): 2–11.

[10] Wang P, 2017, Student, Teacher, and Learning: The Path Evolution of Teaching Evaluation in American Universities – Based on John Biggs' 3P Teaching Model. Exploration of Higher Education, 2017(10): 52–57.

[11] Wang L, 2023, Learning Support Services in the Smart Campus Environment of Universities, thesis, Nanjing University of Posts and Telecommunications.

[12] Zhao X, Zhu J, 2022, Construction of Online Learning Support Service System and Satisfaction Model for College Students – Taking Tongling University as an Example. Journal of Tongling University, 2022(4): 125–129. https://doi.org/10.16394/j.cnki.34-1258/z.2022.04.002

[13] Hu Y, Zhao F, 2023, Research on the Impact of Learning Support Service Quality on the Satisfaction and Sense of

Belongingness of Online Learning Students in Open Universities. Journal of Guangdong Open University, 2023(3): 5–11.

[14] May ML, Williams RV, May JA, et al., 2022, Engaging Early College Students in Their Chemical Education through Academic Support: A Pandemic Era Effort. Journal of Chemical Education, 99(11): 3654–3661.

[15] Xiao M, 2022, The Impact of Teacher Classroom Teaching Behavior on Primary School Students' Learning Outcomes, thesis, Shihezi University.

[16] Han X, 2023, Enhancing the Sense of Achievement in Ideological and Political Courses for College Students in Southern Xinjiang, thesis, Kashgar University

[17] Li Y, 2021, The Correlation between Learning Environment, Learning Methods, and Learning Attitudes in Middle School Mathematics Classrooms, thesis, Southwest University.

[18] Zang P, 2018, The Impact of Online Learning Environment on Learning Outcomes, thesis, Tianjin University.

[19] Ding X, Yang C, 2022, Investigation and Analysis of the Impact of Teacher-Student Interaction in Vocational Colleges on Student Learning Outcomes. China Adult Education, 2022(21): 20–25.