

THE INFLUENCE OF TEACHER-STUDENT INTERACTION ON SELF-LEARNING ABILITY OF STUDENTS OF HIGHER VOCATIONAL COLLEGE IN YUNNAN PROVINCE, CHINA

Dan Zhang

Faculty of Education, Rattana Bundit University, Bangkok, 10240, Thailand

Jurairat Vannaying

Faculty of Education, Rattana Bundit University, Bangkok, 10240, Thailand

Corresponding author E-mail: 643354583@qq.com

Abstract

This study focuses on two higher vocational schools in Kunming, Yunnan Province, exploring the influence mechanism of teacher-student interaction on students' autonomous learning ability through a questionnaire survey. A convenience sampling method was adopted, with 400 questionnaires distributed to students and 387 valid ones recovered. Data analysis shows that the overall status of teacher-student interaction in current higher vocational schools is good, and students' autonomous learning ability is at a moderate level with balanced development across all dimensions. Notably, significant differences in teacher-student interaction and autonomous learning ability were observed among student groups with different admission methods. Further statistical analysis confirms that positive teacher-student interaction can significantly promote the development of students' autonomous learning ability. Based on this finding, the study suggests that higher vocational schools should attach greater importance to students' dominant role in the teaching process, continuously optimize teacher-student interaction models, and adopt diversified measures to enhance students' autonomous learning ability. These research results not only provide a theoretical basis for improving the quality of teacher-student interaction in higher vocational schools but also offer practical guidance for promoting the development of students' autonomous learning ability, playing a positive role in enhancing the teaching quality and management level of vocational colleges.

Keywords: Vocational schools teacher-student interaction students' independent learning ability

Introduction

Higher vocational education plays an important role in China's implementation of the strategy of rejuvenating the country through science and education and the strategy of strengthening the country through talents. As a training base for technology-oriented and applied young talents, higher vocational colleges shoulder the important task of delivering high-quality skilled talents to the society (Li Ping, Zhou Daojuan, 2024). With the rapid development of China's higher vocational education, higher vocational colleges, the high skills, high level personnel training, also more and more attention to cultivate students' autonomous learning ability, and gradually will education talent training concept to encourage students to autonomous learning (Yan Zhiyang, Hao Jinghui, Yan Binjian, 2023, p. 48).

Independent learning ability is the key ability that affects students life, and it is the core ability for students to learn to learn and seek knowledge. Cultivating students independent learning ability is one of the core goals of talent training in higher vocational colleges (Lin Xiaoping, 2024). In the current learning society, independent learning ability is also crucial for the growth of higher vocational students and the development of lifelong learning ability (Wang Hao, 2024, p. 151). However, at present, the cultivation of independent learning ability of Chinese vocational students is faced with problems such as significant differences in

learning motivation, insufficient learning strategies, immature self-monitoring, and learning environment to be improved (Sun Yucheng, 2024, p. 25). Therefore, it is very important to actively explore the factors influencing the self-learning ability of vocational students, which is very critical to put forward and improve the independent learning ability of vocational students. According to relevant literature, factors such as teacher support, family parenting styles, student learning motivation, academic self-efficacy, and teacher-student interaction all influence the autonomous learning ability of vocational college students to varying degrees. For instance, empirical studies have confirmed that teacher-student interaction has a significant positive impact on the autonomous learning ability of vocational college students (Yin Zhiyang, Hao Jinghui, Yan Binjian, 2023, p. 50). Teacher-student interaction is a crucial factor affecting students' academic achievement, as it not only influences their intrinsic motivation and external behaviors but also shapes their self-assessment of learning capabilities. Further research suggests that teachers should lead by example, gain an in-depth understanding of students' thoughts and learning conditions, and integrate professional education with ideological and political education. This approach can provide stronger support, foster a positive learning environment, enhance constructive teacher-student interactions, and ultimately promote the development of students' autonomous learning abilities.

In recent years, the Ministry of Education and other departments have put forward new requirements for the quality assurance of higher education, which emphasize the core role of teachers in the process of students' growth. In this context, the related issues of student-teacher interaction have gradually attracted wide attention in the academic circle. However, few existing studies focus on vocational students and fewer carry out research from the perspective of student interaction. There is a large research space in this study. In addition, according to relevant research views, for a long time, the student interaction in colleges and universities has been in the dilemma of teacher center, and only by turning to the student center and treating students as the main body of education work can it be more conducive to the learning paradigm transformation of university teaching and the improvement of students' independent learning ability (Yang Linyu, 2023; Hoidn S., 2017).

Research Objectives

This study aims to explore the influence of teacher-student interaction on students' autonomous learning ability in higher vocational schools in Yunnan Province. The specific objectives include:

1. To study the level of teacher-student interaction on self-learning ability of students in Yunnan Province
2. To study the influence of teacher-student interaction on self-learning ability of students in Yunnan Province.

Conceptual Framework

Based on the review and summary of the literature and the variable setting of this study, a research relationship model is constructed as shown in Figure 1.

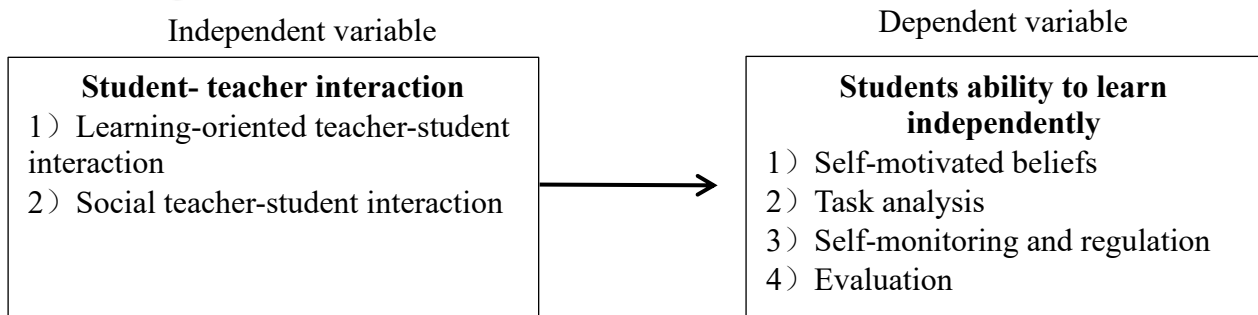


Figure 1: Conceptual Framework Diagram

Hypotheses

This study makes the following assumptions:

H₁: There will be significant differences in the interaction effects of student-teacher interaction on students' self-study ability.

H₂: The impact of student-teacher interaction on students' self-study ability in Yunnan Province is positive.

Research Methodology

Population and Sample

The research objects of this study are students from 2 higher vocational schools in Kunming, Yunnan Province, China, and these 2 schools are representative private higher vocational schools in Yunnan Province, China. In terms of sample size, the questionnaire of this study consists of 40 questions. To ensure the recovery rate and validity of the questionnaire, 400 questionnaires will be distributed. The sample size exceeds 100 and is more than 10 times the number of scale items, so the sample size of this study is reasonable.

Research Instrument

This study uses the Questionnaire on Student-Teacher Interaction and Students' Autonomous Learning Ability in Yunnan Higher Vocational Schools as the main research tool. Based on a review of domestic and foreign literature and consideration of the actual situation of the research subjects, two scales were selected: the Student-Teacher Interaction Scale compiled by Liu Xianghe, et al. (2015) and the Autonomous Learning Ability Evaluation Scale compiled by Yin Zhiyang, et al. (2022). Previous studies by numerous scholars have confirmed that these scales have good reliability and validity.

On this basis, appropriate adaptations were made in this study, resulting in a questionnaire consisting of three parts:

The first part covers the basic information of the research samples, including 5 aspects: gender, grade, major, admission method, and household registration, with a total of 5 questions.

The second part is the Student-Teacher Interaction Scale for higher vocational schools, divided into two dimensions: academic student-teacher interaction and social student-teacher interaction, with a total of 19 questions.

The third part is the Students' Autonomous Learning Ability Scale, containing 16 questions.

The entire questionnaire comprises 49 questions. The scale sections adopt a 5-point Likert scoring method with positive scoring.

Data Collection

This study adopts cluster sampling and convenience sampling methods. Questionnaires are distributed through Wen Juanxing (an online survey platform) and students' class groups, with all responses collected anonymously. Both pre-survey and formal survey are conducted in this research.

Data Analysis

This study utilizes the professional data analysis software SPSS for data processing and analysis, which mainly includes descriptive statistical analysis, reliability and validity test and analysis, analysis of variance, correlation analysis, and regression analysis.

Research Results and Discussion

1. Descriptive statistical analysis

Table 1 describes the statistical results

Dimension	M±SD	Med	Kurtosis	Skewness
Evaluation	3.172±1.137	3.500	-1.218	-0.358
Self-monitoring and regulation	3.155±1.122	3.500	-1.138	-0.394
Task analysis	3.209±1.110	3.500	-1.053	-0.418
Self-motivated beliefs	3.224±1.116	3.500	-1.070	-0.437
Independent learning ability	3.190±0.878	3.313	-0.619	-0.414
Learning interaction between teachers and students	3.192±1.034	3.556	-1.153	-0.473
Social interaction between teachers and students	3.154±1.035	3.500	-1.154	-0.473
Teacher-student interaction	3.172±0.859	3.263	-0.868	-0.531

See Table 1, which presents a descriptive statistical analysis based on the norms, systematically examining the current characteristics and interrelationships of teacher-student interaction and autonomous learning abilities. The data analysis shows as follows in Table 2: Teacher-student interaction exhibits a negative skew distribution (skewness $\approx$ -0.47) in both learning interaction (M = 3.19, SD = 1.03) and social interaction (M = 3.15, SD= 1.04), indicating that most students hold positive evaluations, but there is still room for improvement in social interaction. Autonomous learning abilities show balanced performance across all dimensions (M=3.15-3.22), with self-motivation beliefs (M = 3.22) and task analysis (M = 3.21) performing better, while self-monitoring and regulation (M = 3.16) are relatively weaker. Notably, all dimensions exhibit a negative skew (skewness = -0.36 to -0.53) and low peak characteristics, with the greatest individual differences in self-evaluation (SD = 1.14).

2. Analysis of variance

1) Variance analysis of different specialties

Table 2 Variance analysis of samples from different specialties

Analysis item	Item	N	Average value	Standard deviation	F	P
Teacher-student interaction	1.0	36	3.09	0.98	0.945	0.471
	2.0	75	3.26	0.85		
	3.0	38	3.33	0.85		
	4.0	40	3.27	0.82		
	5.0	51	2.98	0.89		
	6.0	53	3.23	0.80		
	7.0	48	3.13	0.83		
	8.0	46	3.06	0.89		
	Amount to	387	3.17	0.86		
Independent learning ability	1.0	36	3.14	1.01	0.134	0.996
	2.0	75	3.14	0.82		
	3.0	38	3.26	0.69		
	4.0	40	3.22	0.89		
	5.0	51	3.16	1.01		
	6.0	53	3.22	0.86		
	7.0	48	3.23	0.85		
	8.0	46	3.18	0.94		
	Amount to	387	3.19	0.88		
* p<0.05 ** p<0.01						

The results are shown in Table 2. It can be seen that: for all samples from different majors, there is no significant difference ($p > 0.05$) in teacher-student interaction and autonomous learning ability, indicating that these abilities show consistency across different major samples and do not exhibit any differences. In summary, it can be concluded that there is no significant difference in teacher-student interaction and autonomous learning ability among samples from different majors.

2) Analysis of variance by different genders

Table 3 Analysis of variance by different genders

Variable	Sex (M±SD)		F	P
	Males (n = 241)	Females (n = 146)		
Teacher-student interaction	3.21±0.88	3.11±0.83	1.118	0.291
Independent learning ability	3.21±0.90	3.16±0.85	0.330	0.566

The results are shown in Table 3, It can be seen that: different gender samples do not show significant differences in teacher-student interaction and autonomous learning ability ($p > 0.05$), indicating that there is no consistency or difference among different gender samples in these aspects. In summary, different gender samples do not exhibit significant differences in teacher-student interaction and autonomous learning ability.

3) Analysis of variance by grade

Table 4 Variance analysis of samples from different grades

Variable	Grade(M±SD)			F	P
	1.0(n=127)	2.0(n=115)	3.0(n=145)		
Teacher-student interaction	3.12±0.90	3.14±0.86	3.24±0.82	0.675	0.510
Independent learning ability	3.10±0.87	3.19±0.91	3.27±0.85	1.201	0.302

The results are shown in Table 4. It can be seen that: for all samples of different grades, there is no significant difference in teacher-student interaction and autonomous learning ability ($p > 0.05$). This indicates that there is consistency across all samples of different grades regarding teacher-student interaction and autonomous learning ability, with no significant differences. In summary, there is no significant difference in teacher-student interaction and autonomous learning ability among all samples of different grades.

4) Variance analysis of different admission methods

Table 5 Variance analysis of samples of different admission methods

Variable	Access to education (M±SD)		F	P
	Single recruitment examination (n = 156)	National recruitment examination (n = 231)		
Teacher-student interaction	3.31±0.86	3.07±0.90	6.517	0.011*
Independent learning ability	3.31±0.87	3.04±0.90	8.235	0.004**

* $p < 0.05$ ** $p < 0.01$

The results are shown in Table 5. Different admission methods significantly affect teacher-student interaction and autonomous learning ability ($p < 0.05$), indicating that different admission methods lead to differences in these aspects. Specifically, the admission method shows a significant difference at the 0.05 level ($F = 6.517$, $p = 0.011$) in terms of teacher-student interaction. A detailed comparison reveals that the average score for single-recruitment exams (3.31) is significantly higher than that for unified recruitment exams (3.07). The admission method also shows a significant difference at the 0.01 level ($F = 8.235$, $p = 0.004$) in terms of autonomous learning ability. A detailed comparison indicates that the average score for single-recruitment exams (3.31) is significantly higher than that for unified recruitment exams (3.04).

It can be concluded that different enrollment methods have significant differences in teacher-student interaction and autonomous learning ability.

5) Analysis of variance of different students' household registration

Table 6 Variance analysis of different student household registration

variable	Student enrollment (M±SD)		F	p
	Towns (n = 123)	Rural (n = 264)		
Teacher-student interaction	3.09±0.89	3.21±0.84	1.522	0.218
independent learning ability	3.09±0.86	3.24±0.88	2.283	0.132
* $p < 0.05$ ** $p < 0.01$				

The results are shown in Table 6. It can be seen that: the student samples from different household registrations do not show significant differences in teacher-student interaction and autonomous learning ability ($p > 0.05$). This indicates that there is no consistency or difference among the student samples from different household registrations regarding these two aspects. In summary, the student samples from different household registrations do not exhibit significant differences in teacher-student interaction and autonomous learning ability.

Summarizing the above ANOVA results, it can be seen that differences in students' majors, genders, grades, and household registrations do not affect teacher-student interaction or students' autonomous learning abilities. There are no significant differences in teacher-student interaction and students' autonomous learning abilities across these four demographic variables. However, there are significant differences in teacher-student interaction and students' autonomous learning abilities when considering different pathways to higher education. This indicates that Hypothesis 1 (differences in teacher-student interaction and students' autonomous learning abilities among different groups) is partially supported.

3. Correlation analysis

Table 7 Results of correlation analysis

Dimension	Learning interaction between teachers and students	Social interaction between teachers and students	Self-motivated beliefs	Task analysis	Self-monitoring and regulation
Social interaction between teachers and students	.378**				
Self-motivated beliefs	.415**	.412**			
Task analysis	.436**	.446**	.480**		
Self-monitoring and regulation	.428**	.444**	.474**	.485**	
Evaluation	.459**	.455**	.470**	.480**	.513**

** . At the 0.01 level, the correlation was significant.

The results are shown in Table 7. The correlation analysis is used to study the relationship between independent variables (2 dimensions) and dependent variables (4 dimensions). The specific analysis shows that:

1) Self-motivation beliefs and learning interaction between teachers and students, social interaction between teachers and students are all significant, with correlation coefficients of 0.415 and 0.412 respectively, and the correlation coefficient values are both greater than 0, indicating that self-motivation beliefs and learning interaction between teachers and students, social interaction between teachers and students have a positive correlation.

2) Task analysis and learning interaction between teachers and students, social interaction between teachers and students, all showed significant correlation, the correlation coefficient values were 0.435, 0.446 respectively, and the correlation coefficient values were greater than 0, indicating that there was a positive correlation between task analysis and learning interaction between teachers and students, social interaction between teachers and students.

3) Self-monitoring and regulation were significantly correlated with both learning-oriented teacher interaction and social teacher interaction, with correlation coefficients of 0.428 and 0.444 respectively, and the correlation coefficients were all greater than 0, indicating a positive correlation between self-monitoring and regulation and both learning-oriented teacher interaction and social teacher interaction.

4) The correlation coefficients between self-evaluation and learning teacher interaction and social teacher interaction are all significant, with the correlation coefficient values being 0.459 and 0.455 respectively, and both of them are greater than 0, indicating that there is a positive correlation between self-evaluation and learning teacher interaction and social teacher interaction.

4. Regression analysis

1) Regression analysis of independent variable dimension and motivation belief

Table 8 Regression analysis of independent variable dimension and motivation belief (n = 387)

	B		StdF	T	P	VIF	TOL
	B	SE	Beta				
Constant	1.168	0.189	-	6.180	0.000**	-	-
Learning interaction between teachers and students	0.327	0.052	0.303	6.334	0.000**	1.167	0.857
Social interaction between teachers and students	0.321	0.052	0.298	6.234	0.000**	1.167	0.857
R 2				0.249			
Adjust R 2				0.245			
F				F (2,384)=63.517, P=0.000			
D-W				1.780			
Note: Dependent variable = self-motivation belief							
* p<0.05 ** p<0.01							

The results are shown in Table 8, where learning-oriented teacher-student interaction and social-oriented teacher-student interaction are used as independent variables, and self-motivation beliefs are used as the dependent variable for linear regression analysis. It can be seen that the model formula is: Self-Motivation Beliefs = 1.168 + 0.327 * Learning-Oriented Teacher-Student Interaction + 0.321 * Social-Oriented Teacher-Student Interaction. The R-squared value of the model is 0.249, indicating that learning-oriented teacher-student interaction and social-oriented teacher-student interaction can explain 24.9% of the variation in self-motivation beliefs. When performing an F-test on the model, it was found that the model passed the F-test (F=63.517, p=0.000<0.05), which means that at least one of the two factors—learning-oriented teacher-student interaction or social-oriented teacher-student interaction—has an impact on self-motivation beliefs. Additionally, tests for multicollinearity revealed that all VIF values were less than 5, indicating no multicollinearity issues; furthermore, the D-W value was around 2, suggesting no auto correlation in the model, meaning there is no correlation between the sample data, indicating a good model.

Specific analysis shows: (1) The regression coefficient for learning-oriented teacher-student interaction is 0.327 (t=6.334, p=0.000<0.01), indicating that learning-oriented teacher-student interaction has a significant positive impact on self-motivation beliefs. (2) The regression coefficient for social-oriented teacher-student interaction is 0.321 (t=6.234, p=0.000<0.01), indicating that social-oriented teacher-student interaction has a significant positive impact on self-motivation beliefs.

In conclusion, both learning and social teacher interaction will have a significant positive impact on self-motivation beliefs.

2) Regression analysis of independent variable dimension and task analysis

Table 9 Regression analysis of independent variable dimension and task analysis (n = 387)

	B		StdF	T	P	VIF	TOL
	B	SE	Beta				
constant	1.034	0.184	-	5.626	0.000**	-	-
Learning interaction between teachers and students	0.334	0.050	0.312	6.667	0.000**	1.167	0.857
Social interaction between teachers and students	0.351	0.050	0.328	7.014	0.000**	1.167	0.857
R 2				0.282			
Adjust R 2				0.278			
F				F (2,384)=75.291, P=0.000			
D-W				1.758			

Note: Dependent variable = task analysis

* p<0.05 ** p<0.01

The results are shown in Table 9, where learning-oriented teacher-student interaction and social-oriented teacher-student interaction are used as independent variables, while task analysis is the dependent variable, and linear regression analysis is conducted. The model formula is: Task Analysis = 1.034 + 0.334 * Learning-Oriented Teacher-Student Interaction + 0.351 * Social-Oriented Teacher-Student Interaction. The R squared value of the model is 0.282, indicating that learning-oriented teacher-student interaction and social-oriented teacher-student interaction can explain 28.2% of the variation in task analysis. When performing an F-test on the model, it was found that the model passed the F-test (F= 75.291, p <0.05), which means that at least one of the two factors—learning-oriented teacher-student interaction or social-oriented teacher-student interaction—has an impact on task analysis. Additionally, tests for multicollinearity revealed that all VIF values in the model were less than 5, indicating no multicollinearity issues; furthermore, the D-W value was around 2, suggesting no autocorrelation in the model, meaning there is no correlation between the sample data, making the model robust.

Specific analysis shows: The regression coefficient for learning-oriented teacher-student interaction is 0.334 (t=6.667, p=0.000<0.01), indicating that learning-oriented teacher-student interaction has a significant positive impact on task analysis. (2) The regression coefficient for social-oriented teacher-student interaction is 0.351 (t=7.014, p=0.000<0.01), indicating that social-oriented teacher-student interaction has a significant positive impact on task analysis.

In conclusion, both learning and social teacher interaction will have a significant positive impact on task analysis.

3) Regression analysis of independent variable dimension and self-monitoring regulation

Table 10 Regression analysis of independent variable dimension and self-monitoring regulation (n=387)

[illegible]

Note: dependent variable = self-monitoring and regulation

* p<0.05 ** p<0.01

The results are shown in Table 10, where learning-oriented teacher-student interaction and social teacher-student interaction are used as independent variables, while self-monitoring and regulation are used as dependent variables for linear regression analysis. As can be seen from the table, the model formula is: Self-Monitoring and Regulation = $0.976 + 0.329 * \text{Learning-Oriented Teacher-Student Interaction} + 0.357 * \text{Social Teacher-Student Interaction}$. The R-squared value of the model is 0.276, indicating that learning-oriented teacher-student interaction and social teacher-student interaction can explain 27.6% of the variation in self-monitoring and regulation. When performing an F-test on the model, it was found that the model passed the F-test ($F=73.338$, $p=0.000 < 0.05$), which means that at least one of the two factors—learning-oriented teacher-student interaction or social teacher-student interaction—has an impact on self-monitoring and regulation. Additionally, tests for multicollinearity revealed that all VIF values were less than 5, indicating no multicollinearity issues; furthermore, the D-W value was around 2, suggesting no autocorrelation in the model, meaning there is no correlation between the sample data, indicating a good model.

The final specific analysis shows: (1) The regression coefficient for learning-oriented teacher-student interaction is 0.329 ($t=6.473$, $p=0.000<0.01$), indicating that learning-oriented teacher-student interaction has a significant positive impact on self-monitoring and regulation. (2) The regression coefficient for social-oriented teacher-student interaction is 0.357 ($t=7.027$, $p=0.000<0.01$), indicating that social-oriented teacher-student interaction has a significant positive impact on self-monitoring and regulation.

In short, both learning and social teacher interaction will have a significant positive impact on self-monitoring and regulation.

4) Regression analysis of independent variable dimension and self-evaluation

Table 11 Regression analysis of independent variable dimension and self-evaluation (n = 387)

	B		StdF	T	P	VIF	TOL
	B	SE	Beta				
constant	0.858	0.185	-	4.626	0.000**	-	-
Learningly born Teacher interaction	0.368	0.051	0.335	7.279	0.000**	1.167	0.857
Social birth Teacher interaction	0.361	0.051	0.329	7.142	0.000**	1.167	0.857
R 2				0.303			
Adjust R 2				0.300			
F				F (2,384)=83.633, p=0.000			
D-W				2.068			
Note: dependent variable = self-evaluation							
* p<0.05 ** p<0.01							

The results are shown in Table 11, where learning-oriented teacher-student interaction and social teacher-student interaction are used as independent variables, while self-evaluation is the dependent variable, and linear regression analysis is conducted. The model formula is: Self-Evaluation = 0.858 + 0.368 * Learning-Oriented Teacher-Student Interaction + 0.361 * Social Teacher-Student Interaction. The R-squared value of the model is 0.303, indicating that learning-oriented teacher-student interaction and social teacher-student interaction can explain 30.3% of the variation in self-evaluation. When performing an F-test on the model, it was found that the model passes the F-test ($F = 83.633$, $p < 0.05$), which means that at least one of the two factors—learning-oriented teacher-student interaction or social teacher-student interaction has a significant impact on self-evaluation. Additionally, tests for multicollinearity revealed that all VIF values in the model are less than 5, indicating no multicollinearity issues; furthermore, the D-W value is around 2, suggesting no autocorrelation in the model, meaning there is no correlation between the sample data, making the model robust.

Finally, the specific analysis shows that: The regression coefficient value of learning teacher interaction is 0.368 ($t=7.279$, $p=0.000<0.01$), which means that learning teacher interaction will have a significant positive impact on self-evaluation. The regression coefficient value of social teacher interaction was 0.361 ($t=7.142$, $p=0.000<0.01$), indicating that social teacher interaction had a significant positive influence on self-evaluation.

In short, both learning and social teacher interaction will have a significant positive impact on self-evaluation.

Based on the above regression analysis results, it can be concluded that teacher-student interaction (including social interaction and learning interaction) has a significant positive impact on students' learning autonomy (including four dimensions of self-motivation belief, task analysis, self-monitoring and regulation, and self-evaluation), and hypothesis 2 is established.

According to the above test results, all hypotheses proposed in this study were verified, and the results are shown in Table 12:

Table 12 Verification results of assumptions

Hypothesis	Bear fruit
Hypothesis 1: There are differences in teacher-student interaction and students' autonomous learning ability among different groups.	Partially established
Hypothesis 2: Teacher-student interaction has a significant positive predictive effect on students' self-learning ability	Found

Research Suggestions

1. Conclusions

1) Group Differences Exist Between Teacher-Student Interaction and Autonomous Learning Ability

First, according to the survey results, the overall status of teacher-student interaction in Yunnan's higher vocational schools is good. Both academic interaction ($M=3.19$) and social interaction ($M=3.15$) perform well, but there is still room for improvement, especially in social interaction. In addition, students' autonomous learning ability shows balanced performance across all dimensions, with self-motivational beliefs ($M=3.22$) and task analysis ($M=3.21$) performing better, while the score for self-monitoring and regulation ($M=3.16$) is relatively lower.

Second, the results of the analysis of variance indicate that Hypothesis 1 is partially supported. Students' major, gender, grade, and household registration do not affect teacher-student interaction or autonomous learning ability—no significant differences in these two variables were found across these demographic characteristics. However, there are significant differences in teacher-student interaction and autonomous learning ability between students with different admission methods: students admitted through single-admission exams perform better in both aspects than those admitted through unified exams ($F=6.517$, $p=0.011$; $F=8.235$, $p=0.004$). Thus, Hypothesis 1 (i.e., teacher-student interaction and students' autonomous learning ability vary across different groups) is partially valid.

2) Teacher-Student Interaction Has a Significant Positive Predictive Effect on Students' Autonomous Learning Ability

First, correlation analysis results show that both dimensions of teacher-student interaction (academic and social interaction) are significantly positively correlated with all four dimensions of autonomous learning ability (self-motivational beliefs, task analysis, self-monitoring and regulation, and self-evaluation) ($r=0.415-0.459$, $p<0.01$). This is consistent with the findings of Ayuwanti and Siswoyo (2021, p. 666), who observed that teacher-student interaction is related to students' learning ability.

Second, regression analysis results confirm that Hypothesis 2 is supported. Both academic and social teacher-student interactions have significant positive predictive effects on students' self-motivational beliefs, task analysis, self-monitoring and regulation, and self-evaluation, and can explain part of the variance in these four dimensions of autonomous learning ability ($R^2=0.249-0.303$, $p<0.001$).

2. Recommendations

1) Discussion on Differences in Teacher-Student Interaction and Students' Autonomous Learning Ability

First, the study finds significant differences in teacher-student interaction and autonomous learning ability between students with different admission methods, which echoes Sun Xiaotian's research indicating that admission methods significantly influence students'

learning ability and interaction patterns. Analysis suggests that students admitted through single-admission exams may gain an advantage in teacher-student interaction and autonomous learning ability due to their earlier exposure to career-related learning environments and resources (Sun Xiaotian, 2021, p. 93). This finding reminds educators to pay attention to such differences and provide more support and guidance for students admitted through unified exams.

Second, although the overall status of teacher-student interaction in Yunnan's higher vocational schools is good, there is still room for improvement, particularly in social interaction. Additionally, students' autonomous learning ability is balanced across dimensions, with self-motivational beliefs and task analysis performing better, while self-monitoring and regulation lags slightly.

2) Positive Teacher-Student Interaction Promotes Students' Autonomous Learning Ability

Consistent with existing literature, the results confirm that teacher-student interaction significantly affects students' autonomous learning ability, supported by numerous studies. Positive teacher-student interaction helps address students' developmental challenges, resolve confusion in their studies and lives, clarify their learning goals and life significance, stimulate their interest and enthusiasm for learning, and enhance their ability to learn independently and develop themselves (Liu Xianghe & Xiao Zhaowu, 2015, p. 87).

3. Suggestions for Future Research

First, expand research methods: Future studies can integrate diverse methods such as interviews and case studies to gain a deeper understanding of students' perceptions and expectations of educational service quality, as well as the mechanism through which educational service quality influences student satisfaction.

Second, broaden research subjects: Future research can expand the scope to include vocational colleges in more regions, or even different types of higher education institutions, to enhance the generalizability and representativeness of the findings.

Third, deepen research content: Further exploration of the relationship between educational service quality and student satisfaction is needed. Additionally, studies on the moderating effects of other factors (e.g., school management, social environment, family background) on this relationship can provide more comprehensive theoretical support for improving the educational quality of vocational colleges.

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