

**The Influence Mechanism of Teachers' Knowledge
Base on Teaching Innovation in Universities Research**

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Abstract

The knowledge-based theory believes that through the excavation, utilization, and recombination of accumulated knowledge within the organization, new knowledge can be generated to achieve innovation. Team reflection reflects the degree to which the team pays attention to the internal and external environment and responds promptly, which will have a positive impact on key results. From the perspective of the knowledge base of the teaching team, this study introduces team teaching reflection as a mediation factor to explore the relationship between the knowledge base and teachers' teaching innovation. The research shows that there is a significant correlation between knowledge base, teaching innovation and team reflection has a significant partial mediation effect on the impact of knowledge base on teaching innovation. This study clarifies the influence path of knowledge base on teaching innovation, provides a theoretical basis for relevant subjects to formulate policies and measures to promote teaching innovation in universities, and helps universities to formulate promotion strategies for promoting teaching innovation from more diverse perspectives.

Keywords: Knowledge Base, Teaching Innovation, Universities Teachers, Team Reflection

1. Introduction

1.1 Background and Importance of the Problem

Universities undertake the responsibility of cultivating talents for social development. As a kind of grassroots teaching organization, the teaching team of teachers can gather together by the strength between members of the team and between different teams, and carry out ideological collisions to give full play to their strengths. Vitality and function, the knowledge-based theory holds that new knowledge can be generated and innovation can be realized through the excavation, utilization, and recombination of the accumulated stock of knowledge within the organization. Team reflection reflects the degree to which the team pays attention to the internal and external environment and responds promptly, which will have a positive impact on key results, such as team performance, team innovation, and team learning. From the perspective of the knowledge base of the teaching team, this study introduces team teaching reflection as an intermediate factor to explore the relationship between the knowledge base and teachers' teaching innovation.

1.2 Research Objective

This study uses the knowledge base, teaching innovation, and team reflection of the teaching team organization of university teachers as variables to explore the relationship between the factors. Empirical research is carried out by supporting a research hypothesis model, to finally verify that the teaching innovation level of the teaching team can be promoted through the self-improvement of the knowledge base and the strengthening of team reflection.

2. Literature Review

2.1 Related Concepts and Theories

2.1.1 The Relationship between the Knowledge Base and Innovation from a Two-Dimensional Perspective Research

The the knowledge base width emphasizes the width covered by the organization's technology and knowledge fields, which reflects the horizontal diversity of knowledge owned by the organization (Wu & Shanley, 2007). Regarding the impact of the knowledge base width on corporate innovation, existing research holds that there are two main types of views: first, the width of the firm's knowledge base has a significant positive impact on innovation performance; second, the width of the firm's knowledge base has an inverted U-shaped impact on innovation performance.

The knowledge base depth emphasizes the degree of familiarity and mastery of an organization in a specific technical knowledge field (Ozman, 2010). Zhang et al. (2010) found through research that the technical capabilities of an organization are reflected in the depth of its knowledge base to a certain extent (Zhang & Baden-Fuller, 2010). Regarding the relationship between knowledge base depth and the innovation performance of enterprises, the opinions advocated by existing research can be roughly divided into two categories: first, the depth of enterprise knowledge base has a significant positive impact on innovation performance, that is, the deeper the depth of enterprise knowledge base, Second, the impact of enterprise knowledge base depth on innovation performance is inverted U-shaped, that is, there is a reading value of knowledge base depth. Before reaching the threshold, enterprise innovation performance increases with the knowledge base depth. After the hold is reached, the innovation performance of the enterprise decreases with the increase of the knowledge base depth.

2.1.2 Influencing Factors of Teaching Innovation Research

After consulting the data, it is found that foreign scholars have done more research on the influencing factors of teaching innovation. A large number of studies have shown that the factors that affect teaching innovation are mainly elaborated from two aspects: one is the teacher himself, and the other is environmental factors. In terms of teachers themselves, scholars have concluded that the factors that affect teaching innovation include: teachers' characteristics and work skills. Schussler believes that in classroom teaching, teachers' familiarity with students' cognitive development stages and mastery of operational skills affect teachers' teaching efficiency and teaching quality. Teachers have a high degree of familiarity and mastery, which will have a positive effect on teaching innovation. The research of Runhaar et al. shows that teachers' academic level and family education background will affect teachers' teaching innovation. Teachers with higher academic qualifications or better family education backgrounds will increase their enthusiasm for teaching innovation and produce better teaching innovation effects. In terms of environmental factors, Amabile has shown through a large

number of studies that the generation of innovative behavior is related to the working environment in which it is located. If the working environment is harmonious, the relationship between superiors and subordinates or the work team gets along well, it is easier to produce innovative behavior Kimonen & Nevalainen from teaching innovation is analyzed from the perspectives of media and teaching resources. The research shows that the school's long-term teacher education and training will promote teachers' teaching innovation, and the degree of teacher participation will also affect teaching innovation.

2.1.3 The Formation Mechanism of Team Reflection Research

Since West(1996) proposed the concept of team reflection, team reflection has attracted extensive attention and research from scholars. Hirst & Mann (2004) explored the impact of different leadership roles on team processes and outcomes. Through the data analysis of 56 teams from 4 organizations, they found that the leadership innovation role will positively affect team reflection. Tojsovd et al. (2003) explored the impact of conflict management in team interaction on team reflection. Dayan & Basarir (2008) studied the effects of fairness cognition, a team memory interaction system on team reflection. Through the data analysis of 107 production teams and project team questionnaires, they found that different perceptions of fairness have an impact on team reflection, interaction fairness promotes team reflection, and procedural fairness has no significant impact on team reflection, and found that team memory interaction systems also promote team reflection. Tojsovd et al. (2004) explored the impact of different types of work goals on team reflection.

Regarding the research on the outcome variables of team reflection, Boumans (2012) selected the nurse team as the research object and mainly explores the relationship between behavioral team reflections of members who withdraw from the team. The research results showed that when the team regularly carried out reflection activities, team members rare to choose to leave the team and make a move to withdraw from the team; the research of Chinese scholars Wang Duanxu & Wu Chaoyan (2011) found that team reflection will have an impact on team interaction and team cognitive processes. Edmondson (2002) believes that to achieve knowledge innovation can be achieved through the reflection of team members.

The relationship between team reflection and team productivity was first explored by Carter & West in 1998. A longitudinal study of BBC program production teams found that team reflection was an effective predictor of team effectiveness. At the same time, they also found that team reflection has a greater effect on team effectiveness than team innovation atmosphere and team structure. Schippers et al (2003) found through research on 60 teams that team reflection has a direct impact on team performance. West (1996) found that open reviews of team goals, strategies, and processes by team members to establish team-level intellectual output facilitated team innovation.

2.4 Research Hypothesis and Model Construction

2.4.1. There is a Relationship between the Knowledge Base of the Teaching Team of College Teachers and their Teaching Innovation Behavior

Existing studies believe that enterprises create new knowledge by combining knowledge reserves through knowledge exchange among members (Collins & Smith, 2006). Combining knowledge-based theory, this study first hypothesizes that there is a significant correlation between knowledge base and teaching innovation namely:

H1: Knowledge base (KB) has a significant effect on instructional innovation (IT).

This study intends to assume that both the width of the knowledge base and the knowledge base depth are significantly related to teaching innovation, and how the specific correlation will be verified in the empirical verification stage, namely:

H1a: Knowledge base width (KBW) has a significant effect on teaching innovation (IT).

H1b: Knowledge base depth (KBD) has a significant effect on teaching innovation (IT).

2.4.2 The Team Reflection of the Teaching Team of College Teachers Plays a Mediating Role between their Knowledge Base and Innovative Behavior

This study hypothesizes that there is a mediating effect of team reflection on the impact of organizational knowledge base on teaching innovation, namely:

H2: Team reflection (TR) has a significant mediating effect on the impact of the knowledge base (KB) on teaching innovation (IT).

When exploring the mediating effect of team reflection, this study intends to subdivide it into three aspects: task reflection, process reflection, and behavior adjustment. It is assumed that they have mediating effects in the process of the influence of knowledge base width and knowledge base depth on teaching innovation, that is.

H2a: Task reflection (TKR) has a significant mediating effect on the impact of knowledge base width (KBW) on teaching innovation (IT).

H2b: Process reflection (PR) has a significant mediating effect on the impact of knowledge base width (KBW) on teaching innovation (IT).

H2c: Behavior Adjustment (BA) has a significant mediating effect on the impact of Knowledge Base Width (KBW) on teaching Innovation (IT).

H2d: Task reflection (TKR) has a significant mediating effect on the impact of knowledge base depth (KBD) on teaching innovation (IT).

H2e: Process reflection (PR) has a significant mediating role in the impact of knowledge base depth (KBD) on teaching innovation (IT).

H2f: Behavior adjustment (BA) has a significant mediating effect on the impact of knowledge base depth (KBD) on teaching innovation (IT).

2.4.3 Model Construction

Base on the literature review, this study analyzes the mechanism of knowledge base, teaching innovation, team reflection, and knowledge field activity through theoretical deduction, and proposes that the knowledge base of the teaching team of university teachers has a significant impact on teaching innovation. The median effect of team reflection between the knowledge base and teaching innovation, the significant moderating role of knowledge field activity in the process of knowledge base's influence on teaching innovation, and the significant moderating role of knowledge field

activity in the process of knowledge base's impact on team reflection. Base on the above research and related hypotheses, this study constructs a theoretical model as shown in Figure 1.

3. Research Methodology

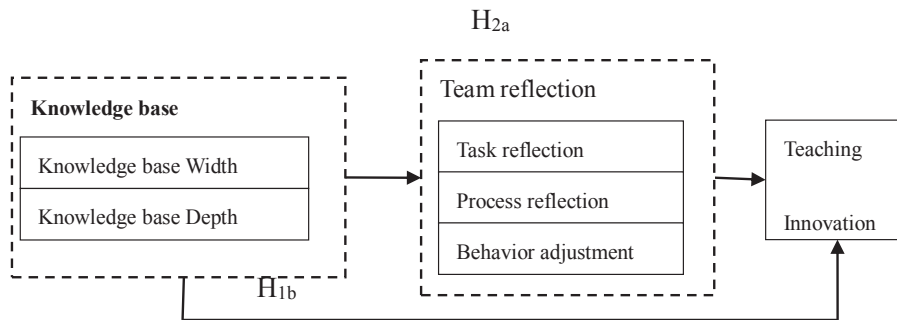


Figure 1 Hypothetical Model of the Relationship between Knowledge Base, Teaching Innovation, and Team Reflection

This study first uses the literature research method to determine the basic research model, during which the variable measurement scales are compared and selected; then all the research data related to the model are obtained through the questionnaire survey method; Finally, the relevant hypotheses proposed in this study are verified by applied analysis statistics.

3.1 Research Design

3.1.1 Scale Design and Measurement

When designing the scale, this study systematically sorted out the dimensions and measurement methods of the required variables and selected the measurement scale developed by domestic scholars Base on the Chinese local situation as much as possible; in addition, according to the research content, the items were analyzed. Afterward, the questionnaire was revised and improved by communicating with experts and scholars in the field; after that, the designed questionnaire was distributed to college teachers with good relationships and rich knowledge and experience for pre-testing, and Base on their feedback, further Modifications formed the final questionnaire.

3.1.2 Scale Reliability and Validity Analysis

(1) Knowledge Base Measurement Scale

The knowledge base measurement part refers to the scales of scholars such as Zhang Zixuan (2021), Zhou & Li, Raymond van Wijk, and is adjusted and modified according to the actual situation. Among them, Knowledge Base Width (KBW) and Knowledge Base Depth (KBD) each contain 4 items, a total of 8 items. Like five-level scoring is used. The higher the scale score, the higher the knowledge base level of the teaching team. The internal consistency reliability values of the two subscales were 0.816 and 0.726, and the internal consistency reliability value of the whole questionnaire was 0.803; the KMO value was 0.812, and $P < 0.01$, which was suitable for factor analysis; The validity test of the table, the constructed model is shown in Figure 2, and the

corresponding model fitting index is shown in Table 1.

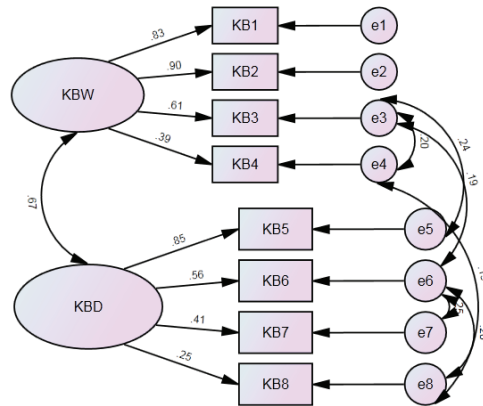


Figure 2 Confirmatory Factor Analysis Model of Knowledge Base Scale

Table 1 Various Fitting Indexes of the Confirmatory Factor Analysis Model of the Knowledge Base Scale

RMSEA	CFI	NFI	IFI	Chi-square/degrees of freedom
0.071	0.974	0.966	0.975	3.911

According to the model and numerical values, the RMSEA value is less than 0.08, the values of CFI, NFI, and IFI are all greater than 9, and the chi-square/degree of freedom value is less than 5, indicating that the overall fit of the model is good.

Table 2 The Standard Factor Loading Value and Combination Reliability of the Confirmatory Factor Analysis Model of the Knowledge Base Scale

			Standard Factor Loading	S.E.	C.R.	P	AVE	CR
KB1	<---	KBW	0.829				0.79	0.685
KB2	<---	KBW	0.897	0.045	20.7	***		
KB3	<---	KBW	0.612	0.038	15.086	***		
KB4	<---	KBW	0.391	0.041	9.166	***		
KB5	<---	KBD	0.852				0.721	0.708
KB6	<---	KBD	0.564	0.055	9.98	***		
KB7	<---	KBD	0.411	0.063	7.869	***		
KB8	<---	KBD	0.647	0.051	5.105	***		

According to the above table, it can be seen that the standard factor loading values of the scale are all greater than 0.5, except that the factor loading value of question 7 is slightly lower, which is 0.411, but it is also higher than 0.4. At the same time, the AVE values are all greater than 0.5, and the CR values are all close to 0.7. The overall aggregation degree of the scale is good, and the validity level is high.

(2) *Teaching Innovation Measurement Scale*

The measurement of the teaching innovation (IT) level of university teachers starts from the perspective of system theory and refers to the scoring standards of the national university teacher teaching innovation competition in the past two years. Self-made scale for each aspect, including 13 items in total, using Likert five-level scoring, the higher the score of the scale, the higher the level of teaching innovation. Given the low initial reliability level of the scale, before the official test, through the reliability analysis of the pretest, the items that affect the internal consistency reliability value were deleted, and the reliability of the scale increased to 0.698.

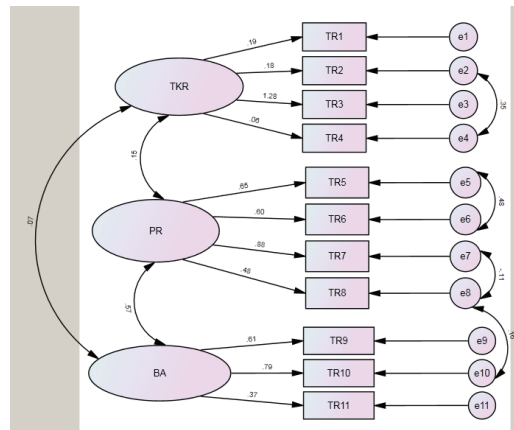


Figure 3 A Confirmatory Factor Analysis Model of the Team Reflection Scale

(3) *Team Reflective Measurement Scale*

The team reflection measurement part refers to the team reflection measurement questionnaire under the Chinese cultural background compiled and developed by Zhang Wenqin & Liu Yun (2011). There are three dimensions in total, which are task reflection, process reflection, and behavior adjustment. The total score or average score consists of 11 items, and the five-level Likert is used for scoring. The higher the scale score, the higher the reflective level of the teaching team.

The internal consistency reliability values of the three subscales were 0.694, 0.777, and 0.660, respectively, and the internal consistency reliability value of the whole questionnaire was 0.732; the KMO value was 0.748, and $P < 0.01$, suitable for factor analysis; To test the validity of the scale, the constructed model is shown in Figure 3.

According to the model and numerical values, the RMSEA value is less than 0.08, the values of CFI, NFI, and IFI are all greater than 9, and the chi-square/degree of freedom value is less than 5, indicating that the overall fit of the model is good.

4. Data Analysis and Findings

4.1 Test of the effect of knowledge base on teaching innovation

To test the impact of knowledge base width and knowledge base depth on teaching innovation, this study uses the regression analysis method to test hypothesis H1 according to the significance level of the regression coefficient.

Table 3 Effects of Width and Depth of Knowledge Base on Teaching Innovation

Model	B	significant	VIF
(constant)	2.602	0	
knowledge base depth	-0.089	0.047	3.26
knowledge base width	0.114	0.016	3.26

a Dependent variable: teaching innovation variable

The fitting adjustment R^2 value of the regression model is 0.302, and the fitting degree is good. The significance levels of the two independent variables are 0.047 and 0.016, both less than 0.05, and the regression coefficient $B=-0.089$ of the knowledge base depth, indicating that the team The higher the level of depth of knowledge base, the lower the level of teaching innovation, that is, there is a significant negative correlation between the knowledge base depth and teaching innovation; at the same time, there is a significant positive correlation between the knowledge base width and teaching innovation, and the regression coefficient is 0.114.

4.2 Test of the Effect of Knowledge Base on Team Reflection

Order to examine the influence of knowledge base on team reflection, regression analysis was used to obtain the following results

Table 4 The Effect of Knowledge Base on Team Reflection

Model	Task Reflection			Process Reflection			Behavior Adjustment			Team Reflection		
	B	Sig.	VIF	B	Sig.	VIF	B	Sig.	VIF	B	Sig.	VIF
(Constant)	2.878	0		3.165			2.304			2.826		
Knowledge based Depth	0.017	0.039	1.346	0.050	0.017	1.346	0.135	0.002	1.346	0.062	0.014	1.346
Knowledge based Width	0.219	0.000	1.346	0.130	0.005	1.346	0.048	0.038	1.346	0.140	0.000	1.346

The fitting degree of the four regression models is good, and the significance level of the independent variables is less than 0.05, which means that there is a significant positive correlation between the knowledge base width and knowledge base depth and the task reflection variable, and the knowledge base width and knowledge base depth are both significant positive correlation with the process reflection variable, there is a significant positive correlation between the knowledge base width and knowledge base depth and the behavior adjustment variable, and there is a significant positive correlation between the knowledge base width and knowledge base depth and the team reflection variable.

4.3 Mediating Effect Test

4.3.1 The Mediating Effect Test of Team Reflection

This study uses the "three-step mediation regression analysis method" proposed by Baron & Kenny to test the mediation hypothesis. According to the theory of Edwards and Lambert, the bootstrapping method is used to analyze the intermediary effect of team reflection between the knowledge base and teaching innovation.

Table 5 Regression Model of Knowledge Base on Team Reflection Variables

Team Reflection	Effect	Standard Error	t	p	Minimum Confidence Interval	Maximum Confidence Interval
constant	2.888	0.091	31.877	.000	2.71	3.066
Knowledge base	0.189	0.028	6.809	.000	0.135	0.244
R-sq	0.074					
F	46.36 5					

It can be seen from the above table that on the 95% confidence interval, $P < 0.05$, the minimum confidence interval value and the maximum confidence interval value have not passed through 0, and the regression coefficient 0.189 is a positive value, indicating that the independent variable knowledge base has a significant effect on the intermediary variable team reflection positive impact.

Table 6 Total Effect, Direct Effect and Indirect Effect among Knowledge Base, Team Reflection and Teaching Innovation

	Effect	Standard Error	t	p	Minimum Confidence Interval	Maximum Confidence Interval
Total Effect	0.447	0.026	1.483	0.000	0.314	0.580
Direct Effect	0.297	0.027	0.698	0.000	0.159	0.435
Indirect Effect	0.149	0.009	\	\	0.005	0.039

It can be seen from the above table that the indirect effect exists significantly, indicating that the intermediary variable team reflection has a significant intermediary role in the influence of the independent variable knowledge base on the dependent variable teaching innovation; and because the direct effect value is significant, it indicates that the intermediary variable plays a partial intermediary role.

It can be seen that hypothesis H2 is supported, and team reflection has a significant partial mediation role in the impact of knowledge base on teaching innovation.

4.3.2 The Mediating Effect Test of Behavior Adjustment

According to the "three-step median regression analysis method" and "bootstrap method", the mediating effect of behavior adjustment between the knowledge base and teaching innovation is analyzed.

(1) First, verify the median effect of the intermediary variable behavior adjustment between the width of the independent variable knowledge base and the dependent variable teaching innovation.

Table 7 Regression Model of Knowledge Base Width on Behavior Adjustment

Behavior Adjustment	Effect	Standard Error	t	p	Minimum Confidence Interval	Maximum Confidence Interval
Constant	2.416	0.112	21.593	.000	2.196	2.635
Knowledge Base Width	0.154	0.037	4.136	.000	0.081	0.228
R-sq	0.029					
F	17.108					

It can be seen from the above table that on the 95% confidence interval, $P < 0.05$, the minimum confidence interval value and the maximum confidence interval value have not passed through 0, and the regression coefficient 0.154 is a positive value, It shows that the width of the independent variable knowledge base significantly positively affects mediator variable behavior adjustment.

Table 8 Total Effect, Direct Effect and Indirect Effect among Knowledge Base Width, Behavior Adjustment and Teaching Innovation

	Effect	Standard Error	t	p	Minimum Confidence Interval	Maximum Confidence Interval
Total Effect	0.044	0.02	2.168	0.031	0.004	0.084
Direct Effect	0.028	0.02	1.377	0.169	-0.012	0.068
Indirect Effect	0.016	0.006	\	\	0.006	0.029

It can be seen from the above table that the indirect effect exists significantly, indicating that the median variable behavior adjustment has a significant median role in the influence of the independent variable knowledge base width on the dependent variable teaching innovation; but because the direct effect value is not significant, it shows that the median variable plays a complete intermediary role.

It can be seen that hypothesis H2c is supported, and behavior adjustment plays a complete mediating role in the impact of knowledge base width on teaching innovation.

(2) Second, verify the median effect of the median variable behavior adjustment between the knowledge base depth of the independent variable and the teaching innovation of the dependent variable.

Table 9 Regression Model of Knowledge Base Depth on Behavior Adjustment

Behavior Adjustment	Effect	Standard Error	t	p	Minimum Confidence Interval	Maximum Confidence Interval
Constant	2.395	0.169	14.154	.000	2.062	2.727
Knowledge Base Depth	0.135	0.048	2.825	0.005	0.041	0.228
R-sq	0.014					
F	7.98					

It can be seen from the above table that on the 95% confidence interval, $P < 0.05$, the minimum confidence interval value and the maximum confidence interval value have not passed through 0, and the regression coefficient 0.135 is a positive value, It shows that the depth of the independent variable knowledge base significantly positively impacts the behavior adjustment of the mediator variable.

Table 10 Total effect, direct effect and indirect effect among knowledge base depth, behavior adjustment and teaching innovation

	Effect	Standard Error	t	p	Minimum Confidence Interval	Maximum Confidence Interval
Total Effect	0.005	0.026	0.182	0.006	0.046	0.056
Direct Effect	0.01	0.026	0.402	0.018	0.061	0.04
Indirect Effect	0.015	0.006	\	\	0.004	0.029

It can be seen from the above table that the indirect effect exists significantly, indicating that the median variable behavior adjustment has a significant median role in the influence of the independent variable knowledge base depth on the dependent variable teaching innovation, and because the direct effect value is significant, it shows that the median variable plays a partial median role.

It can be seen that hypothesis H2f is supported, and behavior adjustment plays a partial mediating role in the impact of knowledge base depth on teaching innovation.

5. Conclusion

First, the knowledge base is significantly related to teaching innovation. There is a significant correlation between knowledge base and teaching innovation. Among them, there is a significant positive correlation between the knowledge base width and teaching innovation; there is a significant negative correlation between the knowledge base depth and teaching innovation.

Second, a knowledge base is significantly related to team reflection. Through the regression model analysis, it is known that 26% of the task reflection level of the teaching team of university teachers is determined by the influence of the knowledge base width and knowledge base depth of the team, and the P values of the two independent variables are less than 0.05, and the knowledge base width and knowledge base depth are both related to task reflection variables. 20.7% of the process reflection level of the teaching team of university teachers is determined by the width and depth of the knowledge base of the team, and the P values of the two independent variables are both less than 0.05. It means that there is a significant positive correlation between the width of the knowledge base and the depth of the knowledge base and process reflection variables. 17.3% of the behavior adjustment level of the teaching team of university teachers is determined by the influence of the team's knowledge base width and knowledge base depth, and the P values of the two independent variables are less than 0.05, which means that the knowledge base width and knowledge base depth are both related to behavior adjustment. There is a significant positive correlation between the variables. 21.9% of the team reflection level of the teaching team of college teachers is determined by the width and depth of the knowledge base of the team, and the P values of the two independent variables are both less than 0.05. That means there is a significant positive correlation between knowledge base width and knowledge base depth, and team reflection variables.

Third, team reflection has a significant mediating effect on the impact of knowledge base on teaching innovation. Through the regression model analysis of the knowledge base on the team reflection variable, it is found that the team reflection has a significant mediating effect on the influence of the independent variable knowledge base on the dependent variable teaching innovation. Among them, behavior adjustment plays a complete mediating role in the influence of knowledge base width on teaching innovation; behavior adjustment plays a partial mediating role in the impact of knowledge base depth on teaching innovation.

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