

# Study on the Influence of College Teachers and Students Matching on Graduate Knowledge Innovation Behavior

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**Abstract.** With the advent of knowledge economy, knowledge innovation is more and more important for economic development, and graduate students in China's the knowledge innovation plays an indispensable role. Through the analysis of teachers and students, and analyze the knowledge innovation of concern, constructing a theoretical model of this study, and the teacher-student matching, complementary matching of knowledge innovation and knowledge innovation ability of graduate students has a significant positive effect on conclusion has significant positive effect on the knowledge innovation behavior of knowledge innovation ability and graduate students through empirical analysis, the research on teacher-student relationship, some intermediaries and graduate knowledge innovation behavior for knowledge innovation ability of students get through further analysis.

**Keywords:** teacher-student matching; knowledge innovation ability; knowledge innovation behavior.

## 1. Introduction

China's graduate education is at a rapid development stage. According to the 2018 China Education Statistical Yearbook, the number of graduate students in China has risen from 300,000 in 2000 to 2.1 million in 2018, with an average annual increase of 100,000 in 18 years [1]. Although graduate students have experienced rapid growth in the number of training, they lack the emphasis on the quality of training, and the research results of high level, innovation and applicability are few. There is always a big gap between China's scientific research achievements and developed countries. The research and innovation ability of college graduate students needs to be strengthened. At present, in research on postgraduate knowledge innovation, scholars focus on the influence of individual characteristics and external environment on their knowledge innovation ability. The research on the influencing factors of individual innovation ability mainly focuses on unique knowledge stock, knowledge absorption ability, individual characteristics and environmental factors (policy, material, and team knowledge heterogeneity), etc. The important role of knowledge innovation is studied. In the study of the tutor system, it is mainly the role of the tutor to the students, ignoring the mutual matching relationship between the tutor and the two autonomous individuals. Therefore, based on the theoretical model of "Ternary Interaction Theory", this paper uses multiple linear regression to study the mechanism of college teachers and students matching the influence of postgraduate knowledge innovation behavior, in order to provide reference and enlightenment for further training of postgraduate knowledge innovation behavior.

## 2. Conceptual Framework and Model Building

### 2.1 Conceptual Definition

The article draws on the predecessors' research on knowledge innovation behavior [2-5], and combines the characteristics of postgraduate training to define the knowledge innovation behavior of graduate students as: through the use of resources of college innovation platform, generate new ideas and new ideas, and in the mentor's Under the guidance of the process of its implementation, the main presentation method is the scientific research results such as papers and patents as its final result. According to Amabile et al. [6], Sternberg et al. [7], Gardner et al. [8], the ability of knowledge

innovation(Abbreviation KIA) refers to the ability of graduate students to collect, retrieve, and share knowledge. It is an important factor affecting the knowledge innovation behavior of graduate students.

According to Kristof's view of teacher-student demand matching, combined with the characteristics of related research and teacher-student relationship, the article believes that the teacher-student needs match is the relationship between the tutor and the graduate student to complete the research task [9], as the tutor provided The financial, material and psychological resources required for postgraduate research, as well as the opportunities for scientific research and interpersonal communication. This kind of matching is the demand-supply matching, that is, the teacher-student identical matching(Abbreviation TSIM); and the graduate student's completion of the task is also the need to help the instructor to complete the subject requirements. This kind of matching is the requirement-capability matching, that is, the teacher-student complementarity matching (Abbreviation TSCM) [9].

## 2.2 Model Building

"Ternary Interaction Theory" points out that the environment, cognition and behavior interact with each other, and individual behavior is controlled by cognition while being influenced by the environment [10]. The environment, subject cognition and subjective behavior are relatively independent and interdependent. There are a mutual influence and restrictive relationship between them, which is similar to "external cause environmental changes individual cognition, and individual cognition changes knowledge innovation behavior". Chini also noted that human behavior is guided by organizational context rules and social resources, and the knowledge transferred by the behavior should match the situational needs of the receiving unit [11]. According to the ternary theory, the teacher-student-student relationship is an innovative environment for postgraduate students. The postgraduate knowledge innovation ability reflects the cognitive level of graduate students, while the postgraduate knowledge innovation behavior (Abbreviation KIA) is the specific behavior of graduate students. The results are reflected. It can be observed that the relationship between the above three can be explained by the ternary interaction theory. The theoretical model is as follows:

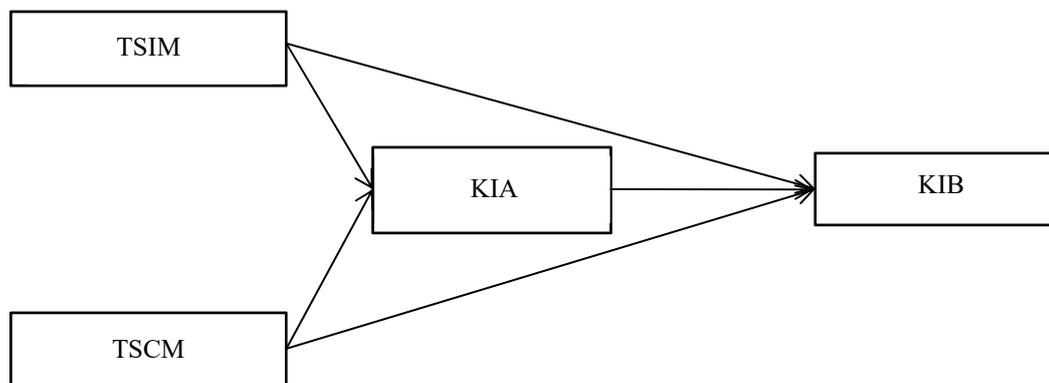


Fig. 1 Conceptual framework.

## 3. Theoretical Hypotheses

(1) The relationship between teacher-student matching and postgraduate knowledge innovation behavior. In the existing scholars' research, consistency and complementarity matching such as value matching [12-13], demand matching [14], and ability matching [15] have certain influence on individual knowledge innovation behavior. In the existing research, individuals are called upon to have had various needs in the innovation activities, such as job return, praise and support of leaders or others, funds and materials. Similarly, there will be diverse needs in the field of postgraduate knowledge innovation. The demand in this area is mainly reflected in the graduates' requirements for rewards and materials in the process of innovation activities, and the graduate students study knowledge and skills and take part in academic exchanges. The need to strengthen your chances of self. Based on this, the following assumptions are made:

H1a: Teacher-student consistency has a significant positive impact on graduate knowledge innovation behavior

H1b: Complementary matching between teachers and students has a significant positive impact on postgraduate knowledge innovation behavior

(2) The relationship between teacher-student matching and postgraduate knowledge innovation ability Li Na et al. [16] scholars in the study of graduate students' knowledge innovation ability, pointed out that the guidance of the tutor makes a significant positive influence on the graduate knowledge innovation ability. In addition, Wang Hao [17] noted in the research that the mentor's guiding style has a significant positive impact on the creativity of graduate students. Tan Chenghua [18] noted in the research that the self-support degree of graduate tutors has a significant positive impact on the creativity of graduate students. The more support the instructors have for the innovation activities of graduate students, the greater the impact on the creativity of graduate students. According to the above analysis, the teacher-student matching relationship has a certain impact on the graduates' knowledge innovation ability, and the assumptions are as follows:

H2a: Teacher-student consistency has a significant positive impact on graduate knowledge innovation ability

H2b: Complementary matching between teachers and students has a significant positive impact on graduate students' knowledge innovation ability

(3) The relationship between graduate knowledge innovation ability and knowledge innovation behavior. Sun Yanling [19] noted in the research that creativity has a decisive role in the individual's innovative behavior. The greater the individual's creativity, the easier it is for the innovation behavior. Wang Xiaohong et al [20] pointed out in the research that individual cognition has a positive impact on individual behavior, and through system dynamics simulation, it is verified that knowledge innovation ability has a positive impact on postgraduate knowledge innovation performance. Through the above scholars' research, it can be considered that the postgraduate knowledge innovation ability has an important influence on the postgraduate knowledge innovation behavior, and the following assumptions are made about the relationship between the two:

H3: Postgraduate knowledge innovation ability has a significant positive impact on graduate knowledge innovation behavior

(4) The mediating effect of graduate students' knowledge innovation ability

According to the ternary cognitive theory, the environment can influence the behavior through individual cognition. It can be considered that the individual cognition plays a certain intermediary role between the environment and the behavior. Combined with the existing research, we can think that the postgraduate knowledge innovation ability has a certain intermediary role between the teacher-student matching relationship and the postgraduate knowledge innovation behavior, and makes the following assumptions:

H4a: Postgraduate knowledge innovation ability has a significant intermediary role between teacher-student identical matching and postgraduate knowledge innovation behavior

H4a: Postgraduate knowledge innovation ability has a significant intermediary between teacher-student complementarity and postgraduate knowledge innovation behavior

## **4. The Data and the Method**

### **4.1 Sampling and Data Collection Procedures**

Since it takes a process from undergraduate to graduate study, and knowledge innovation also takes time, the article is based on graduate students enrolled in 2015 and before. The above groups and tutors have long-term interaction, and whether teachers and students match the measurement. More accurate, in addition, most of the graduate students enrolled in 2015 and before have been engaged in knowledge innovation activities for a period of time, and the performance of graduate knowledge innovation can also be measured. At the same time, the study also controls the gender of the subjects, school categories, subject background, degree categories, etc., to guarantee the reliability and comprehensiveness of the research samples.

## 4.2 Measures

The measurement of the variables in this study mainly consists of four aspects, namely, the measurement of basic information of graduate students, the measurement of teacher-student matching relationship, the measurement of innovative self-efficacy and the measurement of graduate knowledge innovation performance. The basic information includes basic information such as the gender, age, subject category, school category, year of enrollment, and degree category of the graduate student. In the measurement of the other three variables, this study draws on the existing maturity scale and makes minor adjustments in combination with the contents of this study to develop a measurement scale for each variable in this study. According to O'Reilly et al. [21], Cable et al. [22], Zhang Lin et al. [13], the identical matching is set to 7 items such as "I am conducting research and my tutor's research content is consistent"; Cable et al. [22], Weber et al. [23] set complementarity matching to 8 items such as the knowledge taught by the instructor to meet my knowledge learning needs; according to Zhou et al. [24], the knowledge innovation ability was set to "I There are four items such as strong knowledge retrieval and discovery ability; according to Scott et al. [2], the knowledge innovation behavior is set to six items such as "I always seek new theories, techniques and methods".

## 4.3 Reliability and Validity Test

Using the SPSS19.0 software to test the reliability and validity of the questionnaire, the following table can be obtained:

Table 1. Factor loading, Cronbach's  $\alpha$  coefficient for this study

Variable	Code	Factor loading	Cronbach's $\alpha$	
TFCM	Q1	0.861	0.948	
	Q2	0.762		
	Q3	0.613		
	Q4	0.783		
	Q5	0.775		
	Q6	0.805		
	Q7	0.790		
	Q8	0.817		
	Q9	0.686		
	Q10	0.775		
TSCM	Q11	0.733	0.934	
	Q12	0.757		
	Q13	0.715		0.961
	Q14	0.805		
	Q15	0.749		
	Q16	0.896		
KIA	Q1	0.872	0.907	
	Q17	0.879		
	Q18	0.895		
	Q19	0.820		
	Q20	0.906		
KIB	Q21	0.891	0.935	
	Q22	0.863		
	Q23	0.897		
	Q24	0.843		

It can be seen from the above table that the Cronbach's  $\alpha$  coefficient of the measurement scale of this study is above 0.9, indicating that the reliability of the measurement scale of this study is very

good. The factor load of each variable measurement item is greater than 0.5, indicating that the validity of the measurement scale of this study is reliable.

## 5. Results and Analysis

### 5.1 Descriptive Statistical Analysis

The questionnaire was obtained by means of a web platform (questionnaire star) and distributed to the research subjects through online channels. This research questionnaire mainly sends questionnaire links to graduate students of various universities to realize the issuance and recovery of questionnaires. The issuance and collection of the questionnaire began on April 1, 2017 and ended on May 15, 2017. The period was set at one and a half months. A total of 325 questionnaires were collected, excluding the obvious regularity and the brief duration of the answer. Questionnaires, a total of 253 valid questionnaires were obtained, and the questionnaire recovery rate was 78%.

Table 2. Demographic characteristics

Variable	Category	Frequency	Percentage (%)
Gender	Male	128	50.6
	Female	125	49.4
Age range	Under 20	3	1.1
	21-30	237	93.6
	31-40	9	3.5
	40 Above	4	1.8
Subject classification	Literature	126	49.8
	Philosophy	127	50.2
School types	Key university	122	48.2
	General university	131	51.8
	Academic master	149	58.9
Degree category	Professional master	71	28
	Ph.D	33	13.1

It can be seen from the above table that the proportions of the sample gender, subject category, and school category in this survey are all close to 1:1, indicating that the survey object of the questionnaire is comprehensive and representative. In addition, the age of the survey subjects is mainly concentrated in the two stages of 20-30 years, which are consistent with the age distribution of graduate students in colleges and universities, further illustrating the reliability of the questionnaire survey samples.

### 5.2 Correlation Analysis

Correlation analysis of the variables of this study using SPSS19.0 software can be found in the following table:

Table 3. The Pearson correlation tests between studying variables

	TSIM	TSCM	KIA	KIB
TSIM	1			
TSCM	0.039	1		
KIA	0.526***	0.631***	1	
KIB	0.558***	0.660***	0.841***	1

It can be seen from the above table that there is a significant correlation between the teacher-student matching relationship and the postgraduate knowledge innovation ability and knowledge innovation behavior, indicating that regression analysis can be performed between the variables of this research.

### 5.3 Hypothetical Verification

Using SPSS19.0 software, regression analysis is carried out on the relationship between teacher-student consistency, teacher-student complementarity, knowledge innovation ability and knowledge innovation behavior. The results are as follows:

Table 4. Summary of regression analysis results

Types	Variable	KIB						KIA		
		Model						Model		
		M0	M1	M2	M3	M4	M5	M0''	M6	M7
CV	Gender	0.713**	0.437*	0.26	-	-	-0.05	0.713**	0.583**	0.431*
	Under age 20	0.42	-	0.05	0.299	0.12	0.175	0.42	-0.313	-0.173
	Age from21-30	0.302	-	0.27	-	-	-	0.302	0.318	0.546
	Age from31-40	0.893	-	-0.51	-	-	-	0.893	-0.413	-0.107
	Above age 40	0.107	0.272	0.186	-	-0.03	-0.04	0.107	0.383	0.314
	Subject category	-0.053	0.084	0.174	0.002	0.044	0.082	-0.053	0.051	0.128
	Academic master	0.001	-	-	-	-	-	0.001	0.034	0.054
	Professional master	-0.503	0.555	0.916	0.225	0.513	0.648	-0.503	0.053	0.372
IV	TSIM		0.594***			0.209**			0.488***	
	TSCM			0.668***			0.265***			0.559***
MV	KIA				0.891***	0.788***	0.720***			
R <sup>2</sup>		0.199	0.379	0.501	0.721	0.747	0.761	0.159	0.362	0.462

From the table above:

(1) It can be viewed on the above model M1 that the coefficient of teacher-student identical matching is 0.594, and it is significant at the 0.001 level. The model R2 value indicates that teacher-student identical matching has a significant positive impact on graduate knowledge innovation behavior, assuming H1a got support. According to the model M2, the coefficient of complementarity matching between teachers and students is 0.668, and it is significant at the 0.001 level. The model R2 value is 0.501, which indicates that the regression results are reliable. This demonstrates that the complementary matching between teachers and students has a significant predictive effect on graduate knowledge innovation behavior. Therefore, it assumes that H1b is supported.

(2) According to the model M6 in the table, the coefficient of teacher-student identical matching is 0.488, and it is significant at the 0.001 level, and the model R2 value is 0.362. It can be seen that the teacher-student consistency match have the knowledge innovation behavior of graduate students. A better predictive effect, that is, teacher-student identical matching has a significant positive impact on graduate knowledge innovation behavior, assuming H2a is supported. In the same way, it can be seen from M7 that the coefficient of complementarity matching between teachers and students is 0.559, and it is significant at the 0.001 level. The R2 value of the model is 0.462. It can be possible to conclude that the complementarity of teachers and students is better for graduate students' knowledge innovation ability. The predictive role indicates that the complementarity between teachers and students has a significant positive impact on the ability of graduate students to innovate. That is, H2b is supported.

(3) According to the model M3 in the table, the coefficient of graduate knowledge innovation ability is 0.891, and the value of 0.001 is significant, and the model R2 value is 0.721. It can be seen that the graduate knowledge innovation ability have a significant positive prediction on knowledge innovation behavior. The role, that is, the ability of graduate knowledge innovation has a significant positive impact on graduate knowledge innovation behavior, verify hypothesis H3.

(4) Regarding the test of mediating effect, scholars are more commonly used to test the mediating effect as the “three-step test method”. This study will also attempt this method to analyze the mediating effect of graduate students' knowledge innovation ability. Through the analysis of the three models M1, M6 and M4, the consistency of teachers and students has a significant predictive effect on knowledge innovation behavior, and the consistency of teacher and student has a significant predictive effect on graduate knowledge innovation ability. After adding the knowledge innovation ability to the regression model of teacher-student identical matching and knowledge innovation behavior, the model M4 is obtained. According to the model M4, after the mediation variable is added, the teacher-student identical matching and the postgraduate knowledge innovation ability have the graduate knowledge innovation behavior. The significant predictive effect indicates that the knowledge innovation ability has a partial mediating role between the teacher-student identical matching and the graduate knowledge innovation behavior, assuming that H4a is supported. In the same way, according to the three models of model M2, M7, and M5, graduate knowledge innovation ability plays a part in mediating the complementarity between teachers and students and the postgraduate knowledge innovation behavior, that is, H4b is supported.

## **5.4 Discussion and Implications**

Combined with the empirical results of the previous section, we will discuss how to improve the performance of graduate knowledge innovation by cultivating the three levels of postgraduate training units, postgraduate tutors and postgraduate students.

### **5.4.1 Graduate Training Unit Level**

Postgraduate training units should pay attention to the important role of teacher-student matching in postgraduate innovation. In the process of postgraduate training, the role of the tutor is not negligible. A good teacher-student relationship is necessary to promote postgraduate knowledge innovation. Through the above research, it can be found that the degree of consistency between the goals and values of graduate students and tutors have a significant positive impact on the knowledge innovation behavior of graduate students. In the process of assigning graduate students and tutors, the training unit should consider whether the goals, values, and personality of the two are matched as important considerations. In addition, the study also found that the complementarity of the ability and demand between the tutor and the graduate student has a significant positive effect on the postgraduate knowledge innovation behavior, which requires the training unit to take this as a match between the two. One of the important matching factors.

### **5.4.2 Graduate Tutor Level**

The instructor plays a critical role in the process of cultivating graduate knowledge. In the two-way selection process between graduate students and tutors, the instructors also need to take the initiative, and combine the needs of the research content and the situation of graduate students to choose. The consistent matching in the teacher-student matching relationship cannot be changed in the later stages such as goals and values, and the complementarity matching in the three aspects of ability matching, demand matching and emotional matching in the teacher-student matching relationship can be enhanced later. Therefore, in the process of guiding graduate students, instructors need to arrange their scientific research tasks according to their own abilities and strengths, and pay attention to the needs of graduate students in the process of learning and knowledge innovation, and provide them with opportunities and conditions to achieve their goals.

### 5.4.3 Personal Level of Graduate Students

As a subject of cultivation, graduate students' own role cannot be ignored. First of all, before choosing a tutor, graduate students should not only understand the research content that the tutors are engaged in, but also the factors such as the personality characteristics and guiding style of the tutors, and choose the tutors that match their own situation. Don't blindly follow, you must decide on whether your ability and needs match the research content of the instructor, which is very important for the next study and research of graduate students.

## 6. Conclusion

Through reviewing and combing the relevant research on postgraduate knowledge innovation, this paper introduces the related research of human and organizational matching, introduces the matching theory model, and constructs the theoretical model of this research by combining ternary theory, and proves the teacher-student matching through empirical research. Postgraduate knowledge innovation ability and knowledge innovation behavior have significant predictive effects. Further analysis shows that the postgraduate knowledge innovation ability plays a part in mediating between the teacher-student matching relationship and the postgraduate knowledge innovation behavior. However, the article only studies from the perspective of graduate students. In the future, we can study the influence of teacher-student matching on students' innovation.

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