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RESEARCH ON THE IMPACT MECHANISM OF POSTGRADUATES' INNOVATION PERFORMANCE BASED ON SOCIAL COGNITIVE THEORY

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Abstract

Innovation is increasingly valued by various countries. In China, innovation driven development is widely recognized. Innovation cannot do without talent, so graduate education has received attention and importance from the whole society. The country has also introduced relevant policies to support the development of graduate education, such as expanding the number of graduate students and improving the quality of training. Mentors should play a positive role in improving the quality of graduate education. In China, scholars have studied various guidance styles of mentors, and transformational mentors have been recognized by some scholars for their positive impact on postgraduate innovation. This article conducts an empirical study from the perspective of leadership on whether transformational mentors can affect postgraduate innovation performance and their influencing mechanisms. Through research, it has been found that various traits of transformational mentor leadership have a positive impact on postgraduate innovation performance, and the mediating effect of team atmosphere and innovation self-efficacy has also been verified.

Keywords: Innovation Performance, Transformational Leadership, Team Atmosphere, Self-Efficacy.

1. INTRODUCTION

1.1 Introduction to research background

With the deepening development of a new round of technological revolution and industrial transformation, graduate education has played a positive role in cultivating innovative talents and improving innovation capabilities. According to data released by the Chinese Ministry of Education, since the new era, more than 780 graduate training units in China have trained over 600,000 doctoral students and over 6.7 million master's students. These high-level talents, especially those in short supply, are of great significance for the development of society and economy.

Universities are also actively responding, encouraging mentors to lead graduate students in scientific research exploration, adhering to innovation management, and creating a good innovation atmosphere, in order to better play the role of technological innovation in supporting and promoting high-quality development. From the annual reports on the quality of graduate education released by various universities, it can be seen that both in terms of quantity and quality, graduate education is improving year by year. Especially in terms of innovation performance, various universities are striving to improve their effectiveness through various methods.

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1.2 Problem Description

Despite the rapid development of graduate education in China and the active role played by graduate students in scientific research and innovation, it cannot be denied that the quality of graduate education still needs to be further improved. At present, graduate students in China are divided into two categories: academic and professional. Regardless of the type, the cultivation quality of academic and practical innovative talents is highly valued. Therefore, postgraduate innovation has become a research hotspot. The important role of mentors in postgraduate innovation has led many researchers to focus on influencing factors and mechanisms.

1.3 Research Gap

Chinese scholars have conducted less research on the impact mechanism of postgraduate innovation performance, and more attention has been paid to the influence of mentors on postgraduate innovation behavior (Peng, 2021; Zhang, 2018) [1] [2], and the influence of mentors on graduate creativity and innovation ability (Jia, 2017; Zheng & Lu, 2021) [3] [4].

Chinese scholars also attach great importance to studying the influence of mentors on graduate students, but mainly focus on analyzing various guidance styles, with very little involvement in mentor leadership. This article analyzes the impact of different traits of mentors on postgraduate innovation performance from the perspective of leadership. Through literature review, it was found that transformational mentors have a positive impact on postgraduate innovation compared to other styles of mentors. However, in terms of the number of papers, there is still little research on transformational mentors, and many influencing mechanisms are still unknown.

In addition, there are still differences in the development of various provinces and autonomous regions in China, so regional economic development factors should be considered in research. This article focuses on graduate students in Guangxi, attempting to identify methods to improve innovation performance through research.

2. LITERATURE REVIEW

2.1 Theoretical Basis

This study is based on social cognitive theory. The social cognitive theory was proposed by Bandura, which includes the triadic interactive determinism, observational learning, and self-efficacy theory (Bandura, 1977) [5]. According to the ternary interaction determinism, individual behavior is influenced by both internal factors and external environment. The relationship between internal factors, external environmental influences, and individual behavior is interrelated and interactive (Bai, 2021) [6]. Observing learning is the most common way of acquisition. Individuals can decide whether to use it as a model by observing and learning from the behavior of others (Yan, 2020) [7]. Graduate students are clearly greatly influenced by their mentors and teams during the learning process. Self-efficacy is an individual's belief in their potential abilities, which may not necessarily be equal to their actual

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abilities, but rather the belief that they can achieve goals beyond their actual abilities. The theory of self-efficacy has developed innovative self-efficacy in the field of innovation, which is of great significance for innovation. Only by believing that one can innovate can one have more motivation to implement innovative behavior.

2.2 Variables

Based on the above review, this article believes that the internal factors that enable the implementation of postgraduate innovation behavior are the belief in innovation, and the external factors are the guidance of mentors and team atmosphere. This article ultimately determines that the independent variable is transformational mentor leadership, the dependent variable is postgraduate innovation performance, and there are two mediating variables: team atmosphere and innovative self-efficacy. Postgraduate innovation performance refers to the various academic achievements obtained by graduate students, as well as the various academic literacy and innovation abilities cultivated in the process of learning and research. Transformational mentor leadership refers to the transformational leadership traits possessed by mentors, which can promote the innovation performance of graduate students. A graduate team refers to a certain number of teams led by mentors or jointly working on a project. In this team, graduate students trust and support each other under the guidance of their mentors, forming a certain atmosphere that is conducive to innovation. Innovation self-efficacy is a reflection of self-efficacy in the field of innovation, which can promote individual innovation.

3. RESEARCH HYPOTHESES AND THEORETICAL MODELS

3.1 Relationship between variables and research hypotheses

(1) Graduate education requires transformational mentors (Tahernejad, 2012) [8], as they can promote postgraduate innovation. Chinese scholars have developed four widely recognized measurement dimensions based on the existing research on transformational leadership, starting from the Chinese context. According to empirical research by scholars, all four dimensions of transformational leadership have an impact on postgraduate innovation (Xu, 2018) [9], although the degree of influence varies among each dimension. Therefore, this article proposes the first research hypothesis.

H1: The leadership of transformational mentors has a positive impact on the innovation performance of graduate students.

(2) Transformational mentor leadership can create a good team atmosphere (Jia, 2019) [10], promote members to study and research seriously, and actively innovate towards common goals. The four dimensions of leadership in transformational mentors also have a positive impact on team atmosphere (Zhang, 2018) [11], because under the guidance of mentors, members are more willing to share knowledge, dare to propose innovative ideas, and implement innovative behaviors. This creates a good team atmosphere, and conversely, a good team atmosphere will also promote innovation among members.

H2: Transformational mentor leadership has a positive impact on team atmosphere.

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(3) In a team with a good atmosphere, team members can trust and support each other, thereby generating more confidence and beliefs (Zhang, 2021) [12]. There are many dimensions for measuring team atmosphere, and the following three factors have been proven to have a significant impact on innovation: trust, identification, and innovation.

H3: Team atmosphere has a positive impact on innovative self-efficacy.

(4) Innovative self-efficacy is not about recognizing one's actual abilities, but about believing in one's potential for innovation and believing that one can achieve innovative results through hard work. The path of scientific research is often winding, and graduate students with strong innovative self-efficacy can maintain their enthusiasm for innovation for a longer period of time and achieve innovative results (Peng, 2021) [13]. Self-efficacy is usually a single dimension that includes three items, while the measurement dimensions of innovative self-motivation are also relatively scattered. This article selected three dimensions that were chosen by relatively more people and validated.

H4: Innovation self-efficacy has a positive impact on graduate student innovation performance.

(5) Based on social cognitive theory, individual behavior is influenced by both internal factors and external environment. Therefore, this article proposes a chain mediated effect between the independent variable and the dependent variable.

H5: Transformational mentor leadership can have a positive impact on graduate student innovation performance through team atmosphere and innovative self-efficacy.

3.2 Theoretical Model Construction

Based on the literature review and analysis above, this article constructs a theoretical model, as shown in Figure 3.1.

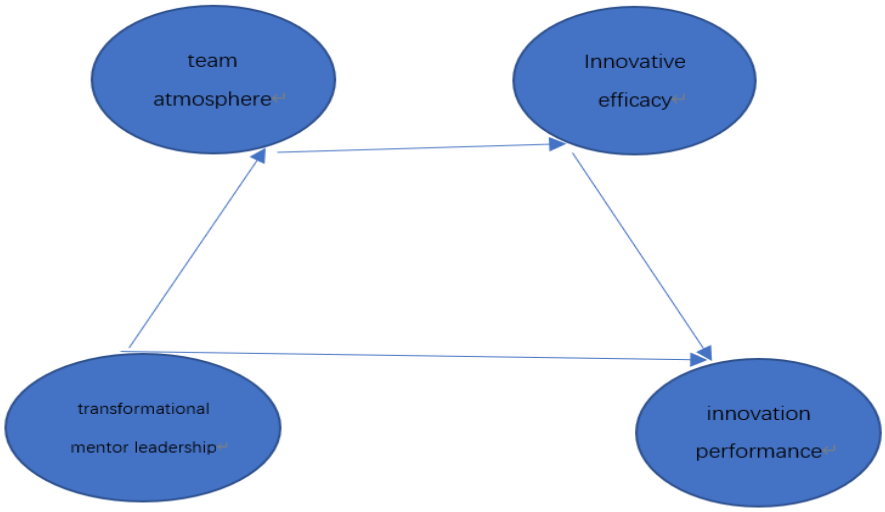

Figure 3.1: Theoretical Model

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4. QUANTITATIVE ANALYSIS

1) Firstly, determine the survey questionnaire. This article selected a mature scale with high reliability and validity to develop the survey questionnaire for this study, and conducted a content reliability test.

2) Next, the reliability and validity of the questionnaire will be tested. This article analyzed the variables studied using SPSS 24. From the analysis results, it can be seen that the CITC of each item is greater than 0.5, and the deleted Cronbach's Alpha coefficient of reliability is lower than the original Cronbach's Alpha coefficient, indicating that each item has good internal consistency.

Table 4.1: Analysis of PIP Scale Items

Items	Correction item total correlation (CITC)	Items that have been deleted α coefficient	Cronbach's α
IM1	0.831	0.897	0.922
IM2	0.727	0.918	
IM3	0.813	0.901	
IM4	0.771	0.909	
IM5	0.847	0.895	
IP1	0.731	0.902	0.908
IP2	0.760	0.894	
IP3	0.854	0.859	
IP4	0.830	0.868	
IT1	0.672	0.852	0.873
IT2	0.694	0.848	
IT3	0.714	0.842	
IT4	0.663	0.854	
IT5	0.767	0.832	
IR1	0.782	0.852	0.887
IR2	0.711	0.867	
IR3	0.710	0.867	
IR4	0.740	0.860	
IR5	0.700	0.870	

Table 4.2: Analysis of TML Scale Items

Items	Correction item total correlation (CITC)	Items that have been deleted α coefficient	Cronbach's α
MC1	0.798	0.878	0.906
MC2	0.717	0.896	
MC3	0.776	0.883	
MC4	0.727	0.894	
MC5	0.809	0.876	
PC1	0.697	0.882	0.895
PC2	0.682	0.887	
PC3	0.876	0.843	
PC4	0.719	0.877	
PC5	0.751	0.870	

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VM1	0.684	0.886	0.896
VM2	0.753	0.871	
VM3	0.680	0.886	
VM4	0.742	0.873	
VM5	0.866	0.846	
MM1	0.725	0.876	0.895
MM2	0.847	0.850	
MM3	0.744	0.872	
MM4	0.736	0.875	
MM5	0.673	0.887	

Table 4.3: Analysis of TA Scale Items

Items	Correction item total correlation (CITC)	Items that have been deleted α coefficient	Cronbach's α
TT1	0.748	0.857	0.886
TT2	0.865	0.827	
TT3	0.733	0.861	
TT4	0.727	0.861	
TT5	0.563	0.896	
TI1	0.784	0.903	0.919
TI2	0.858	0.888	
TI3	0.702	0.918	
TI4	0.859	0.889	
TI5	0.767	0.907	
TIN1	0.686	0.873	0.889
TIN2	0.727	0.868	
TIN3	0.635	0.881	
TIN4	0.739	0.865	
TIN5	0.728	0.867	
TIN6	0.729	0.866	

Table 4.4: Analysis of ISE Scale Items

Items	Correction item total correlation (CITC)	Items that have been deleted α coefficient	Cronbach's α
ISB1	0.859	0.873	0.911
ISB2	0.687	0.910	
ISB3	0.718	0.903	
ISB4	0.869	0.871	
ISB5	0.751	0.896	
IPB1	0.721	0.862	0.886
IPB2	0.696	0.868	
IPB3	0.714	0.864	
IPB4	0.710	0.865	
IPB5	0.786	0.847	
AEB1	0.878	0.863	0.907
AEB2	0.767	0.889	
AEB3	0.738	0.894	
AEB4	0.760	0.889	
AEB5	0.713	0.898	

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After conducting KMO and Bartlett tests, it was found that the sample data can be subjected to factor analysis.

Table 4.5: Test of KMO & Bartlett

KMO Measure of Sampling Adequacy		0.754
Bartlett's test of sphericity	Approximate chi square	6426.785
	df	2415
	P-value	0.000

(3) Finally, conduct formal research and analysis. This study focuses on in-service graduate students from some universities in Guangxi, China. After a small sample prediction, the questionnaire was officially distributed. Through the online platform, a total of 120 questionnaires were distributed and 109 were collected. After excluding invalid questionnaires, 98 valid questionnaires were obtained, with a response rate of 81.67%. After conducting statistical analysis, it was found that the gender comparison of sample size was 55.1% and 44.9%, respectively.

The proportion of third grade students in the sample is 38.78%, first grade students are 33.67%, and second grade students are 27.55%. From the distribution of professional categories, the proportion of engineering majors is 66.33%. From the perspective of the size of the team where the sample is located, teams with more than 10 people account for 38.78%, teams with 7-10 people account for 26.53%, and others account for 34.69%.

Subsequently, structural equation modeling evaluation and analysis were conducted on the sample data, including model fit R2, predictive correlation index Q2, collinearity diagnosis VIF, model fit SRMR, path size significance, effect size ($f2$), and Bootstrap mediation test. It was found that all hypotheses were valid and the chain mediation effect was significant.

5. CONCLUSION

5.1 Research Results

This article focuses on the research questions of national needs and university policies. Through literature review and theoretical foundation, this article constructs a theoretical model and proposes five hypotheses. Based on the analysis results of quantitative research, the research conclusions are shown in Table 4.1.

Research has shown that transformational mentor leadership has a positive impact on postgraduate innovation performance, transformational mentor leadership has a positive impact on team atmosphere, team atmosphere has a significant impact on innovation self-efficacy, and innovation self-efficacy has a significant promoting effect on postgraduate innovation performance.

Meanwhile, the chain mediation effect is also established. The influence of the independent variable on the dependent variable becomes stronger through chain mediation.

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Table 4.6 Research Conclusion

Research Hypothesis	Inspection Results
H1: The leadership of transformational mentors has a positive impact on postgraduates' innovation performance.	accepted
H2: Transformational mentor leadership has a positive impact on team atmosphere.	accepted
H3: Team atmosphere has a positive impact on innovative self-efficacy.	accepted
H4: Innovative self-efficacy has a positive impact on postgraduates' innovation performance.	accepted
H5: Transformational mentor leadership can have a positive impact on postgraduates' innovation performance through team atmosphere and innovative self-efficacy.	accepted

5.2 Theoretical and practical contributions

This study has certain innovations in both theoretical and practical aspects. In terms of theoretical innovation, the impact of mentors on postgraduate innovation performance was studied from the perspective of leadership, and a theoretical framework was constructed. In terms of practical innovation, in-depth research has been conducted on graduate students from some universities in Guangxi, and the level of relevant variables has been evaluated, which can provide a basis for universities to formulate policies.

5.3 Research Prospects

This study only focuses on the impact of mentors with transformational leadership traits on innovation performance, and further research can be conducted on mentors with other traits in the future. The research subjects also have certain limitations. In the future, we can expand to other regions and pay attention to the differences in different sample categories. Finally, more variables can be introduced to explore the impact mechanism more comprehensively.

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