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An Empirical Study on Research Feeding Teaching in Private Universities from the Perspective of New Quality Productivity

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Abstract: *In the era of "new quality productivity", private colleges and universities are faced with the dual challenges of improving the quality of running schools and the level of scientific research, and research feeding teaching has become the key path to promote the sustainable development of schools. In this paper, Geely University is selected as the research scope, aiming to explore the path of scientific research feeding teaching and the factors affecting the effectiveness of scientific research feeding through studying the mode of scientific research feeding in private universities. This paper combined qualitative and quantitative research methods, determined research variables by literature method, distributed gradient questionnaires to 2,000 students by random sampling method to obtain data, and used SPSS26 for data analysis. The results show that the cultivation of comprehensive literacy in scientific research education feeds effect through the positive influence of scientific research experience, and the mediating effect of scientific research experience is as high as 96.23%. This study believes that the teachers' teaching evaluation system, time management ability and reality fit degree are the key factors and priorities that affect the realization of scientific research feedback effect in private universities.*

Keywords: *Private Colleges and Universities; Research Feeds Teaching; Geely University of China*

1. Introduction

Scientific research feedback teaching oriented to cultivating new talents is one of the important strategic tasks of rejuvenating the country through science, education and talents. At present, the requirements for scientific research feedback teaching are becoming more and more stringent with the progress of the times, which is specifically manifested in the diverse interactions of various subjects in colleges and universities. The balance between scientific research and teaching is its core feature, but in private colleges and universities, the overall effectiveness still has room for improvement. As an important part of my country's higher education, private colleges and universities play a role of inheriting the past and ushering in the future in the higher education system, and their status and role cannot be underestimated. As a leading school of private education, Geely College has excellent faculty and scientific research platforms. It is vigorously exploring the model of scientific research feedback education, providing a steady stream of university wisdom and university solutions for the high-quality development of education.

Based on the above background, this study is committed to improving the system and mechanism of scientific research feedback teaching, exploring the strong and weak relationship between scientific research and teaching in private colleges and universities and the specific feedback path, and exploring the matching plan of talent training plan with social needs. This study focuses on Geely College and uses a combination of qualitative and quantitative methods to conduct research. First, the research framework is constructed, and variables are determined through literature reading. Then, data is obtained by distributing scale questionnaires. SPSS26 is then used to test the reliability and validity of the data obtained from the questionnaires, perform correlation analysis, principal component analysis, and mediating effect analysis. Finally, conclusions and suggestions are put forward based on the results of empirical analysis.

This study not only enriches the connotation and extension of scientific research feedback teaching in theory, and contributes new ideas and methods to the development of higher education management

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theory; but also provides effective solutions to solve practical problems in the integration of scientific research and teaching in private universities in practice. It is of great significance to improve the quality of higher education in my country and promote the connection between talent training and social needs.

2. Literature Review

2.1. Related Concepts

New-quality productivity is an advanced productivity driven by innovation. It requires the cultivation of "new-quality talents", that is, high-quality workers who can promote the development of productivity and realize their own value[1]. The cultivation of such talents requires the support of high-level educators and the innovation of universities in the scientific research and education system, which closely integrates new-quality productivity with universities. In this context, the difference between scientific research education and feedback is particularly important. Scientific research education focuses on topics and experiments, requiring students to have psychological endurance and hands-on ability, while scientific research feedback requires the use of scientific research resources to enrich teaching content[2] and improve students' creativity and practical ability. This model cultivates "new-quality talents" who promote social progress by stimulating students' interest and forms a positive interaction between students, teachers, universities and society.

Scientific research and education should complement each other in talent cultivation. Education is the core work of universities, and scientific research provides support for it. At the undergraduate stage, although scientific research activities are not the focus, they help improve students' comprehensive quality, which is in line with the high-quality education goals in the "14th Five-Year Plan"[3]. Universities can maintain a balance between science and education, improve teaching efficiency and quality, and cultivate diversified compound talents. However, there is a certain problem of "focusing on scientific research and neglecting education" in my country's colleges and universities. Due to the late start or insufficient investment of private colleges and universities, the effect of scientific research feeding back to teaching is limited[4]. As society's requirements for talents increase, the problem is becoming increasingly prominent. The path to achieving a balance between science and education will be the focus of this article.

2.2. Theoretical Basis

The theory of higher education provides the basic framework for this topic, believing that scientific research and teaching are the dual pillars for universities to achieve their educational mission, and the two complement each other. Zhang Xianli (2007) believes that scientific research provides academic achievements and cutting-edge knowledge, updates teaching content and methods, and thus improves teaching quality[5]; Gu Mingxia and Bao Jihua (2014) further believe that "scientific research feeding back to teaching" helps to make up for the shortcomings of teaching and achieve the coordinated development of science and education[6]; Cai Jinyan (2018) emphasizes that integrating scientific research results and thinking into education helps students understand and apply knowledge, and cultivates scientific research literacy and professional spirit[7]. This concept emphasizes the deep integration of scientific research and teaching, which is not only a process of knowledge transfer, but also a process of cultivating values and thinking patterns. The integration of science and education is not only a process of knowledge transfer, but also a process of cultivating thinking patterns and values, which provides an analytical framework for exploring the scientific research feeding back teaching mechanism of private universities.

Scientific research management theory provides a basis for optimizing scientific research activities to enhance the feedback effect of teaching. Song Jingang et al. (2020) pointed out that scientific research feedback to teaching is the key to improving the quality of education and promoting the comprehensive development of universities. Optimizing scientific research management can provide high-quality scientific research results and promote the renewal of education[8]. Chen Baiman and Lin Yousheng (2021) further pointed out that high-level teacher construction and application-oriented talent training rely on scientific research feedback to teaching[9]. Under this framework, through resource allocation and achievement transformation, the interaction mechanism between science and education can be optimized, the teaching quality and scientific research experience can be improved, and the feedback effect can be enhanced.

The theory of knowledge innovation provides a theoretical basis for understanding how scientific

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research activities feed back into teaching, emphasizing that scientific research is the source of knowledge innovation. Wang Zhenglu and Zhang Bo (2018) proposed that the core of scientific research feeding back into education is the accumulation and transformation of scientific research resources[10]; Li Na (2021) pointed out that by utilizing the technological advantages and multi-dimensional scientific research platforms of colleges and universities, scientific research integration can be achieved, and students' innovation capabilities can be improved[11]. Liu Yurong and Hu Rong (2022) believe that scientific research resources should serve teaching and promote the transformation of scientific research results into teaching through the integration of scientific research resources[12]. In summary, teaching content should be updated through scientific research transformation, teaching progress should be promoted through scientific research, and students' learning experience should be improved through practice.

3. Research Design

3.1. Variable Selection

Based on the above literature, this study (Table 1) selected learning attitude, teaching effect, scientific research resources, scientific research effectiveness, and balance between science and education as independent variables; scientific research experience as a mediating variable to measure the impact of scientific research on teaching content and methods; the dependent variable feedback effectiveness is used to measure the ultimate impact of scientific research on teaching.

Table 1: Variable Design.

Variable			Variable Dimension
Independent variable	Learning attitude	A	Professional achievement(A1), Research focus(A2), Research goal positioning(A3), Time management ability(A4)
	Teaching effect	B	Teaching satisfaction(B1), Teacher-student relationship(B2), Research guidance(B3), Research feeding Teaching degree(B4)
	Scientific research resources	C	Research culture(C1), Research strength(C2), Research achievements(C3)
	Scientific research value	D	The degree of correlation between scientific research and profession(D1), The effect of scientific research input-output(D2), Ability cultivation(D3), The degree of realistic fit(D4)
	Balance between science and education	E	Students' scientific research premise(E1), Students' scientific research participation(E2), Teachers' subject-teaching balance ability(E3), Teachers' teaching quality evaluation system(E4)
Intermediate variable	Scientific research experience	F	-
Dependent variable	Refeeding effect	G	-

3.2. Research Hypothesis

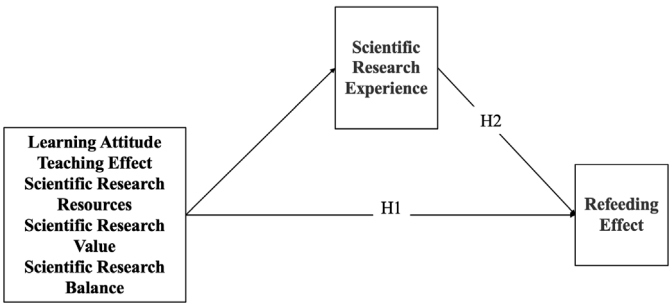

Figure 1: Research hypothesis.

According to figure 1, this study proposes the following 2 hypothesis. H1: Learning attitude, teaching

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effect, scientific research resources, scientific research value and scientific research balance positively affects the refeeding effect. H2: Learning attitude, teaching effect, scientific research resources, scientific research value and scientific research balance positively influence the refeeding effect through scientific research experience.

3.3. Data Acquisition and Analysis Methods

This paper designs a scale questionnaire based on the variable dimension to obtain data. The random sampling method is used to distribute it to a total of 2,000 students from different colleges and majors in the whole school. The research subjects have large differences in age and majors to ensure that the data acquisition is more extensive and comprehensive. However, since the questionnaire is filled out online, there may be a certain degree of deviation in the sample and data of the study. The missing values are filled in the data preprocessing process by the difference method.

For the acquired data, the reliability and validity of the questionnaire data are first verified by the reliability and validity test; secondly, the potential correlation of each variable dimension is explored through correlation analysis; then the main factors are extracted through principal component analysis to simplify the data structure while retaining most of the information of the original data; finally, the mediation effect regression analysis is used to test the mediating role of scientific research experience between the independent variable group and the feedback effectiveness.

4. Research Results

4.1. Reliability and Validity Test

Table 2: Reliability and Validity Test Results.

Klonbach Alpha		0.950
KMO Sampling Suitability Measure		0.762
Bartlett's Test of Sphericity	Approximate Chi-square	785.865
	Degree of Freedom	210
	Significance	0.000

The reliability analysis results (Table 2) show that the questionnaire data in this article has high reliability. The overall consistency is as high as 0.950. The questionnaire data accurately measures the variables under study and has high consistency, and the reliability test passes. From the validity analysis results, it can be found that the overall research validity of the questionnaire is relatively high. Specifically, the KMO value is as high as 0.762. At the same time, the Bartlett sphericity test has high significance ($p<0.01$), and other data can directly prove that the questionnaire data is suitable for factor analysis.

4.2. Correlation Analysis

Table 3: Correlation Analysis Results.

	A	B	C	D	E	F	G
A	1						
B	.606**	1					
C	.344*	.711**	1				
D	.563**	.810**	.628**	1			
E	.580**	.698**	.418*	.811**	1		
F	.469**	.610**	.334*	.814**	.876**	1	
G	0.246	0.325	0.099	.473**	.650**	.730**	1

This study uses the mean method to process the independent variable group and conducts correlation analysis. The results (Table 3) show that there is a significant positive correlation between the independent variable, the mediating variable, and the dependent variable ($r > 0$, $p < 0.05$), which indicates that the increase in the independent variable shows a consistent trend with the increase in the mediating variable and the dependent variable. This result initially supports the research hypothesis of this article. However, there is also a correlation between independent variables. Before further exploring the specific mechanism and influencing factors of the correlation results, to simplify Variables can be processed by advanced dimensionality reduction.

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4.3. Principal Component Analysis

Table 4: Principal Component Analysis Results.

	(Factor 1)	(Factor 2)	(Factor 3)
Teacher teaching evaluation system	0.888		
Time management ability	0.816		
Realistic fit	0.794		
Ability cultivation	0.762		
Teachers' ability to balance science and teaching	0.69		
Orientation of scientific research objectives	0.679		
Student participation in scientific research	0.676		
Scientific research guidance	0.636		
The relevance of scientific research to the profession	0.549		
Scientific research strength		0.956	
Scientific research achievement		0.951	
Scientific research culture		0.803	
Professional achievement			0.847
Teacher-student relationship			0.648

In principal component analysis (Table 4), the original variables are effectively summarized into three principal components, which represent the core characteristics of the three dimensions of scientific research education, scientific research strength and cultural construction, and education quality and interpersonal construction. Each principal component contains information on multiple original variables, and each principal component is relatively independent. This processing achieves dimensionality reduction and simplification of data.

4.4. Regression Analysis

As table 5 shown, Model 1 mainly explores the impact of independent variableson scientific research experience. The results show that Factor 1 has a significant positive impact on scientific research experience (Beta=1.3464, P<0.0001), while the impact of Factor 2 and Factor 3 is not significant. The overall fit of the model is high (R square = 0.7702), indicating that Factor 1 is an important predictor of scientific research experience. Model 2 directly analyzes the impact of independent variables on the effectiveness of feedback without considering the mediating effect. The results show that only Factor 1 has a significant positive impact on the effectiveness of feedback (Beta=1.0260, P<0.0001), while Factor 2 and Factor 3 have no significant impact. The model fit is moderate (R square = 0.4008), indicating that Factor 1 is one of the main predictors of feedback effectiveness. Model 3 adds scientific research experience to Model 2 to explore its role between independent variables and dependent variables. The results show that scientific research experience has a significant positive impact on the effectiveness of feedback (Beta=0.8740, P=0.0018). Although the direct effect of Factor 1 is weakened, it is still significant, indicating that scientific research experience plays a partial role in the relationship between Factor 1 and the effectiveness of feedback. The mediating effect and model fitting degree are improved (R square = 0.5651), further verifying the mediating effect of scientific research experience, with the mediating effect accounting for as high as 96.23. Part of the hypothesis H1 is true, so is part of H2.

Table 5: Intermediate Regression Analysis Results.

	Model 1 (F)				Model 2 (G)				Model 3 (G)			
Variable	Beta	P	LLCI	ULCI	Beta	P	LLCI	ULCI	Beta	P	LLCI	ULCI
Constant	7.3611	0.0000	7.0938	7.6284	7.2222	0.0008	6.7761	7.6683	0.7883	0.0000	−3.0657	4.6422
Factor 1	1.3464	0.0000	1.0754	1.6175	1.0260	0.0001	0.5736	1.4785	0.0387	0.043	−0.9544	0.6527
Factor 2	0.2575	0.0618	−0.0135	0.5286	0.0573	0.7981	−0.5098	0.3951	0.2824	0.1745	−0.6968	0.1320
Factor 3	0.1414	0.2958	−0.1296	0.4125	0.0119	0.9575	−0.4644	0.4405	0.1355	0.4935	−0.5345	0.2634
F									0.7333	0.0018	0.3531	1.3950
R square	0.7702				0.4008				0.5651			
F	35.7517				7.1358				10.0711			

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5. Research Discussion

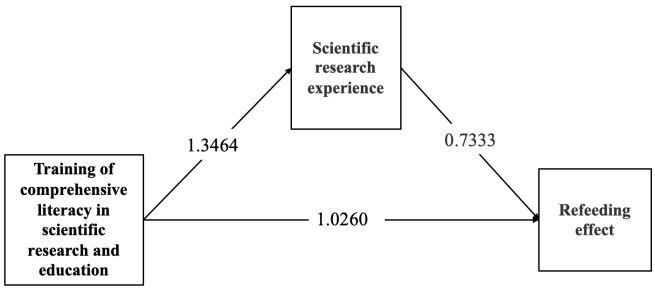

Figure 2: Research achievement.

Research results (Figure 2) show that comprehensive literacy in scientific research education has a positive impact on scientific research experience and feedback effectiveness. The key lies in teaching evaluation, learning balance, reality fit and ability cultivation. Teaching quality evaluation encourages teachers to balance scientific research and teaching to improve the quality of science and education; students' subjective initiative promotes the application of knowledge in scientific research; scientific research combined with practical problems is more effective; scientific research improves comprehensive literacy and forms a closed loop. However, scientific research strength and culture, education quality and interpersonal construction have no significant impact on scientific research experience and feedback effectiveness. The reasons may be that private universities do not pay enough attention to scientific research, have limited funds, imperfect cultural construction, and focus on exam-oriented curriculum. Based on the above issues, this article believes that scientific research education should balance scientific research and teaching, improve comprehensive quality, and enhance social responsibility; increase scientific research incentive mechanisms and optimize teacher course arrangements; strengthen scientific research thinking and method education in the curriculum system, especially in the practical link. , to cultivate students' scientific research interests and skills, promote scientific research to feed education, and cultivate new talents.

6. Conclusion

Based on the perspective of new quality productivity, this paper empirically studies the model and mechanism of scientific research feedback teaching in private universities, reveals that the mediating effect of scientific research experience on the cultivation of comprehensive scientific research education literacy is as high as 96.23%, and proposes key factors such as teacher teaching evaluation system, time management ability, and reality fit. Compared with existing literature, this paper uses a quantitative model to make a breakthrough in refining the influencing mechanism of scientific research feedback effectiveness, but there are deficiencies such as sample limitations. In the future, it is necessary to expand the sample size and deepen the exploration of the path of integration of scientific research and teaching.

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