A Study on the Influencing Factors of Young Teachers' Research-based Teaching Ability in Non-Double First-Class Undergraduate Institutions

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Abstract:*In order to enhance the research-based teaching ability of young teachers at non-Double First-Class undergraduate institutions, this study constructs an index system of influencing factors across three levels: macro-environment, university organization, and individual teachers. The Analytic Hierarchy Process (AHP) is employed to analyze the weight of each factor. The results show that individual-level factors carry the highest weight, among which teaching and research competence, professional attitude, and teaching reflection are the most critical. At the organizational level, faculty training systems and evaluation and recruitment mechanisms exert significant influence. At the macro-environmental level, scientific research conditions and teaching infrastructure are the main contributing factors. Based on these findings, targeted strategies are proposed to provide both theoretical foundation and practical guidance for improving young teachers' research-based teaching ability at non-Double First-Class institutions.*

Keywords: *Non-Double First-Class undergraduate institutions; young teachers; research-based teaching ability; Analytic Hierarchy Process (AHP); influencing factors*

Introduction

China's higher education has fully entered a stage of massification and now ranks first globally in scale[1-2]. According to statistics released by the Ministry of Education in 2019, there are a total of 2,688 regular higher education institutions nationwide, among which only 137 are designated as "Double First-Class" universities. In contrast, 2,551 institutions are categorized as non-Double First-Class, accounting for approximately 95% of the total and forming the main body of China's higher education system. As a vital force in the sector, these institutions have built diversified educational resource systems and fostered inclusive academic environments[3-4]. Grounded in their unique institutional missions, they have developed distinctive academic strengths across various disciplines and demonstrated notable achievements in talent cultivation, research innovation, and community service.

As reforms in higher education deepen, the roles of non-Double First-Class institutions in optimizing educational structures, empowering regional economic development, and training highly skilled applied talents have become increasingly prominent. Their existence and development have not only solidified the foundation of the higher education system but also promoted educational equity by offering diverse learning opportunities, thereby injecting strong momentum into the construction of a high-quality education system.

In recent years, the continued growth in undergraduate enrollment has led to a rising student-teacher ratio and a significant shortage of teaching staff in regular universities. To address this challenge, many institutions have adopted strategies such as recruiting outstanding doctoral graduates or attracting talented young teachers from other universities. While these measures have effectively mitigated the shortage of faculty, many of the newly hired young teachers lack systematic training in pedagogy. Consequently, they often struggle with classroom management, digital literacy in teaching, practical teaching experience, integration of scientific research into teaching, and the development of innovative teaching concepts and models.

Additionally, these young educators frequently encounter difficulties incorporating cutting-edge

academic developments, recent research findings, and real-world applications into classroom instruction. They also tend to have insufficient subject-specific thinking, lack coordination in lesson planning, and fail to incorporate research-based learning elements into teaching and assessment, resulting in limited instructional effectiveness.

Therefore, improving the research-based teaching ability of young university teachers has become a pressing issue for enhancing the quality of higher education and talent development in China.

Young faculty members at non-Double First-Class institutions often face further constraints, such as limited research resources, weak academic foundations, and a lack of external academic support. These challenges make the task of improving their research-based teaching ability even more demanding. Thus, identifying and analyzing the main influencing factors affecting their teaching practices is essential for developing effective strategies.

This paper focuses on the primary influencing factors of young teachers' research-based teaching ability at non-Double First-Class institutions and proposes practical countermeasures. The findings are of great practical importance for enhancing teaching quality and talent cultivation in China's higher education system.

1. The Connotation of Teachers' Research-Based Teaching Ability

Research-based teaching is a student-centered instructional model in which students acquire knowledge and skills through independent inquiry and discovery under the careful organization and guidance of the teacher. During the process, the teacher raises questions that stimulate students' interest in learning. To solve the problems posed by the teacher, students engage in discussion, analysis, and research. The teacher, in turn, provides guidance based on the students' inquiry process, offering appropriate methods and suggestions. After integrating various forms of knowledge, students ultimately reach conclusions. Throughout this process, students' logical thinking, critical thinking, problem analysis and summarization skills, and innovative capabilities are all enhanced.

Research-based teaching emphasizes students' active participation. It focuses not only on the transmission of knowledge but also on the cultivation of students' comprehensive abilities. In this model, the teacher plays multiple roles: lecturer, guide, organizer, and mentor; while students are no longer passive listeners, but active participants, self-directed learners, and problem explorers.

Teachers' research-based teaching ability refers to the comprehensive ability system by which teachers employ scientific methods and advanced concepts in the teaching process, with the goal of fostering students' innovative thinking and problem-solving skills. This ability involves integrating subject knowledge, teaching methods, and research methodologies to guide students in deep learning through autonomous inquiry and collaborative learning. It includes: the ability to integrate one's own disciplinary knowledge and research literacy; the ability to design and implement research-based teaching; the ability to guide and support students effectively; the ability to integrate resources and innovate in evaluation; and the ability to update educational philosophies and research awareness.

The strength of a teacher's research-based teaching ability is directly related to the quality of undergraduate education and the effectiveness of talent cultivation in higher education institutions.

2. Indicator System of Influencing Factors on Teachers' Research-Based Teaching Ability

Establishing an indicator system of influencing factors on teachers' research-based teaching ability is a crucial step toward systematically analyzing the development mechanism of teaching competence, improving the theoretical framework of research-based teaching, accurately identifying gaps in teachers' abilities, and enhancing the overall competitiveness of teacher education. It also serves as a key bridge from "vague understanding" to "targeted action."

To this end, based on preliminary investigations, literature review, and expert consultations [5–9], an indicator system of influencing factors on young teachers' research-based teaching ability at non-Double First-Class undergraduate institutions has been developed. This system consists of three second-level indicators—macro-environment, university organization, and individual teachers—and a total of 15 third-level indicator factors, as detailed in Table 1.

Table 1. Index System of Influencing Factors of Teachers' Research-based Teaching Ability

Target layer	Criterion layer	Indicator layer
First-level indicator	Secondary indicators	Third-level indicators
Influencing factors of research-based teaching ability Z	Macro environment A_1	Educational policies and regulations S1, Socio-economic level S2, Special funds for teaching S3, Scientific research environmental conditions S4, Teaching environmental conditions S5
	University organization A_2	School educational Philosophy S6, Teaching management system S7, Teaching evaluation system S8, Teacher training system S9, Teacher evaluation and appointment system S10
	Individual teacher A_3	Educational attainment S11, Teaching and research ability S12, Professional attitude S13, Teaching Reflection S14, The awareness of autonomous development S15

3. Analysis of the Importance of Influencing Factors on Teachers' Research-Based Teaching Ability

The analysis of the importance of influencing factors on teachers' research-based teaching ability aims to clarify the relative significance of each dimension or indicator that constitutes this ability, thereby providing a basis for building evaluation systems and setting teacher development goals. This type of analysis typically involves determining the weights of each factor, which requires either quantitative or qualitative evaluation methods. Commonly used methods include: the Analytic Hierarchy Process (AHP), the Delphi Method, Principal Component Analysis, Factor Analysis, the Critical Incident Technique, and the Fuzzy Comprehensive Evaluation Method. Based on the preliminary survey data and the strengths and limitations of various analytical methods, this study adopts the Analytic Hierarchy Process (AHP) to calculate the importance of the influencing factors.

3.1 Analytic Hierarchy Process (AHP)

AHP is a systematic analytical method that combines both qualitative and quantitative analysis. It is particularly suitable for determining the weights of indicators in complex ability systems characterized by multiple dimensions, levels, and structures. This method transforms subjective expert judgments into scientifically derived weights by integrating qualitative and quantitative approaches. It simplifies complex problems into hierarchical structures and quantifies qualitative issues, making it ideal for ranking the importance of indicators during the initial phase of evaluation system development.

Accordingly, this study applies AHP by following a series of structured steps: building a hierarchical structure model, defining scales and constructing judgment matrices, calculating eigenvectors and eigenvalues, and conducting consistency tests. These steps decompose complex decision-making problems into manageable hierarchical components and, through quantitative analysis, produce scientifically valid weight values. The method offers several advantages, including systematic organization, hierarchical clarity, simplicity, practicality, flexibility, and reliability [7-10].

3.2 Calculation and Analysis of Indicator Weights

Based on preliminary survey data and expert consultation results, the importance of indicators at both the criterion and sub-criterion levels was compared. An importance scoring table and judgment matrices were created, and the weight values of each indicator were calculated. The basis for the importance scoring is shown in Table 2. The judgment matrices and weight calculation results for the goal and criterion levels are presented in Tables 3 through 6. Using the weight values from Tables 3 to 6, the composite weights and importance rankings of the influencing factors on research-based teaching ability were derived, with the results shown in Table 7.

Table 2．Importance Rating Table

Factor I / Factor j	Quantifiable value	Factor I / Factor j	Quantifiable value
Equally important	1	Strongly important	7
Slightly important	3	Extremely important	9
Strong importance	5	The median value of two adjacent judgments	2、4、6、8

Table 3．Judgment Matrix and Index Weights of the target Layer Z

Z	A_1	A_2	A_3	Weight

A₁	1	1/4	1/6	0.0843
A₂	4	1	1/5	0.2232
A₃	6	5	1	0.6925

Table 4．Judgment Matrix and Index Weights of Criterion Layer A1

A₁	S₁	S₂	S₃	S₄	S₅	Weight
S₁	1	2	1/5	1/7	1/6	0.0563
S₂	1/2	1	1/5	1/8	1/6	0.0403
S₃	5	5	1	1/3	1/2	0.1832
S₄	7	8	3	1	3	0.4658
S₅	6	6	2	1/3	1	0.2544

Table 5．Judgment Matrix and Index Weights of Criterion Layer A2

A₂	S₆	S₇	S₈	S₉	S₁₀	Weight
S₆	1	1/2	1/4	1/7	1/5	0.0472
S₇	2	1	1/3	1/6	1/4	0.0714
S₈	4	3	1	1/4	1/2	0.1565
S₉	7	6	4	1	3	0.4888
S₁₀	5	4	2	1/3	1	0.2361

Table 6．Judgment Matrix and Index Weights of Criterion Layer A3

A₃	S₁₁	S₁₂	S₁₃	S₁₄	S₁₅	Weight
S₁₁	1	1/7	1/5	1/4	1/2	0.0464
S₁₂	7	1	4	3	2	0.4191
S₁₃	5	1/4	1	3	4	0.2650
S₁₄	4	1/3	1/3	1	3	0.1671
S₁₅	2	1/2	1/4	1/3	1	0.1024

Table 7．Weights of each index of the influencing factors of research-based teaching ability

Criterion layer	Weight	Indicator layer	Weight	Sorting
The macro environmental level A₁	8.43%	Educational policies and regulations S₁	0.47%	14
		Socio-economic level S₂	0.34%	15
		Special funds for teaching S₃	1.55%	12
		Scientific research environmental conditions S₄	3.93%	7
		Teaching environmental conditions S₅	2.15%	10
The organizational level of colleges and universities A₂	22.32%	School educational Philosophy S₆	1.05%	13
		Teaching management system S₇	1.59%	11
		Teaching evaluation system S₈	3.49%	8
		Teacher training system S₉	10.91%	4
		Teacher evaluation and appointment system S₁₀	5.27%	6
The individual level of teachers A₃	69.25%	Educational attainment S₁₁	3.21%	9
		Teaching and research ability S₁₂	29.05%	1
		Professional attitude S₁₃	18.36%	2
		Teaching Reflection S₁₄	11.57%	3
		The awareness of autonomous development S₁₅	7.09%	5

As shown in Table 7, the ranking of primary indicators influencing the research-based teaching

ability of young faculty members at non-double-first-class undergraduate institutions is as follows: individual-level factors (A3) > institutional-level factors (A2) > macro-level factors (A1). This indicates that, among the three categories, individual-level factors have the greatest impact on young teachers' research-based teaching ability at such institutions, followed by institutional-level and macro-level factors. It suggests that, in non-double-first-class universities, young teachers' personal initiative serves as the internal driving force for professional development and is the key to overcoming resource limitations. At the same time, institutional design directly affects teachers' motivation to integrate research into teaching. Therefore, it is necessary for universities of this type to optimize internal governance and promote institutional innovation in order to address resource constraints, shift teachers from passive compliance to active engagement, and create a virtuous ecosystem for faculty development. The macro environment, on the other hand, serves as the "soil" for long-term teacher development by providing foundational conditions.

The ranking of secondary indicators influencing young teachers' research-based teaching ability at non-double-first-class institutions is as follows: teaching and research competence (S12) > professional attitude (S13) > teaching reflection (S14) > teacher training system (S9) > awareness of self-development (S15) > teacher evaluation and promotion system (S10) > research infrastructure and conditions (S4) > teaching evaluation system (S8) > level of education (S11) > teaching environment conditions (S5) > teaching management system (S7) > earmarked teaching funds (S3) > institutional philosophy (S6) > education policies and regulations (S1) > socioeconomic development level (S2). These results reveal that, among the influencing factors, the most critical is teaching and research competence, followed by professional attitude, teaching reflection, and teacher training. The next tier includes awareness of self-development, evaluation and promotion systems, research conditions, teaching evaluation, educational background, and teaching environment. Finally, less influential factors include teaching management, special funding for teaching, institutional philosophy, educational policies and regulations, and socioeconomic context.

This ranking illustrates the "pragmatic logic" behind the development of young teachers' research-based teaching ability in resource-constrained institutions. Specifically, individual competence and initiative are the primary driving forces in overcoming developmental bottlenecks; institutional design serves as a "lever" to amplify individual effectiveness; and the influence of the macro environment depends on the proactive adaptation by the former two levels. These findings provide a clear strategic path for such universities: prioritize the enhancement of core teacher competencies, improve incentive systems, and foster a supportive environment, rather than passively waiting for external conditions to improve. This internally driven development model not only aligns with the realities of non-double-first-class institutions but also underscores the decisive role of the "human factor" in higher education.

4. Recommendations

4.1 At the Individual Level

Teachers should further strengthen their teaching and research competence by actively participating in professional development programs aimed at enhancing teaching abilities. Continuous updates to knowledge systems, teaching philosophies, instructional models, and methods should be pursued to enrich pedagogical knowledge and improve teaching management skills. Research should be effectively integrated into teaching practices to promote in-depth learning. Professional attitudes should be optimized by reinforcing a strong sense of responsibility aligned with learner-centered instruction, thereby stimulating intrinsic motivation and enhancing a sense of mission. Reflective teaching practices should be deepened through the establishment of routine reflection mechanisms that foster iterative improvement. Awareness of self-development should be cultivated, internalizing the enhancement of research-based teaching ability as a conscious pursuit of career advancement.

4.2 At the Institutional Level

Higher education institutions should establish tiered and categorized training systems, offering specialized workshops focused on research-based teaching to strengthen faculty members' ability to integrate academic inquiry with instruction. Research-based teaching performance indicators should be incorporated into faculty promotion criteria to encourage a balanced approach to teaching and research roles. A diversified evaluation system should be developed for teaching assessments, including the

evaluation of students' higher-order thinking development and the inclusion of teaching research papers, along with a dynamic feedback mechanism for instructional improvement. In terms of teaching management, incentive systems should be refined, and dedicated research-based teaching funds should be established. Furthermore, institutional philosophies should explicitly incorporate "research-enhanced teaching" as part of the talent cultivation strategy, thereby fostering a supportive atmosphere for research-based instruction.

4.3 At the Macro Level

Efforts should be made to continuously improve research infrastructure and strengthen laboratory facilities to create a conducive research environment. Smart classroom hardware should be upgraded, and blended teaching models should be promoted to establish high-quality instructional environments. A dedicated research-based teaching innovation fund should be established to provide financial support for implementing research-based teaching initiatives.

Conclusion

Among the three secondary indicators at the criterion level that influence the research-based teaching ability of young faculty members at non-double-first-class undergraduate institutions, the individual level of teachers emerges as the primary influencing factor, followed by the institutional level, and finally the macro-environment level. Among the 15 tertiary indicators at the factor level, teaching and research competence ranks first, followed by professional attitude, reflective teaching, and faculty training systems. Both the criterion and indicator levels reveal that the individual dimension is the core factor in enhancing teachers' research-based teaching ability. Institutional and macro-environmental dimensions serve to provide the necessary structural and environmental support for individual development. Therefore, efforts to enhance research-based teaching ability among young faculty members at non-double-first-class institutions should focus primarily on the cultivation and development of individual teacher capabilities.

Project Funding

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