Development of Teacher Competency Model for Higher Vocational Colleges in Zhejiang Province

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Abstract

This article aimed to (1) study the level of the teacher competency model in higher vocational colleges in Zhejiang province; (2) analyze components of the teacher competency model in higher vocational colleges in Zhejiang province; and (3) propose a teacher competency model in higher vocational colleges in Zhejiang province. The sample was 15 high-level vocational colleges with Chinese characteristics and professional construction plan construction units in Zhejiang Province. These schools represent the more outstanding vocational colleges in Zhejiang Province and had strong representativeness. The instrument for collecting data was a questionnaire survey and semi-structured interview. Data was analyzed by descriptive statistics and content analysis. The research results were as follows:

1. The research results showed that there were still some problems in the development of competence of higher vocational teachers in Zhejiang Province, and the problems and reasons for the cultivation of competence of higher vocational teachers were sorted out. 2. This study proposed to construct a competency model for teachers in higher vocational colleges in Zhejiang Province, which consists of 7 components and 28 factors. The potential factors of competency of teachers in higher vocational colleges in Zhejiang Province were composed of seven components: teaching ability, academic ability, administrative capacity, teaching support, learning inputs, social inputs, and supportive campus environment. Overall, the average score of each potential factor was lower than 2.5, which showed that the overall competency of teachers in higher vocational colleges in Zhejiang Province was at a low level and needs to be further improved. 3. Confirmatory factor analysis confirmed the fit, convergent validity, and discriminant validity of the

model and confirmed that these were the key factors in the competency model of teachers in higher vocational colleges in Zhejiang Province. The research results can be used as a comprehensive model for evaluating the competency of higher vocational teachers.

Keywords: Higher Vocational Education; Teacher competency; Competency model; Development

Introduction

At a time when higher vocational education is booming, the competence construction of teachers in higher vocational colleges is of vital importance, as it connects teacher growth, talent training and school development. The research on the "competence model of teachers in higher vocational colleges" is of great significance. From the perspective of social development, the talent demand structure is transforming, and labor skills are upgrading to innovative qualities and high-level abilities. The cultivation of teacher competence has become the key. The academic community has increasingly attached importance to the research on the core competence of higher vocational education, but many studies ignore the characteristics of higher vocational education. The Ministry of Education clearly mentioned in the "Opinions of the CPC Central Committee and the State Council on Carrying Forward the Spirit of Educators and Strengthening the Construction of a High-Quality and Professional Teacher Team in the New Era" that the improvement of the subject ability and subject literacy of college teachers should be regarded as an important part of subject construction, and teachers should be encouraged to stand at the forefront of the subject to carry out teaching and scientific research, and innovate teaching models and methods (Tachajaroenkit, 2024).

With the vigorous development of vocational education, the society has higher requirements for the quality of talent training in higher vocational colleges. It is urgent to clarify the competence standards of teachers, select and train high-quality teachers, and provide applied talents for the society. Industrial upgrading has prompted the updating of majors and courses. Teachers need to quickly adapt to and impart new knowledge and technology, and there is an urgent need to improve their competence. The group of teachers in higher vocational colleges is unique. They must not only have solid theoretical teaching ability, but also have rich practical experience, be able to provide practical guidance to students, and have the characteristics of "double teachers". The current research attempts to solve many key problems, such as what are the specific components of the competence of teachers in higher vocational colleges, whether there are differences in the competence of teachers in different majors and different teaching

stages, how to scientifically and comprehensively evaluate the competence of teachers, and how to improve the competence of teachers to meet the needs of the rapid development of vocational education (Anaraki et al., 2024). The researchers have been deeply engaged in the field of vocational education for a long time, conducted in-depth research in higher vocational colleges, participated in policy formulation and evaluation, have corporate experience, and can integrate industry needs with teacher competence research. It can build a teacher competency model, clarify core dimensions, develop evaluation tools and training programs, promote the connection between results and policies, and provide support for the management of higher vocational colleges, teachers, education administrative departments and vocational education researchers in teacher construction, development, policy formulation and research, to adapt to the ever-changing needs of vocational education and cultivate more high-quality skilled talents that meet social needs (Zhang & Li, 2023).

The competency model proposed in this research helps solve key issues in vocational education by providing a clear path for teacher development, improving teaching quality, and aligning educational outcomes with industry needs. It enables institutions to revise curricula, teaching methods, and training programs to enhance students' job readiness. Additionally, the model supports efficient school management by offering measurable standards for faculty development, resource allocation, and quality assessment—driving sustainable and competitive growth for vocational colleges. (Arifin & Rasdi, 2017).

Research objectives

1. To study the level of teacher competency model in higher vocational colleges in Zhejiang province.

2. To analyze components of teacher competency model in higher vocational colleges in Zhejiang province.

3. To Propose of teacher competency model in higher vocational colleges in Zhejiang province.

Literature review

The connotation of competence of teachers in higher vocational colleges

In the study of the connotation of competence of teachers in higher vocational colleges, different scholars have put forward different views from different perspectives. From a

philosophical perspective, competence is an external manifestation of a person's inner strength. The representative view is Marx's definition of competence, in which he believes that competence is "the public display of a person's essential strength". There are currently three concepts of competence in the field of psychology that have a great influence, namely the potential theory: competence is manifested in the degree of mastery of knowledge and skills by an individual when completing a task, the factor combination theory: competence is a combination of knowledge, talent, skills and attitudes manifested in a series of typical work task situations, and the personality psychological characteristics theory: competence is the personality psychological characteristics required to complete certain activities. The concept of competency was proposed by McClelland (1973). In response to the problem of people traditionally using intelligence tests as the main indicator of competency testing, he proposed that competency tests should replace traditional intelligence tests, which would be more conducive to effectively predicting employees' performance in future actual work. In this study, teacher competence is synonymous with "competency", which is a comprehensive concept integrating knowledge, skills and attitudes. With reference to the existing concept of competence and combined with the actual construction of the teaching team of higher vocational colleges, it is defined as: individuals who are dedicated to higher vocational education teaching and research, and the qualities, knowledge and skills necessary to complete the teaching and research work of vocational education (Antera, 2021).

Competency Index System for Higher Vocational Teachers

In the research on the competency index system of higher vocational teachers, Zhang Jianjun pointed out based on the grey correlation evaluation model that the core literacy of teachers in higher vocational colleges includes four first-level indicators, namely knowledge literacy, ability literacy, empathy literacy, attitude and values, and 17 second-level indicators, namely professional knowledge level. Peng Jianjun and Zong Wen divided the core professional literacy into three first-level indicators, namely professional ethics literacy, professional ideal and belief literacy, and professional ability literacy, and nine second-level indicators, namely professional ethics content. Luo believed that the competency of higher vocational teachers should be based on the key abilities understood in the traditional sense, namely, the four professional abilities of cognitive ability, cooperation ability, and innovation ability as first-level indicators, and 14 professional abilities such as professional qualifications as second-level indicators, and then matched with corresponding weights to construct a competency training system. Guo divided the competency standard system of higher vocational teachers into four aspects, namely, general

ability, professional ability, social ability, and professional ethics, in accordance with the principle of ability orientation (Yuanyuan et al., 2024).

Competence training path for teachers in higher vocational colleges

In the study of the competence training paths for teachers in higher vocational colleges, Chen Zhixiong believed that competence should be transformed into teaching standards to fully reflect direction, professionalism and scientificity. Many scholars have also proposed more comprehensive training paths or methods: Zhou Zhixiong proposed that vocational schools should integrate teacher competence into various aspects of teacher development, talent training goals, curriculum plans, school–enterprise cooperation, school culture, and assessment mechanisms. Chen Zhixiong believes that a new look for the competence training of higher vocational teachers should be created through on–campus collaboration, and a channel for the competence training of higher vocational teachers should be built through off–campus collaboration. Cao Zhijun believes that the cultivation paths of higher vocational teachers' competence include optimizing the training methods, improving the training mechanism, and building a new curriculum system that meets the requirements. Wu Jianjun conducted a study on the core competence of digital majors and believed that the core competence of digital majors has the characteristics of stability and transferability, indicating that the nature of competence is the most universal transferability and universality, but it also reflects the unique characteristics of the discipline (Mhunpiew & Asavisanu, 2023).

The relationship between higher vocational education and competence

Teacher competence is an important way for teachers in higher vocational colleges to improve their professional abilities, and can directly or indirectly affect their career development. Kirchknopf explored the career adaptability and professional identity of German dual–system commercial apprentices and emphasized the importance of career adaptability in career development. Bhatta discussed the positive impact of vocational education and training programs on youth employment in Nepal, demonstrating the socioeconomic benefits of such initiatives. A study on teacher competencies was conducted in Florida, USA, which listed 1,276 competencies of teachers, including the ability to evaluate student behavior, instructional design ability, teaching ability, ability to handle administrative affairs, communication ability, etc. Bisschoff and Grobler believed that teacher competence consists of eight aspects: learning environment, teacher professional commitment, discipline, teacher teaching foundation, teacher reflection, teacher cooperation ability, effectiveness and leadership. Donald M. Medley believes that professional knowledge, professional skills or abilities, and professional attitudes or values constitute teacher

competence; Danielson et al. (2024) proposed that planning and preparation, teacher environment monitoring, teaching and professional responsibility constitute teacher competence; Ramli Bakar divides teacher competence into professional competence and personal competence (Sricharumedhiyan et al., 2024). Professional competence includes mastering knowledge, mastering the curriculum and school syllabus, learning special learning methods, ethical insight and professional development; personal competence includes personal stability and noble character, maturity and wisdom, exemplary behavior and being recognized as a source of authority (Hanyu et al., 2024).

Grounded theory

Grounded Theory is a qualitative research methodology developed by sociologists Barney G. Glaser and Anselm L. Strauss in 1978. It aims to develop theories or conceptual frameworks from data collected during the research process. This study uses the grounded theory technique to study and organize the competency elements of teachers in higher vocational colleges. This method was adopted because it focuses on developing hypotheses from primary data and is increasingly important in social sciences. Grounded theory involves the following three steps:

Open Coding: In this phase, we will start the preliminary analysis of the data. The method used is to encode (i.e. label) each component of the data using descriptive or explanatory labels. First, each piece of data is broken down into smaller units, and then these small units are given codes to accurately capture the inherent meaning contained in the data. This process is like building a clear index for the data, which can help us quickly identify potential patterns and key concepts, and lay a solid foundation for subsequent in-depth analysis.

Axial Coding: In this critical step, we will start to classify and associate the existing codes, and gradually build a more coherent and tighter framework. Through careful sorting, in-depth exploration of the internal connections between categories and their subcategories, and analysis of their interaction logic, we aim to clearly understand how these elements are connected to each other in a more systematic and logical way, thus providing a well-organized and hierarchical structural foundation for subsequent research work.

Selective Coding: In this step, the focus is to accurately locate the core category that connects other categories, or to extract the central theme that runs through the whole. This core category contains the core essence of grounded theory, highly condenses the main concepts and phenomena of the study, and is the cornerstone of the theoretical system. Subsequent selective coding requires a comprehensive and in-depth analysis of the core category and its complex

connections with other categories, sorting out the logical context, laying a solid foundation for building grounded theory, and strongly supporting subsequent research and practice (Holton, 2010).

Conceptual Framework

This research is a research study. The researcher defines the research conceptual framework based on the theory of Futurology Theory, Three–way parenting theory and Competency model theory together with teacher competence The details are as follows.

Figure 1 Conceptual Framework

Research Methodology

According to the quantitative research design, this study compiled and distributed the "Questionnaire on the Competency Level of Teachers in Higher Vocational Colleges in Zhejiang Province". This study selected 15 construction units in Zhejiang Province that were selected into the Chinese Characteristic High-level Vocational Colleges and Professional Construction Plan, covering teachers and educational management personnel in these units. The sample frame was convenient for sampling, and the qualitative data used non-probability sampling techniques. A total of 750 questionnaires were distributed in this survey, and 732 valid questionnaires were collected, with an effective recovery rate of 97.60%. In the data collection stage, it was mainly conducted through questionnaire surveys and semi-structured interviews.

According to Creswell (2012), the sample size of qualitative data depends on saturation. For interviews, the qualitative research method of in-depth interviews was used to study potential factors and observation factors. The interview subjects were 9 experts in related fields. After the interview, the interview text was carefully analyzed to further explore the key information hidden behind the text and provide multi-dimensional support for the research conclusions. Each interview followed a standardized interview protocol.

Since this study is applicable to higher vocational colleges in Zhejiang Province, the quantitative data were collected using probability sampling techniques. Therefore, the researchers believe that probability sampling is appropriate when the quantitative data has a high degree of generalizability. A total of 732 samples were collected for this survey. An average of 732 questionnaires were examined for quantitative data collection; the variables were measured using a five-point Likert scale. The demographic profile classification of the quantitative data is shown in Table 1.

Table 1 Descriptive Statistical Analysis of Demographic Variables (N=732)

Item	Options	Frequency	Percentage (%)	Cumulative percentage (%)
Gender	1.0	360	49.18	49.18
	2.0	372	50.82	100.00
Age	2.0	102	13.93	13.93
	3.0	300	40.98	54.92
	4.0	252	34.43	89.34
	5.0	78	10.66	100.00
Education	1.0	204	27.87	27.87
	2.0	462	63.11	90.98
	3.0	60	8.20	99.18
	4.0	6	0.82	100.00
Work experience	1.0	198	27.05	27.05
	2.0	126	17.21	44.26
	3.0	108	14.75	59.01
	4.0	156	21.32	80.33
	5.0	144	19.67	100.00
Position	1.0	180	24.59	24.59
	2.0	552	75.41	100.00
Total		**732**	**100.0**	**100.0**

In the quantitative analysis phase, this study made full use of professional statistical analysis software AMOS to rigorously carry out a series of work such as descriptive statistics, information analysis, validity analysis, and confirmatory factor analysis. Based on 732 valid sample data carefully collected and strictly screened, the convergent validity and discriminant validity of the model were deeply analyzed. Through in-depth mining and analysis of the data, the complex relationship between potential variables was accurately identified to ensure that each measurement indicator can stably and consistently reflect the potential variables, and effectively distinguish different potential variables to ensure the validity and reliability of the model. Finally, the competency model of teachers in higher vocational colleges in Zhejiang Province was successfully constructed, providing solid data support and theoretical basis for subsequent in-depth research and practical application.

Research Results

Objective 1. The results showed that the overall mean level of teacher competence is 1.716, and the standard deviation is 0.699, indicating that the competence level of teachers in higher vocational colleges in Zhejiang Province is still at a relatively low stage, and the individual differences are quite significant. This shows that there is still a lot of room for improvement in the core competencies of teachers in higher vocational colleges, such as teaching, scientific research, and social services. It also highlights the shortcomings of higher vocational colleges in teacher training, resource investment, and supportive environment construction. In-depth analysis of the scores of the seven factors of competence shows that the academic ability factor has the highest score of 1.891, while the supportive college environment factor has the lowest score of 1.607, which further shows that there is a problem of structural uneven distribution in the development of teacher competence.

Table 2 Descriptive Analysis of Teacher Competencies

Item	n	Min	Max	$\overline{X}$	S.D.	Level
AA	732	1.000	4.150	1.891	0.821	Low
SCE	732	1.000	4.850	1.607	0.756	Low
SI	732	1.000	4.000	1.696	0.736	Low
LI	732	1.000	4.250	1.627	0.692	Low
TS	732	1.000	4.000	1.733	0.757	Low
AC	732	1.000	4.000	1.783	0.803	Low
TA	732	1.000	4.000	1.674	0.699	Low

Objective 2. The results showed that This study proposes to construct a competency model for teachers in higher vocational colleges in Zhejiang Province, which consists of 7 components and 28 factors. The potential factors of competency of teachers in higher vocational colleges in Zhejiang Province are composed of seven components: teaching ability (TA), academic ability (AA), administrative ability (AC), teaching support (TS), learning involvement (LI), social involvement (SI), and supportive college environment (SCE).

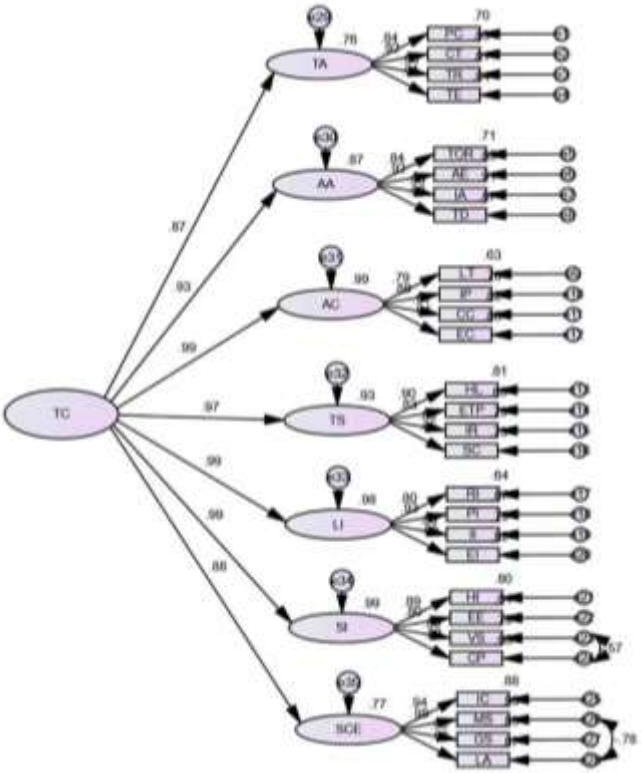

Figure 2 shows Confirmatory factor analysis results

Objective 3. The results showed that This study successfully constructed a competency model for teachers in higher vocational colleges in Zhejiang Province, which is helpful for evaluating and improving the competency of higher vocational teachers, and provides a useful reference for managers and educators of higher vocational colleges to improve the competency level of higher vocational teachers. The evaluation results can be used as a basis for targeted education to help educators tailor training programs; teachers can also understand their current competency level through the evaluation results, formulate development plans, promote their own comprehensive growth, and help cultivate talents in higher vocational education.

Discussions

1. Discussion of potential factors

The researchers first listed the variable matrix of the competency model of teachers in higher vocational colleges in Zhejiang Province through literature review and expert consultation, constructed seven latent variables: teaching ability, academic ability, administrative capacity, teaching support, learning inputs, social inputs and supportive campus environment, and compiled

a questionnaire based on the connotation of these seven latent variables. When inviting experts to conduct content consistency evaluation (IOC), the scores of each item were all above 0.6. Through confirmatory factor analysis, the factor loadings of the seven dimensions were all above 0.6, and the overall factor loading was relatively ideal. According to the structural equation model, the seven latent factors have a strong relationship with "teacher competency". The conclusions of the qualitative interviews also support this conclusion. Experts generally believe that the seven latent variables contained in the competency model of teachers in higher vocational colleges in Zhejiang Province are relatively comprehensive. Some experts also suggest that in addition to the latent variables already mentioned in the model, attention should also be paid to the "dual-teacher type". The connotation of this factor is mainly the development of teachers' teaching ability. Since this connotation has been included in other factors, it is no longer considered separately.

2. Discussions related to teaching ability

In the preliminary constructed model, the relationship between observed factors and potential factors is highly emphasized and has strong explanatory power. In the qualitative analysis, expert opinions also support this conclusion, that is, the observed factors are comprehensive. combining the conclusions of quantitative and qualitative research, the teaching ability factors include four observed factors: professional competence, classroom teaching, teaching reforms, and teaching evaluation. They are mainly the ability of teachers to use professional knowledge, teaching methods and technical means in the teaching process to effectively organize the classroom, stimulate students' interest in learning, and promote the improvement of students' knowledge and skills.

3. Discussions related to academic ability

According to the structural equation model, the relationship between observed factors and latent factors is highly emphasized and has strong explanatory power. In the qualitative analysis, experts also support this conclusion, believing that academic ability can fully express the connotation of latent factors. combining the conclusions of quantitative and qualitative research, the "academic ability" factor includes four observed factors: Transformation of results, academic exchange, innovative application, technology development. It mainly refers to the ability of higher vocational teachers to carry out scientific research innovation, academic exchange and achievement transformation in their professional fields to promote discipline development and enhance their own academic influence.

4. Discussions on administrative capacity

In quantitative research, the relationship between observed factors and latent factors can be obtained from the structural equation model, which has a strong explanatory power. In qualitative analysis, expert opinions also support this conclusion, that is, the four observed factors can fully express the connotation of the latent factors. Combining the conclusions of quantitative and qualitative research, the " administrative ability" factor includes four observed factors: leadership team, integrated program, collaboration capacity, and execution capability. It mainly refers to the ability of higher vocational teachers to efficiently plan, execute and optimize administrative affairs in teaching management, scientific research organization, resource coordination and teamwork, as well as the comprehensive abilities of planning, organization, coordination, decision-making and execution that should be possessed in promoting the efficient development of teaching-related administrative affairs.

5. Discussions related to teaching support

According to the structural equation model, the relationship between observed factors and latent factors is highly emphasized and has strong explanatory power. In the qualitative analysis, expert opinions also support this conclusion, that is, the four observed factors can fully express the connotation of the latent factors. Combining the conclusions of quantitative and qualitative research, the "teaching support" factor includes four observed factors: higher-order Learning, effective teaching practices, instructional resources, smart classroom. Specifically, it refers to the ability and quality of vocational college teachers in the development and integration of teaching resources, the maintenance and utilization of teaching facilities, the application and innovation of teaching technology, and the provision of learning guidance and assistance to students in order to ensure the smooth development of teaching activities and improve teaching effectiveness.

6. Discussions related to learning inputs

According to the structural equation model, the relationship between observed factors and latent factors is highly emphasized and has strong explanatory power. In the qualitative analysis, the expert opinions also support this conclusion, that is, the four observed factors can fully express the connotation of the latent factors. Combining the conclusions of quantitative and qualitative research, the "learning investment" factor includes four observed factors: rule-based inputs, process input, intellectual inputs and extended inputs. Specifically, it refers to the awareness, behavior, and effort of higher vocational teachers in actively learning professional knowledge and educational and teaching theories, actively participating in various training and academic exchange

activities, investing time and energy in self-improvement, and guiding and motivating students to actively engage in learning.

7. Discussions related to Social Inputs

According to the structural equation model, the relationship between the observed factors and the latent factors is highly emphasized and has a strong explanatory power. In the qualitative analysis, the expert opinions also support this conclusion, that is, the four observed factors can fully express the connotation of the latent factors. Combining the conclusions of quantitative and qualitative research, the " social investment" factor includes four observed factors: human interaction, educational experience, volunteer service and corporate practice. Specifically, it refers to the degree of participation, contribution, and investment level of higher vocational teachers in actively participating in social services and public welfare activities, deeply intervening in industry affairs and school-enterprise cooperation, widely building and utilizing social relationship networks, and focusing on cultivating students' sense of social responsibility and practical ability.

8. Discussions related to Supportive Campus Environment

According to the structural equation model, the relationship between observed factors and latent factors is highly emphasized and has strong explanatory power. In the qualitative analysis, expert opinions also support this conclusion, that is, the four observed factors can fully express the connotation of the latent factors. Combining the conclusions of quantitative and qualitative research, the "supportive school environment" factor includes four observed factors: institutional characteristics, management services, growth services and learning atmosphere. Specifically, the school provides all-round support and favorable conditions for teachers' teaching, scientific research, and professional growth in terms of the allocation of teaching facilities and resources, the rationality and flexibility of management systems and policies, the creation of campus culture and atmosphere, the provision of teacher training and development opportunities, and the construction of teamwork and communication mechanisms.

Knowledge from Research

From this study, the key knowledge that can be applied to the development of higher vocational education is to build a diversified and targeted teacher competency system. In terms of personal characteristics, teachers should have a high degree of professionalism, responsibility and innovation, and be the guide for students' career development. In terms of teaching ability, focus on cultivating teaching design ability, creating courses that meet industry needs; improve

classroom organization and management capabilities, create a good atmosphere; strengthen teaching evaluation capabilities, and accurately grasp the learning situation. In terms of innovation ability, encourage innovation in teaching methods, promote scientific research and technological innovation, and transform results. In the field of knowledge and skills, teachers must not only be proficient in professional knowledge and track the forefront, but also master education and teaching with information technology and integrate teaching. In terms of interpersonal communication, have good communication between teachers and students, teamwork and social interaction. In addition, create decentralized leadership, encourage teachers to lead with their expertise; emphasize teamwork and integrate resources; create an environment for full participation and support personalized development. These can help teachers and educators in higher vocational colleges to develop continuously and promote the high-quality development of schools.

Conclusion

The survey results show that although the teacher competency system in Zhejiang's higher vocational colleges is well-developed and covers core dimensions such as teaching, academics, social service and professional ethics, there are still weaknesses in research innovation and information technology teaching. Teacher competency varies according to local areas and individual characteristics. For example, large cities have advantages in resources and international perspectives, while some cities lack the ability of lifelong learning and adaptation. Support from campus environment plays an important role in teacher development, especially lifelong learning, which is the core of professional development in the era of change. Colleges should promote teacher training, develop specialized curricula, and adjust evaluation and motivation mechanisms to improve teacher competency and the quality of vocational education in the future.

Suggestions

1. Proposals for applying research results

1.1 The Office of Vocational Education should set a policy to promote the concept of "student-centered" and integrate learning with the industrial sector at the curriculum level.

1.2 Vocational colleges should organize training to enhance knowledge, practical skills, and teaching innovation for teachers regularly to improve the quality of teachers in all aspects.

1.3 School administrators should allocate budgets and resources for research and academic services, encourage teachers to conduct practical research and participate in communities and society.

2. Proposals for further research

2.1 In-depth study of teacher competence by professional field should be conducted to develop a more accurate group-specific competence model.

2.2 Comparative research should be conducted between teachers in urban and rural areas to find ways to reduce inequality in resources and development opportunities.

2.3 The influence of government policies and internal administration of educational institutions on the development of teacher competence in the long term should be studied.

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