

# THE EFFECT OF INNOVATION TRAINING ON TEACHER COMPETENCE: THE MEDIATING ROLE OF WORK ENGAGEMENT AND PERCEIVED ORGANIZATIONAL SUPPORT

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## Abstract

In order to explore the current situation and relationship between innovation training, work engagement, perceived organizational support and teacher competence in Chinese universities, and to construct a mechanism for innovation training, work engagement, and perceived organizational support to promote teacher competence, this study took university teachers in Kunming City, Yunnan Province, China, as the object of the study, and conducted a questionnaire survey on 260 university teachers through simple random sampling and snowball sampling methods. The results of structural equation modeling show that innovation training is positively related to work engagement, perceived organizational support and teacher competence, work engagement is positively related to teacher competence, perceived organizational support is positively related to teacher competence, and work engagement and perceived organizational support mediate between innovation training and teacher competence. At the same time, this study proves that: we can improve teacher competence by improving innovation training, work engagement and perceived organizational support. This study enriches the theoretical research in the field of teacher competence, provides management suggestions for human resource managers in universities on how to improve teacher competence to enhance work performance, and promotes the development of education, economy and society in Yunnan Province.

**Keywords:** Innovation Training, Teacher Competence, Work Engagement, Perceived Organizational Support, China.

## INTRODUCTION

### Research Background

In November 2022, INSEAD, Poturan Institute and Singapore Institute of Human Capital Leadership jointly released the report Global Talent Competitiveness Index in 2022 (GTCI), which emphasized the importance of high-quality talents in the global market. High-quality talents are the most critical competitive advantage of an organization, and they are also important resources for the survival of an organization. For colleges and universities, teachers are the core of colleges and universities, the transmitters of knowledge and the builders of competence, and their competence is related to the quality of talent training and the future of higher education (Zheng, J. & Chen, Y (2013). As one of the most important changes in today's society, the technological revolution, has had a profound impact on all walks of life. Education, as an important field, is no exception (Vincenzi, 2020). Scientific and technological revolution promotes digital learning and interactive teaching, and also promotes the improvement of

learning tools and the renewal of teaching content, which makes it difficult for teachers' original teaching concepts, teaching methods, knowledge structures and teaching models to adapt to the transformation and development of higher education. These present situations have brought challenges to college teachers and human resource management. Training is an important element of human resource management and plays an important role in changing teachers' concepts and perceptions and enhancing their competence (Campbell & Kuncel, 2001). Xie & Zhu (2020) argued that green training was the key to stimulate corporate sustainability performance. Astaíza-Martínez et al (2021) believed that teacher training was the key factor to improve the quality of higher education. Then, with the increasingly mature development of science and technology, how can we improve the competency level of university teachers? It's a question worth looking into.

### **Problem Statement**

Located in the southwest border of China, Yunnan Province is a relatively backward province in China with a low overall education level, which directly affects the quality of higher education as well as economic and social development. In addition, along with the advancement of the scientific and technological revolution as well as the change of social needs, the state and society have put forward higher requirements for the professionalism and reliability of the teaching force. Therefore, it is imperative to improve teacher competence. Currently, there is an abundance of research on teacher competence, however, there is a lack of research on improving teacher competence through innovation training, work engagement and Perceived organizational support.

### **Research Questions**

This study will focus on the influencing mechanism of how innovation training affects teacher competence, with the following questions:

- 1) What is the current situation of teacher competence, Innovation training, work engagement and Perceived organizational support in Chinese universities?
- 2) What is the relationship between Innovation training, Work engagement, Perceived organizational support and teacher competence in Chinese universities?
- 3) What is the model for enhancing teacher competence by Innovation training, Work engagement, Perceived organizational support in Chinese universities?

### **Research Objectives**

This study will focus on the influencing mechanism of how innovation training affects teacher competence, with the following objectives:

- 1) To explore the current situation of teacher competence, Innovation training, work engagement and Perceived organizational support in Chinese universities
- 2) To understand the relationship between Innovation training, work engagement, perceived organizational support and teacher competence in Chinese universities
- 3) To create the model for enhancing teacher competence by Innovation training, work engagement, perceived organizational support in Chinese universities.

## LITERATURE REVIEW

### Teacher Competence

On the definition of teacher competence, different scholars hold different interpretations, but they refer to some common elements: knowledge, skills, values, attitudes and traits. Medley (1980) referred to teacher competence as a group of combinations related to competence. He believed that the stronger the ability, the stronger the competence. Olson & Wyett (2000) believed that teacher competence referred to the professional knowledge, professional skills and professional values of teachers related to the successful implementation of teaching. Sulaiman & Ismail (2020) thought that teacher competence referred to the process of combining knowledge theory with practice, emphasizing teachers' knowledge and skills. According to the framework of "overall competency model", Wan & Gao (2023) argued that teacher competency was an overall system including three "practical competencies": cognitive competency, professional competency and social competency. There are also abundant researches on the dimension model of teacher competency. Medley (1977) is an early scholar who studies the dimension of teacher competence. It is considered that the dimensions of teacher competency included three aspects: professional knowledge, professional skills or abilities, professional attitudes or values. Le Deist & Winterton (2005) believed that teacher competence included knowledge, values and skills. Spencer (2008) held that teacher competence included five dimensions: motivation, knowledge, characteristics, self-image, and skills. Yan et al (2022) thought that teacher competency included three dimensions: communication skills, skills in teaching strategies, and methods and teaching-involving skills within a framework. In summary, according to this study, the so-called teacher competence refers to the abilities and characteristics of a teacher who can be instructed in the four dimensions: of knowledge, skills, values and attitudes, and traits.

### Innovation Training

Tracey (1991) believes that training refers to a series of activities carried out by an organization to improve vocational skills and competitiveness before employees are aware of the lack of knowledge and skills. Dessler (2001) believes that training is a process that can improve the working condition of new and old employees, and better fulfillment of their needs. learning process. Pastore & Zimmermann (2019) believes that training as an innovative activity carried out for employees, which takes many forms, with the aim of obtaining the achievement of goals, training does not necessarily lead to success, it may delay the transition to work, but it can open the horizons of young people and a long-term quality career. Li & Zhong (2022) believe that Innovation training is an innovative social practice with education as its connotation and service as its attribute. In this paper, innovation training refers to the use of innovative technologies, models and mechanisms within organizations or enterprises to improve employees' knowledge, skills, concepts, behaviors and other innovative activities.

Ahadi & Jacobs (2017) believes that innovation training has three dimensions: Technologies, Process and Mechanism. ORA Group. (2020) believes that innovation training has two dimensions: technologies and mechanism. Ma (2021) believes that innovation training has two

dimensions: concept and technologies. Zhang et al. (2023) believes that innovation training includes five dimensions: planning, support, practice, feedback and diversity. To sum up, this study believes that innovation training includes three dimensions: technologies, mode and mechanism

### **Work Engagement**

Kahn (1992) believed that work engagement refers to the combination of employee self and job role (harnessing), which enables individuals to express and display themselves through body, cognition and emotion in work. Lesener et al (2020) believe that work engagement is a positive, fulfilling and work-related state of mind. Bakker & Albrecht (2018), Li(2019) and other scholars believed that work engagement includes vigor, dedication and absorption three elements. This study considers that work engagement refers to the highly engaged emotional, cognitive and behavioral states shown by individuals in the context of work, the dimensions of work engagement include Vigor, dedication and Absorption.

### **Perceived Organizational Support**

Eisenberger (1986) believed that perceived organizational support refers to employees' perceptions and opinions about how the organization views their contributions and cares about their interests. Terle (2020) believed that perceived organizational support refers to the value perception and experience that employees bring to the organization. McMillian (1997) believed that perceived organizational support includes work support, personal trait two elements. Terle (2020) believed that perceived organizational support includes salary and leader support two elements. This study considers that perceived organizational support refers to employees' self-perception and perception of how the organization views their contribution, value, and cares about their interests, the dimensions include work support, care for benefit and value recognition.

### **Related Research**

Many scholars believe that training is positively related to work engagement. Hassett, (2022) showed that there was a positive correlation between access to training and a higher rate of work engagement in the federal workforce. Sun et al. (2022) found that nurses who received standardized training showed a high level of work engagement. Pekaar & Demerouti (2023) showed that the intervention group showed higher willingness to participate in work after training. According to most scholars, training is positively related to perceptions of organizational support. Maué, E et al. (2023) believed that through training, trainees internalized the values and goals of the company and regard themselves as a part of the company, thus enhancing the perceived organizational support. The research results of Pham et al(2023) showed that the digital skills training program enhanced employees' perceived organizational support, thus reducing the conflict between work and family. Many scholars who have demonstrated that training can enhance teachers' competence. Hebles et al. (2023) held that training was the way to acquire key abilities such as entrepreneurship and innovation. Gu et al(2023) argued that creativity training combined with STEAM activities was an effective method to cultivate creativity. Many scholars believe that work engagement is positively

related to teacher competence. Bakker (2015) believed that employees with high work engagement tended to have higher job satisfaction, more enthusiasm and better job performance. Fiorilli, et al (2020) concluded that teachers' work engagement had a positive impact on teachers' attitude towards work. The results of Zhang et al (2022) showed that work engagement and organizational support were the main factors affecting the improvement of emergency response ability of grassroots medical staff. Scholars have studied the relationship between perceived organizational support and teacher competency. Duan et al. (2020) thought that organizational support was positively correlated with employee creativity and significantly correlated. Aldabbas, et al. (2023) found that employees who experience and perceive organizational support could promote work engagement and employee creativity more than employees who have low perceived organizational support. Li & Yang (2023) found that perceived organizational support improved the experience ability of the new generation of employees. To sum up, this paper puts forward the following research hypotheses:

- H1: Innovation training is positively correlated with work engagement
- H2: Innovation training is positively correlated with perceived organizational support
- H3: Innovation training is positively correlated with teacher competence
- H4: Work engagement is positively correlated with teacher competence
- H5: Perceived organizational support is positively correlated with teacher competence
- H6: Work engagement plays an intermediary role between innovation training and teacher competence
- H7: Perceived organizational support plays an intermediary role between innovation training and teacher competence

## **METHODOLOGY**

### **Research Design**

This study adopts the quantitative research method of questionnaire survey. The subjects of this study were college teachers in Kunming, Yunnan Province, China. Simple random sampling and snowball sampling methods were adopted to collect data through Sojump app.

### **Research Population**

This study was conducted in Kunming, Yunnan Province, China, and the subjects were university teachers. In Kunming, 12 public undergraduate colleges and 8 private undergraduate colleges were selected as the sample population, and 260 teachers were selected from them to conduct a questionnaire survey.

### **Research Analysis**

The collected data will be used by SmartPLS for Inferential Analysis to build a mechanism model of how innovation training, work engagement and Perceived Organizational Support affect teacher competence.

## RESULTS

### Descriptive Analysis

The questionnaire measured in this study consists of two parts: respondents' basic information, and 4 latent variable scales. The basic information of the respondents is the control variable, including gender, age, marital status, title and other information, with a total of 6 items, and the specific distribution of the sample is shown in Table 1. In the 4 latent variable scales, innovation training is the independent variable, teacher competence is the dependent variable, and work Engagement and Perceived Organizational Support are the intermediate variables, and there are a total of 60 items in the latent variable scales.

**Table 1: Number and percentage of demographic information (n = 260)**

Demographic Information	Number	Percentage
<b>Sex</b>		
Male	121	46.54
Female	139	53.46
<b>Age</b>		
Less than 31	23	8.85
31 - 40	120	46.15
41 - 50	91	35.00
Greater than 50	26	10.00
<b>Marital status</b>		
Single	54	20.77
Married	206	79.23
<b>Education</b>		
Under bachelor's degree	32	12.31
Bachelor's degree	131	50.38
Postgraduate degree	97	37.31
<b>Years of work experience</b>		
less than 5 years	39	15.00
6 to 10 years	61	23.46
11 to 15 years	104	40.00
<b>Professional title</b>	56	21.54
Teaching Assistant	31	11.92
Lecturer	93	35.77
Associate Professor	88	33.85
Professor	10	3.85
Other	38	14.62

Table 1 revealed that most of the sample group was female (139, 53.46%) and male (121, 46.54%); aged 31-40 years old (120, 46.15%), 41-50 years old (91, 35.00%), greater than 50 years old (26, 10.00%), and less than 31 years old (23, 8.85%); married status (206, 79.23%), and single status (54, 20.77%); obtained a bachelor's degree (131, 50.38%), postgraduate degree (97, 37.31%), and under bachelor's degree (32, 12.31%); worked for 11-15 years (104, 40.00%), 6-10 years (61, 23.46%), 16 years and above (56, 21.54%), and less than 5 years (39, 15.00%); worked as the lecturer (93, 35.77%), Associate Professor (88, 33.85%), other position (38, 14.26%), Teaching Assistant (31, 11.92%), and Professor (10, 3.85%).

## Inferential Analysis

Inferential analysis applies structural equation modelling (SEM) to describe and explain the Level of variables and the relationships between variables. A model that integrates innovation training, perceived Organizational support, work engagement and teacher competence is constructed and implemented.

**Table 2: Mean ( $\bar{x}$ ), Standard Deviation (S.D.), and Interpretation for the level of variables (n = 260)**

Variables	$\bar{x}$	S.D.	Interpretation
<b>Innovation Training (IT)</b>			
Technologies (TEC)	3.42	0.83	High
Mode (MOD)	3.42	0.80	High
Mechanism (MEC)	3.13	0.88	Moderate
<b>Total</b>	<b>3.32</b>	<b>0.78</b>	<b>Moderate</b>
<b>Teacher Competence (TC)</b>			
Knowledge (KNO)	3.93	0.72	High
Skills (SKI)	3.66	0.77	High
Values And Attitudes (VAA)	3.64	0.76	High
Traits (TRA)	3.87	0.70	High
<b>Total</b>	<b>3.78</b>	<b>0.65</b>	<b>High</b>
<b>Work Engagement (WE)</b>			
Vigor (VIG)	3.86	0.70	High
Dedication (DED)	3.98	0.72	High
Absorption (ABS)	4.03	0.70	High
<b>Total</b>	<b>3.95</b>	<b>0.63</b>	<b>High</b>
<b>Perceived Organizational Support (POS)</b>			
Work Support (WS)	3.70	0.69	High
Care For Benefit (CFB)	3.83	0.65	High
Value Recognition (VR)	3.99	0.63	High
<b>Total</b>	<b>3.84</b>	<b>0.61</b>	<b>High</b>

As can be seen from Table 2: Mean ( $\bar{x}$ ), Standard Deviation (S.D.) and level of Interpretation show that the levels of innovative training, job commitment, sense of organizational support and teacher competence of university teachers in Kunming, Yunnan Province, China are at the medium and above level. Among them, the level of innovation training (IT) of Chinese university teachers is between the moderate level to the high level, in the order of Technology (TEC), Mode (MOD) and Mechanism (MEC). Teacher competence (TC) level is at the high level, in the order of knowledge (knowledge, KNO), skills (skills, SKI), traits (traits, TRA), values and attitudes (values and attitudes, VAA). Work Engagement (WE) levels are in the high range, followed by Absorption (ABS), Dedication (DED), and Vigor (VIG). Perceived Organizational Support (POS) is in the high range, followed by Value Recognition (VR), Care for Benefit (CFB), and Work Support (WS).

**Table 3: Correlation coefficient of the observation variables in the Structural Equation Modeling (SEM) (n = 260)**

	TEC	MOD	MEC	VIG	DED	ABS	WS	CFB	VR	KNO	SKI	VAA	TRA
TEC	1												
MOD	0.752**	1											
MEC	0.743**	0.795**	1										
VIG	0.438**	0.448**	0.393**	1									
DED	0.416**	0.388**	0.342**	0.670**	1								
ABS	0.346**	0.365**	0.294**	0.643**	0.788**	1							
WS	0.370**	0.449**	0.381**	0.515**	0.555**	0.560**	1						
CFB	0.349**	0.383**	0.300**	0.540**	0.545**	0.572**	0.725**	1					
VR	0.358**	0.390**	0.273**	0.600**	0.611**	0.628**	0.765**	0.743**	1				
KNO	0.366**	0.398**	0.318**	0.522**	0.476**	0.506**	0.709**	0.776**	0.776**	1			
SKI	0.364**	0.404**	0.336**	0.425**	0.456**	0.442**	0.744**	0.691**	0.702**	0.741**	1		
VAA	0.373**	0.423**	0.368**	0.400**	0.429**	0.456**	0.761**	0.735**	0.716**	0.752**	0.785**	1	
TRA	0.272**	0.303**	0.215**	0.485**	0.612**	0.648**	0.649**	0.665**	0.735**	0.604**	0.613**	0.661**	1

Remark\*\* at a 0.01 level of significance (p < .01)

From Table 3: Checking of the observation variable relationship in the Structural Equation Modeling (SEM) by using Pearson Product-Moment Correlation Coefficient revealed that it was less than 0.90 which was consistent with the criteria defined as the Correlation Coefficient of 0.90 and above would be a multicollinearity (Kline, 2016; Pallant, 2010; Hair et al., 2010). Consequently, it could be assumed that all observation variables were not multicollinearity and overlap variables, and appropriate for the Structural Equation Modeling (SEM) analysis.

The analysis of the structural model on enhancing teacher competence by innovation training, work engagement, and perceived organizational support in Chinese universities. The exogenous latent variables modeling comprising; Innovation Training (IT), Work Engagement (WE), Perceived Organizational Support (POS), and Teacher Competence (TC) with 13 observation variables, and the acceptable criteria of the factor loadings were greater than 0.70, then the structural equation modeling relationship was analyzed as shown in in Figure 1.



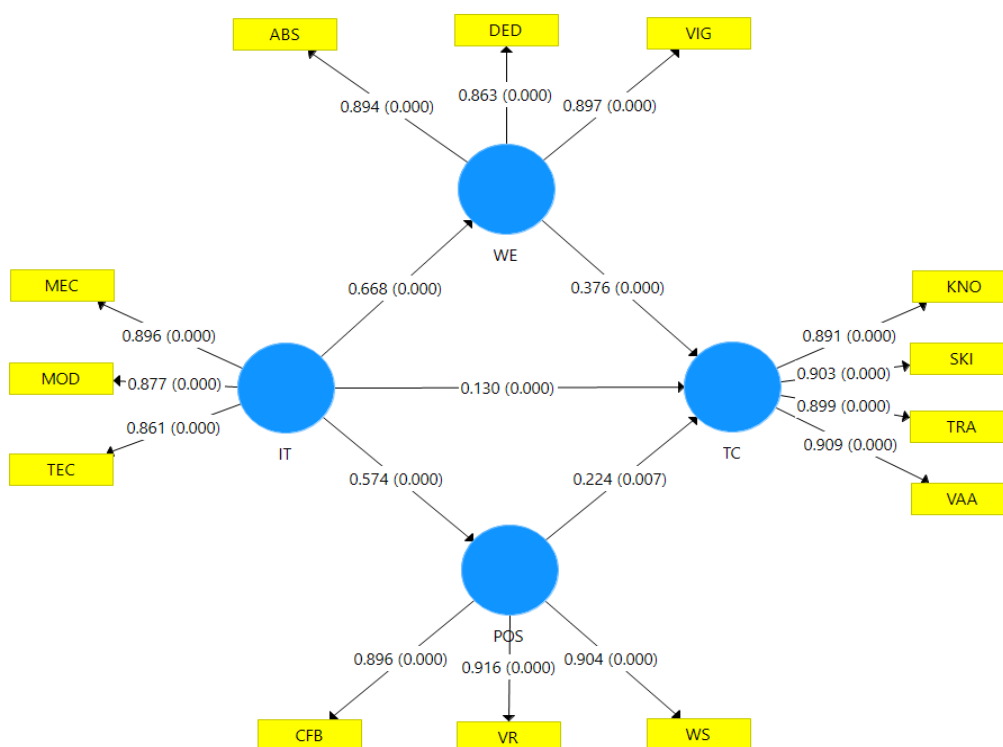


Figure 1: The statistical significance test results by Bootstrapping (n = 260)

Table 4: The statistical significance test results on enhancing teacher competence by innovation training, work engagement, and perceived organizational support in Chinese universities

Relationship	Path Coefficient	Standard Deviation	t-value	P-values
IT -> POS	0.574	0.049	11.769***	0.000
IT -> TC	0.130	0.042	3.095**	0.000
IT -> WE	0.668	0.044	15.107***	0.000
POS -> TC	0.224	0.083	2.701**	0.007
WE -> TC	0.376	0.081	4.667***	0.000

\* 0.05 level of significance (p < .05)

\*\* 0.01 level of significance (p < .01)

\*\*\* 0.001 level of significance (p < .001)

Remark: a value in the parentheses was a t-value;

If it was not in a range of -1.96 to 1.96 means a 0.05 level of significance

If it was not in a range of -2.58 to 2.58 means a 0.01 level of significance

If it was not in a range of -3.29 to 3.29 means a 0.001 level of significance

Figure 1 and Table 3 revealed the values that appeared in the relationship line between the indicator variables and latent variables were P-values, and the values that appeared on the relationship line between the latent variables were Path Coefficients and P-values, consecutively as follows:

The Path Coefficient on Innovation Training (IT) and Perceived Organizational Support (POS) was 0.547 (t-value = 11.769) which was greater than the critical value (3.29), indicating that Innovation Training (IT) had a direct positive relationship to Perceived Organizational Support (POS). The Path Coefficient on Innovation Training (IT) and Teacher Competence (TC) was 0.130 (t-value = 3.095) which was greater than the critical value (2.58), indicating that Innovation Training (IT) had a direct positive relationship to Teacher Competence (TC).

The Path Coefficient on Innovation Training (IT) and Work Engagement (WE) was 0.668 (t-value = 15.107) which was greater than the critical value (3.29), indicating that Innovation Training (IT) had a direct positive relationship to Work Engagement (WE). The Path Coefficient on Perceived Organizational Support (POS) and Teacher Competence (TC) was 0.224 (t-value = 2.701) which was greater than the critical value (2.58), indicating that Perceived Organizational Support (POS) had a direct positive relationship to Teacher Competence (TC). The Path Coefficient on Work Engagement (WE) and Teacher Competence (TC) was 0.376 (t-value = 4.667) which was greater than the critical value (3.29), indicating that Work Engagement (WE) had a direct positive relationship to Teacher Competence (TC).

## CONCLUSION AND FUTURE WORK

### Conclusion

The results of structural equation model in this study are as follows:

First, the level of innovation training (IT) of Chinese university teachers is between the moderate level to the high level, in the order of Technology (TEC), Mode (MOD) and Mechanism (MEC). Teacher competence (TC) level is at the high level, in the order of knowledge (knowledge, KNO), skills (skills, SKI), traits (traits, TRA), values and attitudes (values and attitudes, VAA). Work Engagement (WE) levels are in the high range, followed by Absorption (ABS), Dedication (DED), and Vigor (VIG). Perceived Organizational Support (POS) is in the high range, followed by Value Recognition (VR), Care for Benefit (CFB), and Work Support (WS).

Second, innovation training is positively related to work engagement, perceived organizational support and teacher competence, work engagement is positively related to teacher competence, perceived organizational support is positively related to teacher competence, and work engagement and perceived organizational support mediate between innovation training and teacher competence.

Finally, innovation training, work engagement and perceived organizational support are the three main factors that affect teacher competence. We can improve teacher competence by increasing the level of innovation training, work engagement, and perceived organizational support.

### **Limitations and Future Work**

There are three limitations of the research. First, due to potential sample bias or other circumstances, the research may have limited generality, which means that the research results may not be applicable to all regions and countries. Furthermore, due to the objective conditions and ability limitation, teachers from specific places nearby are selected as samples, which may lead to insufficient sample representativeness. Secondly, the individual scales in the research are self-made.

Although their reliability and validity are tested before the measurement, there will still be limitations, and the validity and reliability of the research results may be affected. Thirdly, the basic information of teachers only includes commonly discussed variables such as age, gender and professional title, and other demographic variables that may have an impact may be further explored. Therefore, future research can be improved in three ways: first, expanding the scope of the study and sample size. Second, selecting well-established scales with high visibility for measurement. Third, increase the basic information, such as adding the number of children and physical fitness.

### **Recommendations**

Firstly, since innovation training is positively correlated with teacher competence, human resource managers in colleges and universities can improve teacher competence by providing teachers with innovation training. Human resource managers in colleges and universities should value the training and professional development of teachers, and make teachers engaged in the construction and development of the university by various ways.

They can improve teacher competence by building a digital platform for free learning with the latest Internet or virtual reality technology in the training process, online and offline mixed teaching methods, developing featured training modules, perfecting teacher training plans based on age, departments and disciplines, improving infrastructure, and forming training evaluation mechanisms. Huang et al (2022) believed that innovation training can help nurses improve their innovation skills, increasing the output of scientific research and innovation projects.

Managers can flexibly develop training modules with regional characteristics based on this course, and effectively improve the innovation skills of nurses, thus meeting the urgent demand for innovative nurses and the rapid development of the discipline of nursing. Iqbal et al. (2022) believed that improving the quality of educational skills system and technical infrastructure system can make education and training more effective.

Secondly, Human resource managers in colleges and universities need to respect and recognize every employee, value the personal value and dignity of teachers, motivate them for growth, sincerely care about their personal wellbeing and development, and improve teacher competence by making them enthusiastic, concentrated and dedicated in work, allowing them to have a sense of identity and belonging to the university, and establishing multiple system supports and incentive mechanism(Wang et al.,2023).

Human resource managers in colleges and universities can enhance teacher competence by providing teachers with all kinds of protection and support, caring for their lives and interests, and recognizing and acknowledging their contributions and values. Specific measures include: creating a working environment and atmosphere for university teachers that is respectful, inclusive, fair, relaxing, enjoyable, supportive and encouraging (Jing & Yan, 2022); providing teachers with appropriate teaching and research resources and equipment; leaders and colleagues pay attention to caring for, accommodating, and encouraging teachers; strengthen guidance for career development (Wang et al.,2023); and motivate employees and so on.

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