

Research on competency and relationship between competency and performance of research university teachers

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Abstract: The paper introduced a competency theory into research university teacher management, and took examples from the domestic and foreign research methods of constructing the competency model, and established the competency model of research university teachers, then discussed the relationship between competency and performance of research university teachers. For the current strengthen the construction of the high level teaching staff, speed up the construction of Research University, and accelerate talent power strategy to have the important meaning.

Keywords: Research University, Teacher, Competency, Model

1. Introduction

Research university with innovative knowledge spread, production and application for the center, to produce high level scientific research and training high-level elite talents for the target, it plays an important role in social development, economic construction, the progress of science and technology, culture prosperity, national security. Research University is talents gathered center, exploration of talent training center, great achievements in forming centre, a new subject forming centre, science and technology and industrial combination of center. Because of this, the developed countries pay high attention to the first-class research university construction, Often rise to the national development strategy level, accelerate development, improve the quality of higher education to speed up to become "world" trend. And teacher's team of excellent degree is an important index of the measure research universities. Current, the country vigorously implementing talent power strategy,

the strategy of reinvigorating, higher education front higher education power forward construction goal, the construction of the top faculty research University for Construction Target is the core of university strategic task.

Throughout to research university for the goal of construction of colleges and universities, For a variety of reasons, teacher management concept, mechanism, means and methods is still in a traditional human resource management phase, lack of scientific theory and method of the guidance, and selection, training, check system according to post requirement, often by teacher education background, knowledge level, skills, working performance and past experience dominant ability and quality and performance as the basis, the pursuit of these people the match, but often knowledge, skills strong were not necessarily performance is outstanding person, cannot very well selection, use the high potential. Will be competency theory into research university teacher management, take examples from the domestic and foreign research methods for constructing quality model, and explore to establish the modern university human resources management system based on the competency model, improving the scientific of the teacher hiring, training pertinence, accuracy of performance appraisal, contributing to promote the traditional education management to modern human resources management changes. For the current strengthen the construction of the high level teaching staff, speed up the construction of Research University, and accelerate talent power strategy to have the important meaning.

2. Related research review

Research on competency produce broad impact in the global, and won a large amount of research achievements and rich empirical research. Around the university teachers' competency respect, domestic and foreign scholars have carried out all research work. Dineke E.H. (2004) put forward the teacher's competency refers to the teacher's personality characteristics, the knowledge and the comprehensive teaching techniques and teaching attitude in different teaching background.

Bisschoff and Grobler analysis the factor of the teachers' competency characteristics using structured questionnaire, finally summed up two factors model, which is education competency and collaboration competency. Danielson etc propose teachers' competency character model has four dimensions: planning and preparation, environmental monitoring, teaching and teacher professional responsibility. Donald m. Medley (1977) believes that teachers' competency include professional knowledge, professional skill or

ability, professional attitude or values three categories. Hay McBer submitted a titled "high performance teacher model" report to Department for Education and Employment, and puts forward effective teachers' five kinds of Competency group: specialization, leadership, thinking, plan/set expectations, relationships with others. Foreign scholars generally agree that the teachers' competency model should include highly educated, business overall and development ability.

Domestic scholars discussed the teachers' competency mainly from the respects of the teachers' trait, quality, ability, personality and teacher evaluation etc; and made great achievements. Li Yingwu, Li Fengying (2005) used structured interview, questionnaire survey method edit the teachers' competency questionnaire by themselves, and explored structure dimension of the primary and secondary school teachers in China, including emotional moral characteristics, teaching competency, motivation and regulation, management competency. Wang Yu, Dai Liang tie (2006) taking college teachers as the research object collected relevant items by behavioural event interview method and collect relevant items of literatures, compiled university teachers' competency questionnaire, concluded that the university teachers' competence characteristics include the following seven dimensions: innovation ability, the information ability, interpersonal comprehension, responsibility, thinking ability, relationship, and achievement orientation. Ren Rongrong, Shi Xuejun (2007) took teaching of teachers' competency in Hebei province as the research object, the resulting university teachers' competency model including three factors: professional ability, drive ability and personal mature. Chinese scholars generally speaking the teachers' competency model is divided into four dimensions: knowledge competency, teaching competency, organization competency, scientific competency.

Research on the relationship of competence and performance: Borman and Motowidlo (1997), put towards that task performance and contextual performance influenced by different factors. Knowledge, skills, differences in the degree of influence of task performance is higher than the degree of influence of contextual performance, cooperation, persistence, responsibility, and variables such as performance and relationships with high correlation. Holmes and Joyce (1993) thought competency studies should be focus on how it affects their performance. So competency model should select those have an impact on the performance. In this paper, on the basis of building a research university teacher competency model, it studies the prediction to performance.

3. Research university teachers' competency model building

Research university teachers' competency models including the following steps: the first step is to extract the competent for competency initial indicator through research university teachers to interviews. The second step is to edit the research university teachers' competency questionnaire according to competency initial indicator, amended questionnaire through the survey data analysis, and exploratory factor analysis, and gradually screening dimension and the entry, seeking the possible structure of competency model according with psychometrics index, and concluded that research university teachers' competency model.

3.1 Interview and questionnaire establishment

Research University teachers were randomly selected for behavioral event interview, through sorting of content of the interview, obtain competency initial indicator. It defines the competency initial indicator and random arrangement, and forms initial questionnaire of research university teachers' competency. The initial questionnaire includes research university teachers' basic quality, professional knowledge, and ability of teaching and scientific research ability etc. The initial questionnaire by inviting experts to revise and perfect the final form of the formal questionnaire, including 22 entries as is shown in table 1.

Tab.1 The survey index of research university teachers' competency

number	index	number	index	number	index
A1	The spirit of dedication for scientific research	A13	Understand the student's learning and life	A9	Good organization skills
A2	The affinity, harmonious relationship with students	A14	Class is instructive	A10	Knowledge sharing and taught
A3	Innovative thinking	A15	Good learning ability.	A11	Good science ethics
A4	Explicit teaching goal	A16	Ability to analyze the problem	A12	Constantly updating the teaching contents

A5	Being honesty, have a sense of justice	A17	Solid this discipline knowledge	A21	Keen observation and insight
A6	Good critical thinking	A18	To understand the subject in the forefront of the theory	A22	The persistent concentration of research
A7	Advanced education concept	A19	Strong information search capability		
A8	Efficient way of working	A20	Good communication ability		

3.2 The investigation and analysis of the questionnaire for competency

(1) Questionnaire investigation

The survey object is research university teachers. Results 100 questionnaires were given out and 97 recycled and 94 effective recalled. The formal investigation 94 effective test samples were divided into two halves according to the odd and even. The first half of the sample ($N = 47$) used for exploration, hereinafter referred to as the sample is even (sample number from 2, 4, 6...); the second half a sample ($N = 47$) used for verification, hereinafter referred to as an odd number of samples (samples from serial number 1, 3, 5...).

(2) Factor analysis

Using the Principal component orthogonal maximal rotation method analyses the questionnaire. Before the factor analysis, the first test whether sample data for factor analysis, usually have two judgments index, KMO value and Bartlett's spherical inspection of the value. According to the point of Kaiser (1974), if $KMO < 0.5$, more difficult for factor analysis. This sample $KMO = 0.778$, more suitable for factor analysis. Bartlett's spherical inspection value is 1977.766, $df = 659$, $p < 0.001$, reached significant level, also show that suitable for factor analysis.

In the process of factor analysis, mainly refer to the common factors and load value of various projects, filter part of the project. Select project which is project in high common degree and factors of high load value, delete items which is project in low common degree and factors of low load value project.

Finally, according to the principal component analysis results extract factor by feature a value greater than equal 1 for the principle, ensure that the questionnaire was drawn out and explained effective factors have four, a total of 18 project, the variance accumulation contribution rate of 81.3%. The data is shown in table 2.

Tab.2 Rotation factor loading matrix

Items	1	2	3	4
A15	0.628			
A16	0.620			
A19	0.614			
A20	0.612			
A21	0.541			
A5	0.426			
A2		0.644		
A4		0.625		
A9		0.601		
A10		0.538		
A13		0.490		
A14		0.439		
A7			0.651	
A17			0.584	
A18			0.551	
A12			0.516	
A1				0.609
A6				0.550
A11				0.545
A22				0.532
A3				0.529
A8				0.496

(3) Confirmatory factor analysis

Use an odd number of samples in formal investigation, and explore to test the research university teachers competency model structure. Determine whether the results of exploratory research income are stable, reliable. Use Amos5.0

statistical software to test the four factors of structure of exploratory factor analysis, it is shown in table 3.

Tab. 3 the fitting degree index of structure confirmatory factor analysis of safety evaluation four factors (N = 47)

X^2	df	x^2 / df	GFI	AGFI	IFI	TLI	CFI	RMR	RMSEA
240.632	129	1.912	0.910	0.901	0.902	0.899	0.903	0.073	0.048

In the index to measure model, subjective indicators x^2/df more close to 0, observation data and the model fit the better, $x^2/df < 3$, show integral fitting degree is better, the model is better; $x^2/df < 5$, show that the whole model was acceptable. The changes interval of GFI, AGFI, CFI, and TLI are in between 0 to 1, closer to 1, fitness is good, more than 0.90 above, and the model is better fitting. The change interval of RMR and RMSEA are in between 0 to 1, closer to zero, the better. According to the general standard, $RMSEA < 0.1$, observation data and the model is better fitting; $RMSEA < 0.05$, observation data and the model is very good fitting. From the above indexes, competency four factors to the fitting model data is good, the fitting indexes achieve better fitting level. Indicating the observed data better support the conception model, exploratory research results have been proved.

3.3 Competency model building

In the questionnaire structure of the research university teachers' safety quality, total extract the four dimensions. The first dimension "basic quality", and dimension contains A15、A16、A19、A20、A21 five projects, mainly inspects the ability of the research university teachers in the classroom positions.

The second dimension of the questionnaire structure of Research University teachers' safety quality is "teaching ability", dimension contains A2、A4、A9、A10 four projects, mainly reflect the ability of research university teachers as a professional teacher in the classroom or in knowledge conduction in counseling.

The third dimension of the questionnaire structure of Research University teachers' safety quality is "professional knowledge", including A7、A17、A18、A12 four projects, the project involves the content for the research

university teachers have the discipline of professional knowledge and advanced theory.

The fourth dimension of the questionnaire structure of Research University teachers' safety quality is "scientific research ability", including A1、A6、A11、A22、A3 five projects, the project involves the content for the research university teachers' scientific research ability level.

The resulting research university teachers' competency model is shown in figure 1.

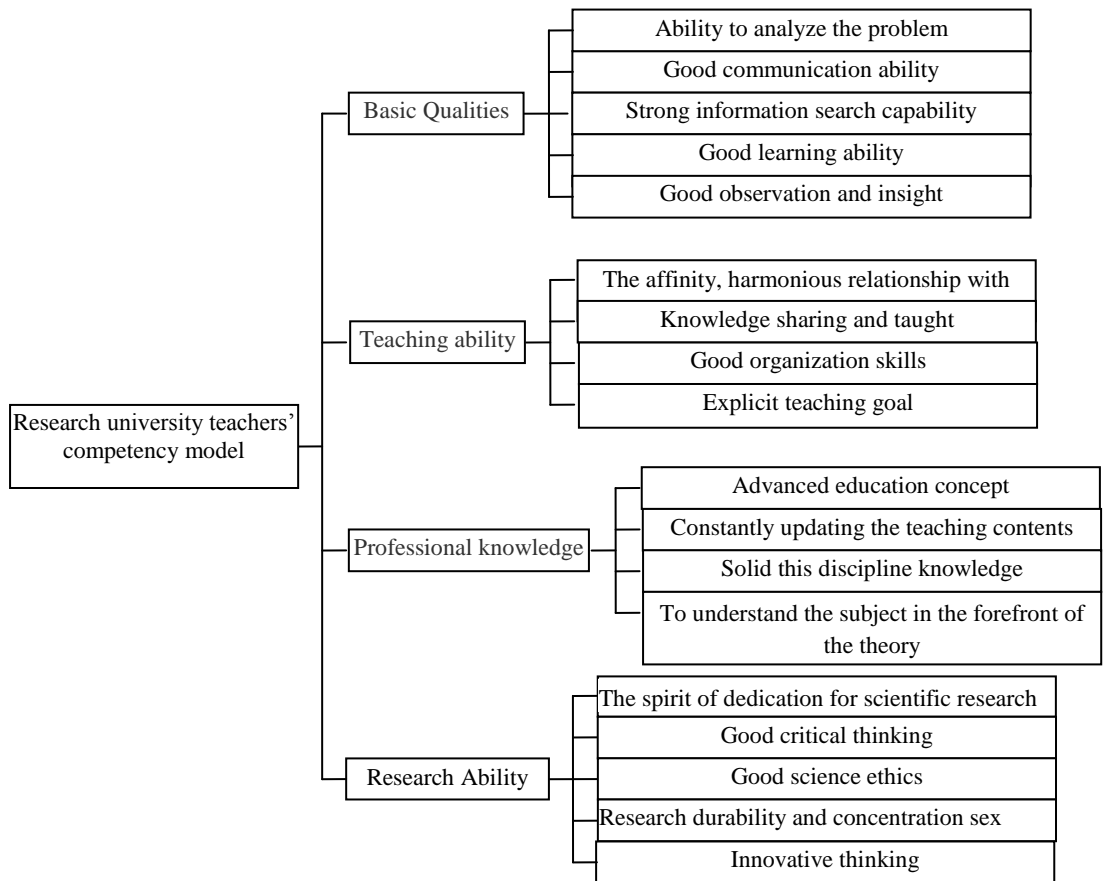


Fig.1 Research university teachers' competency model

4. Applications of Research university teachers' competency model

On the basis of the previous study, this section conducted a sample survey in teacher performance of research universities by building a structured scale. And it further analysis the interaction between

Research university teacher competency and performance, combined with a research university teacher competency model. The “teacher performance scale in Research University” in this article is based on the adaptation of “Teachers' job performance scale”, which establishment by Song Qian (2008). The scale divides the performance of research university teachers into two dimensions, Task performance and contextual performance, and gets a sound reliability and validity test. The following will analysis the relationship between teachers' competency and performance in the research university.

4.1 Correlation analysis

This section mainly analysis the relationship of four dimensions elements in competency and performance among the research university teachers. The result shows that there exists significant correlation at the level of 0.05 or 0.01 in the competency dimension and performance of research university teachers. This result is consistent with the idea of the research design, illustrate that the competency of research university teachers is an important variable affecting its performance.

Meanwhile, at each dimensions of the teachers' competence in research university, there exists a high positive correlation between basis quality, research capacity and the two indicators of the performance, which illustrate that the basis quality and research capacity make a great impact in teachers' performance promoting; the high positive correlation between expertise dimensions and job performance illustrate that the research university teachers, who learn new knowledge and cutting-edge theory of the discipline constantly can be able to improve their work performance more better; the high positive correlation between Teaching ability and relation performance indicators illustrate that teachers with higher teaching ability can be able to play a better team role and produce a higher relationship performance.

4.2 Regression analysis

In regression analysis, based on the competency of the research university teachers' each dimension as independent variables and performance indicators

as the dependent variable, we use multiple regression analysis to explore the research university teachers' competence of various dimensions about predicting the quality of their performance. Results are shown in Table 4: R^2 is 0.416, indicating that each dimension of competent explained 41.6% of the variance, the adjusted R^2 is 0.380, $F = 19.008$, showing research university teachers' each dimension of competency has a considerable effect.

In the competency of the research university teachers' each dimension, the research capability of its performance contribution ($\text{Beta} = 0.449$) is the highest, followed by basic quality ($\text{Beta} = 0.401$), indicating that the research capacity and basic quality of research university teachers' are the important factors about teachers' performance.

Table.4. regression analysis between the research university teachers' competence and the performance

competence of various dimensions				R^2	The	F	The	The
the	Basic	Teaching			adjusted		Variation of	Variation
research	quality	ability	Professional		R^2		R^2	of F
capacity			knowledge					
0.449	0.401	0.304	0.377	0.416	0.380	19.0	0.316	18.106
						08		

5. Conclusion

Competency theory is introduced to build the construction of the research university teachers, giving new methods and perspectives about building the new management system of research university teachers. In this study, we use interviews, questionnaires, data analysis and other methods to establish a competency model of research university teachers. Meanwhile, we base on this model to study the research university teachers' competency impacting on performance, contributing to the selection of the research university teachers and planning the research university teachers' career development.

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