

## Exploring University Teachers' Instructional Competencies Model Based on Exploratory Factor Analysis in Guizhou, China

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Received 2022-03-24; Revised 2022-05-03; Accepted 2022-05-05;  
Published online: 2022-05-30

### Abstract

Instructional competencies are the necessary skills and abilities that instructors should possess to carry out their main responsibility effectively, that is, to teach the students. Instructors at university also need to be competent so that they can prepare, deliver, and evaluate instruction properly. The purposes of this study were to study the factors that contributed to instructional competency and identified significant instructional competencies for university instructors in China. This quantitative study applied exploratory and confirmatory factor analysis (EFA and CFA) to determine the instructional competencies. The sample was 204 instructors from a university in Guizhou, China. Results from the initial exploratory factor analysis found eleven instructional competencies which were reduced to nine competencies upon analysis using confirmatory factor analysis (CFA): *teaching needs analysis, teaching design, professional knowledge, pedagogical reflection, pedagogical optimization, pedagogical innovation, pedagogical technology knowledge, and professional ethics*. Nine competencies were confirmed. Future benefits include determining areas of instructional competencies for instructor improvement to plan for and evaluate instructional competency in the faculty members and the design and implementation of targeted training programs for maximum effectiveness.

**Keywords:** *Instructional Competencies, University Instructors, Instructor Improvement*

### 1. Introduction

Teachers have been identified as the main contributors to the education of the students (Bandura, 1997; Vanek et al., 2021). Most students acknowledge their teachers as their role models and are known as an indirect source of motivation and self-efficacy for students (Pintrich & Schunk, 1996; Tian et al., 2022). Teachers are professionals who are qualified to apply theoretical and critical analysis of the education process to the teaching of their specialized subjects. This process can allow them to create the context and process by setting objectives and goals for the curriculum with differentiated teaching approaches that help the students to improve (Valica & Rohn, 2013). Additionally, they impart new knowledge and instruct learners to acquire new knowledge.

Similarly, the university instructor also has a great role in developing knowledge and contributing to the development of human resources in society. In their research, Blašková, et.al (2014) it was reiterated that the students see their teachers as role models and sources of

inspiration. University teachers are connected to students and their abilities can transfer to the positive student achievement (Wang et al., 2021). Nonetheless, the work of a university instructor is very demanding, and it requires constant development and updating of professional competencies, social competencies, and the ability for continuous professional development. Notwithstanding, university instructors' instructional competency not only influences students' learning, but also can affect their daily life. Instructors' efforts in planning lessons, teaching students, their knowledge and behavior play very important role in the students' learning process. Therefore, it is imperative to support the development of instructional competencies for university instructors.

## **2. Research Objectives**

The following research objectives formed the basis for this research:

- 1) To determine the factors contributing to instructional competencies of teachers at a university, Guizhou, China
- 2) To identify significant instructional competencies of teachers at a university, Guizhou, China

## **3. Literature Review**

### **3.1 Competencies of university instructors**

Competence, or what is also known as professional competence can be defined as the professional and personal skills that the instructors should possess or behavioral procedures that the instructors should have to successfully achieve their teaching goals and do well in the tasks that related to their profession and take responsibility for their behaviors (Blašková, 2011). According to Gibb (2008), competence can also be defined as the work the instructors are able to do or their capabilities. The term competence is also acknowledged as the proven ability that individuals must effectively use their knowledge responsibly and with autonomy (Quendler et al., 2013).

The competency of university instructors can be divided into the following categories: didactic and psychodynamic; education in general terms; diagnostic and interventional; psychosocial and communicational; managerial; and cultivation (Hoidn & Kärkkäinen, 2014). According to Valica and Rohn (2013), competencies consist of the following categories: expert/technical competencies; moral and ethical responsibilities; pedagogical-psychological and didactic-methodological competencies; and self-developing competencies.

### **3.2 Iceberg competency model**

The Iceberg Competency Model presents the competencies of instructors as a metaphor of an iceberg. For an iceberg, only one-ninth of the iceberg is visible with the rest being beneath the surface. According to McClelland (1973), in the model there are six components. They include knowledge, skills, social role, self-image, traits, and motives. The visible components or the competencies that are observable are the knowledge and skills. However, underneath the surface, other competencies, or components such as social roles, traits, thinking styles and self-image are not seen but constitute an individual's competency.

The observable competencies, knowledge, and skills are the demonstrated abilities, while the part below the water constitutes behavioral components of the instructors in terms of their values, behavior of the teachers and the nature of the profession of teaching. Incompetence is acknowledged as a concept that is a combination of generic and specific aspects. Some previous studies have shown that training instructors to improve their professional competencies and instilling positive attitudes toward teaching can help instructors to improve their effectiveness in the classroom (Jhang, 2019). Research that has been conducted has reported instructors' competencies as including leadership and management competency, evidence-based competency, practice-based competency, subject competency, professional competency, collaboration, or teamwork competency, creating new activities competency, and continuous professional development competency (Kuivila et al., 2020).

### 3.3 Instructional competencies

Instructional competence in the language teaching classroom includes the mastery of the specialized subject content, experiences, teaching skills or teaching approaches, the way the instructors manage the classroom and students, how the instructors create their lessons according to the differentiated teaching approach and effective evaluation skills. According to Pelligrino and Hilton (2012), instructional competencies for schoolteachers are categorized into three main areas: 1) cognitive skills, 2) personal and social skills, and 3) intrapersonal skills. Through the teachers' instructional competencies and strategies, students develop skills in actively engaging in the lessons. Instructional competencies for instructors consist of the following items: 1) general knowledge of their professional subject field; 2) teaching skills such as using different teaching approaches to teach the students; 3) classroom management such as using different teaching approaches to attain the students' interest; 4) evaluation skills such as using an effective method to evaluate the students; and 5) academic performance of the students.

Generally, competent instructors use appropriate teaching strategies to help students improve and have higher achievement, this includes differentiated teaching approaches. They also use inquiry and project-based teaching methods, and classroom collaboration methods that can help the students to get better results. Teachers' evaluation skills are also important for the students since effective evaluation will help teachers gauge students' knowledge, abilities, and what additional knowledge or improvement is needed. Additionally, a knowledge of instructional alignment is needed to create evaluation plans accordingly.

## 4. Research Methodology

### 4.1 Research design

This research was a quantitative study utilizing a questionnaire instrument. Exploratory factor analysis (EFA) which was used to reduce the data to obtain the nine constructs that were derived from the initial instructional competencies. To develop the model, confirmatory factor analysis (CFA) was used. The researcher used questionnaires to collect data and aim to investigate the factors contributing to instructional competencies of teachers at a university and to propose a model for enhancing instructional competencies of teachers at a university, Guizhou, China.

#### 4.2 Research instrument

The research instrument was developed from a review of the literature related to factors contributing to instructional competencies of instructors. The following factors were derived: professional knowledge, specialized subject knowledge, pedagogical content knowledge, pedagogical technology knowledge, professional ethics, teaching design ability, curriculum development ability, teaching practice ability, organizational ability, practical innovation ability, and teaching evaluation ability. Questionnaire items were adapted from Hanifah et.al., (2019) based on the 11 derived factors. The total number of the items was 49 items. The draft of the instrument was sent to five experts who work in the educational field more than ten years were invited to validate the questionnaire. The results of the content validity using the Item Object Congruency method resulted in an average total average IOC score of 0.86. A pilot study for the instrument was carried out using 30 teachers from the same university. The reliability of the questionnaire based on the Cronbach's Alpha score was 0.83.

#### 4.3 Participants

The study was conducted at a private university. The questionnaire was sent to 467 full-time faculty members whose contacts were supplied by the university. A total of 210 questionnaires were returned making the return rate equal to 45 percent. Of the 210 returned questionnaires, 204 were used and six discarded due to incomplete data. Table 1 shows the demographic information of the instructors who participated in the study. The gender of the respondents was 56.8 percent female and 43.2 percent male instructors. Most of the respondents were aged between 41 to 45 at 31.9 percent. Ninety-one instructors (44.6 percent) had advanced degrees (Ph.D.), 105 instructors (51.4 percent) had master's degrees and eight instructors (3.9 percent) had bachelor's degrees. Regarding the teaching experience of six instructors (2.9 percent) had fewer than five years of teaching experience, while 51 instructors (25 percent) had six to ten years of teaching experience, 65 instructors (31.9 percent) had 11 to 15 years of teaching experiences, 46 instructors (22.5%) had 16 to 20 years of teaching experiences.

**Table 1.** Demographic Information of the Respondents

Response Demographic Background		Number	Percentage (%)
Gender	Female	116	56.8
	male	88	43.2
	<b>Total</b>	<b>204</b>	<b>100</b>
Age	Less than 30 Years old	4	2
	31 to 35 years old	5	2.5
	36 to 40 years old	54	26.5
	41 to 45 years old	65	31.9
	46 to 50 years old	41	20
	51 to 55 years old	20	9.8
	More than 56 years old	15	7.3
	<b>Total</b>	<b>204</b>	<b>100</b>
Education Qualification	Doctorate (Ph.D)	91	<b>44.6</b>
	Mater Degree	105	51.4
	Bachelor's degree	8	3.9
	<b>Total</b>	<b>200</b>	<b>100</b>
Teaching Experiences	Less than 5 Years old	6	2.9
	6 to 10 years old	51	25
	11 to 15 years old	65	31.9
	16 to 20 years old	46	22.5
	21 to 25 years old	29	14.2
	26 to 30 years old	4	2
	More than 31 years old	3	1.4
	<b>Total</b>	<b>204</b>	<b>100</b>

## 5. Findings

According to the results of the exploratory factor analysis, the factors contributing to instructional competencies of instructors obtained were teaching needs analysis, teaching design, professional knowledge, pedagogical evaluation, pedagogical reflection, pedagogical optimization, pedagogical innovation, pedagogical technology knowledge, professional ethical.

### 5.1 Findings from the exploratory factor analysis

The modified questionnaire for the factors contributing to instructional competencies of instructors has a total of 49 measurement items which used a five-point Likert-type scale for evaluation of the items. The scoring criteria was: 4.50 -5.00 = Strongly Agree (SA); 3.50-4.49 = Agree (A); 2.50-3.49 = Neutral (N); 1.50-2.49 = Disagree (D); 1.00-1.49 = Strongly Disagree (SD). Through further analysis of the data, there were a total of eleven factors that contributed to instructional competencies of instructors: *professional knowledge, specialized subject content knowledge, pedagogical content knowledge, pedagogical technology knowledge, professional ethical, teaching design ability, curriculum development ability, teaching practice ability, organizational ability, practical innovation ability, and teaching evaluation ability*. In view of the continuity of variables, the variable values were within a reasonable range, and the data close to normal distribution. As the normality of the

distribution was confirmed, exploratory factor analysis was indicated to be valid (Kim, 2011).

**Table 2.** Initial Measurement of the Central Tendency of the Latent Variable Structure Developed for Research and used in Confirmatory Factor Analysis (n = 204)

The factors contributing to instructional competencies of instructors	Mean	S.D.	Interpretation
1. Professional knowledge	4.54	.485	Agree
2. Specialized subject content knowledge	4.22	.478	Agree
3. Pedagogical content knowledge	4.131	.507	Agree
4. Pedagogical technology knowledge	4.06	.512	Agree
5. Professional ethics	4.35	.507	Agree
6. Teaching design ability	3.75	.492	Agree
7. Curriculum development ability	3.931	.574	Agree
8. Teaching practice ability	4.454	.501	Agree
9. Organizational ability	4.36	.577	Agree
10. Practical innovation ability	4.48	.543	Agree
11. Teaching evaluation ability	4.112	.515	Agree

KMO and Bartlett tests were performed to determine the suitability of the samples for exploratory factor analysis. The results are shown in Table 3 below:

**Table 3.** KMO and Bartlett’s Test Tables

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.881
Bartlett’s Test of Sphericity	Approx. Chi-Square	4076.01
	Df	910
	Sig.	.000

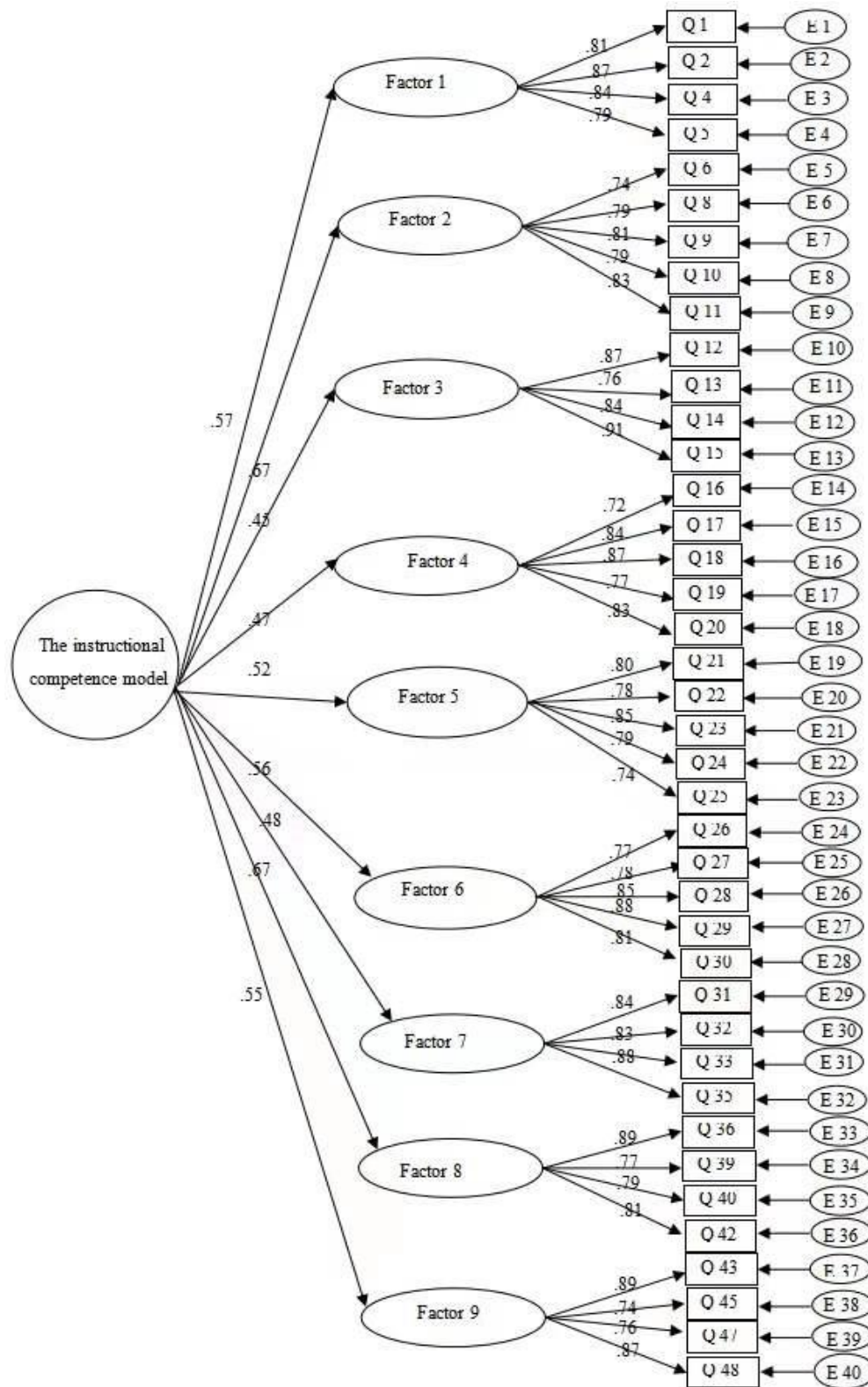
Bartlett’s spherical test value was confirmed to be large enough, and the significance value was .000, which was less than 0.05, which is correlated and confirmed suitable for factor analysis. The KMO value was 0.881, which is more than 0.6. and confirmed suitable for factor analysis.

For this study, the principal component method, Promax with Kaiser Normalization Rotation method, and the maximum variance method in factor analysis were used to analyze the obtained 11 characteristic items, and the factor structure of the whole model was constructed (see Table 3). Factor loading showed that the extracted nine eigenvalues were greater than 1 was able to explain 80.12% of all variable information, thus confirming nine factors. The Cronbach’s alpha coefficient value was 0.836 after the questionnaire data was tested by the software, which confirmed that the research data obtained in the previous period had high reliability.

According to the analysis results, this study found and confirmed the characteristic categories of factors at all levels of the model, among which Items 1,2, 4,5 were named as *Teaching Needs Analysis*; Items 6, 8-11 were named as *Teaching Design*; Items 12-15 were named *Professional Knowledge*; Items 16-20 were named *Pedagogical Evaluation*; Items 21-25 were named *Pedagogical Reflection*; Items 26-30 were named *Pedagogical Optimization*; Items 31-33, 35 were named *Pedagogical Innovation*; Items 36, 39-42 were named *Pedagogical Technology Knowledge*; and Items 43-48 were named *Professional Ethics*.

#### 5.2 Confirmatory factor analysis of the instructional competence model of college teachers

Through exploratory factor analysis (EFA) of the samples of N = 204, this study initially obtained a nine-factor model of college instructors' instructional competencies. To further test the rationality of the model structure of the nine factors, the study carried out confirmatory factor analysis (CFA) to test the theoretical relationships between the observed items and the common factors. Through the study of model details and standardization, the results of the correlation and importance of each factor were found. Please see the following Figure 1.



**Figure 1.** Nine factors of the Instructional Competency Model of University Instructors



### 5.3 Model AVE and CR indicator results

The average variance extraction (AVE) and combination reliability (CR) were used to analyze the aggregation validity (convergent validity). First: in general, if AVE value is greater than 0.5 and the CR is greater than 0.7, this means that the convergence validity efficiency is higher. Second, if Ave or CR values are low, consider removing one factor and re-analyzing convergence validity (Bandalos & Finney, 2018). As shown in Table 4, the CFA analyzed a total of nine factors. As can be seen from the table 4, the AVE values of the 9 factors are all greater than 0.6, and the CR values are all greater than 0.7, which shows that the data in this analysis have good convergent validity.

**Table 4.** Model AVE and CR Indicator Results

Model AVE and CR Indicator Results		
Factor	AVE Value	CR Value
Factor 1	0.662	0.826
Factor 2	0.743	0.861
Factor 3	0.815	0.825
Factor 4	0.724	0.837
Factor 5	0.816	0.752
Factor 6	0.831	0.794
Factor 7	0.617	0.766
Factor 8	0.671	0.841
Factor 9	0.647	0.721

For the study, the fit index was calculated. From the results of the Chi-square Test of Goodness of Fit, the structural model fit index CMIN/DF was 2.63, and the fit index was between 1 and 3, indicating a high degree of fit. In addition, RMSEF=0.094<0.1, GFI=0.915>0.9 TLI=0.917>0.9, confirmatory factor analysis indicators were all within a reasonable range (Orçan, 2018). Thus, the instructional competencies model of college instructors was confirmed.

## 6. Discussion and Conclusion

The traditional instructor performance evaluation methods have tended to be singular with the indicators being relatively simple. Thus, the effectiveness and validity of the evaluation systems have not been perfect. This leads to doubt about the comprehensiveness and fairness of the evaluation. Many instructors have objections to the evaluation results and the evaluation cannot accurately discern the teaching ability of instructors. The level of teaching ability and the inability to find the defects and improvement in teaching ability in turn, lead to a lack of willingness to improve teaching ability, and even the phenomenon that the score of poor instructors may be higher than that of good instructors (Wang Zhengdong, 2008). A comprehensive teaching competency model can reflect the teaching characteristics and competencies of excellent teachers (Yan Xiaochun et al., 2010).

The model developed from this study combines the requirements of practical teaching and teaching competencies from models of teaching quality, teaching motivation, teaching cognition, teaching skills, information-based teaching methods, teaching interaction and teaching management required for teaching. Due to the distinct characteristics of teaching in the Internet Age, the model expands and enriches the depth and pertinence of the competencies and applicability to the instructor evaluation system. Thus, the assessment system supported by the developed model also has flexibility and dynamic adaptability, which is an advantage compared to other assessment systems.

Additionally, the environment of the instructors also has effects on their competencies. If instructors receive negative comments from their environment, they might feel anxious or depressed and start to avoid challenging activities and give up easily (Bandura, 2008). This leads to a lowered level of motivation. Instructors' motivational levels also has a big impact on students. The emotional states of the teachers, such as anxiety, stress, concern, happiness, excitement can affect their competence as well as their physical conditions such as illness, sickness, headaches, and other physical ailments. Both soft skills in terms of critical thinking skills, creating skills, communication skills, and problem-solving skills in the teachers and teaching competency are also acknowledged as current instructional competencies of schoolteachers in China. This study found that the levels of the nine teaching competencies were relatively high in the sample population. These findings point to the potential of the model for enhancing instructional competencies of university instructors in other parts of China.

## **7. Recommendations**

Based on the finding from the research, the researcher provides the following recommendations for the teachers, school administrators, and future researchers.

The teaching profession is accepted as a noble one and it is the duty of the teachers to maintain a high standard of professionalism. On the other hand, teachers also should be aware of the different factors that can contribute to their competency and at the same time how they can maintain their standard. Therefore, it is recommended that instructors continue to always have the right attitude toward their profession by providing a positive teaching environment and appropriate teaching approach. As was stated earlier, teachers are role models. As a result, the characteristics of the teacher have a big impact on students' learning. Thus, it is strongly recommended the instructors should add more combinations of innovation to the curriculum modification and add differentiated instructional strategies. These should all be considered in the development of individual instructional competencies.

The competency model can determine areas of instructional competencies for instructor improvement. Thus, administrators of various programs and departments in universities may use the model to plan for and evaluate instructional competency in the faculty members. Targeted training programs can be designed and implemented to specifically address areas that need attention for maximum effectiveness.

This study focused only on university instructors at one institution in China. Therefore, there may be certain limitations as to the generalizability of the model. Therefore, studies in other institutions or contexts may add to the data and overall findings related to this topic.

## 8. The Author

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