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Designing and Testing a Model of Professional Competencies of Instructors in Comprehensive University of Applied Science

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ABSTRACT: Considering developments and advances in technology and the future needs of teaching skills based on changes in labor markets and the need to respond, there is a need to design a model of competencies required for effective job performance of instructors. Thus, the present study was conducted with the aim of designing and testing the model of professional competencies of instructors in the comprehensive university of applied-science. The research method was applied in terms of aim, and quantitative in terms of method. Inferential analysis method and data description and factor analysis (exploratory and confirmatory) were used to analyze the questionnaire data and present the results. Due to confirmation of questions by the experts, the content validity of the questionnaire was confirmed. The statistical population of the study included 54000 people and the sample consisted of 391 university instructors. Cochran's formula was used to calculate the sample size. Cronbach's alpha coefficient of the questionnaire was obtained at .90 and the used instrument showed a good reliability. The collected data were analyzed using SPSS 16 and Smart PLS software. The tested factors included leadership, assessment, perceptual, classroom management, technological and virtual, educational, obligation, positive perfectionism, ethical, and global mindset. These factors were evaluated through a questionnaire and factor loads were assessed using factor analysis. Since in all components, both the factor load and their path coefficient were more than .30, and the whole model was significant, no component was removed from the path analysis and all their components and indicators were accepted as components of the model of professional competencies of instructors.

Keywords: Model of Professional Competency, Professional Competency of Instructors, Comprehensive University of Applied-Science, Comprehensive University of Applied-Science Instructors

Introduction

In a knowledge-based economy, the success of organizations depends on the quality of the human resources. Nowadays, organizational strategy should be designed to identify, nurture and use competencies (Chouhan & Srivastava, 2014). All of us need competencies in work and everyday life to independently find solutions to unprecedented new situations. The most important point is that competencies can be changed and can be actively implemented using new and complex tasks in the higher education system (Müller-Frommeyer, Aymans, Bargmann, Kauffeld, & Herrmann, 2017). Three main factors causing these changes include emergence of the information society, globalization of

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economy, and scientific and technological advances that require constant updating of specialty (Mulder, 2017). Competencies are the attributes that people use to achieve a successful performance (Dubois & Rothwell, 2004). The presence of a meritocracy system in any country will consolidate its acceptability and legitimacy (Abaspour, Ahmadi, Rahimian, & Delavar, 2016). Competencies refer to purposeful behaviors that include knowledge and awareness, abilities or skills, and attitudes and values (Rodinova et al., 2017). Franklin and Melville (2015) consider competency as the ability to work within the standards set by the actual work environment. Competency is a part of one's overall qualification that can be applied to actual behavior and performance as a coherent set of knowledge, skills, and attitudes (Mulder, 2014). The concept of competency refers to a type of personal trait that can distinguish the superior performance from normal performance in a particular job position and organizational environment (Dongmei, 2011).

Instructors' competency model has four important areas of teaching competency including the ability of instructors to provide successful theoretical, practical or combined teachings (Diep & Hartmann, 2016); specialized competency that ensures that instructors have mastered their professional knowledge and know the most up-to-date information needed by students (Grollmann & Spottl, 2008); communication competency: instructors also need communication competency to transfer knowledge to students and to advise and persuade them (Oluwasola, 2014); and personal competency that is the last area reflecting the work of vocational instructors. Self-image, ethical and personal goals are personal traits that can improve the level of competency of instructors for effective work performance (Yusof, Roddin, & Awang, 2015). In any society, the higher education system or university is considered as a crucial part (Ghorbannejad & Isa Khani, 2016). The issue of university performance and reaching more modern, better, more flexible, more competent and more attractive universities in various scientific works have been investigated by many researchers (Blaskova, Blasko, Matuska, & Rosak-Szyrocka, 2015). Universities and scientific centers are places for generation of science and knowledge. This science must improve living conditions and the most important area of its use in solving problems is society and industry (Ministry of Science and Technology Research).

In university or general education as well as in technical vocational education and training, instructors are the main focus of the educational system (Paryono, 2015). Thus, the role and competency of technical and vocational education instructors are key elements that reflect the brand image of technical vocational graduates (Arifin, Rasdi, Anuar, & Omar, 2017). Instructors need different types of competencies to create better quality for learning courses (Aslami, Esmaeili, Saeidipour, & Sarmadi, 2018). Thus, if instructors have more preparedness, qualification and capability, they will more contribute to improving the efficiency of systems (Dibaei Saber, Abbassi, Fathi Vajargah, & Safaei Movahed, 2020). Ministry of Science, Research and Technology is thinking about development of skills for long time. At this time, the existing capacities in higher education and universities of Iran and high capacities of industries, including the public and private sectors, are used to encourage skills training and make the maximum use of the existing capacities in higher education, including technical and vocational universities and comprehensive university of applied-science (Salehi Omran, 2014).

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In this regard, the effort to increase the productivity of university graduates in the sustainable development of the country highlights the need to change the role of university lecturers (Sangari, 2017). An instructor is a key element in any educational program. Before training task to be assigned to him/her, he/she should be evaluated to know if he or she has sufficient competency to do the task well (Jour Bonyan, 2016).

The quality of technical and vocational training and education is determined by the performance of graduates in their job and work field (Paryono, 2015), and the performance of graduates is also associated with the ability and competency of instructors in skills training centers. Salimi et al. (2015) identified the competencies of faculty members according to the perceptions and expectations of doctoral students, and concluded that the most important competency of professors in the next decade will be research competency and there is a great gap between the current status and desired status of teaching competencies, counseling, providing services and cooperation and faculty members with their co-workers.

The results of a study conducted by Farzaneh et al. (2015) showed that the professional competencies and psychological abilities of high school instructors in Shirvan are above the moderate level. The results of a study conducted by Jalili and Niknam (2014), aimed at determining the status of instructors' professional abilities and competencies, showed that the current situation of instructors in the cognitive, skill and attitude dimensions is not at desirable level. The results of a study conducted by Nasiri and Abdolmaleki (2014) showed that there is a positive and significant relationship between instructors' professional competencies and students' self-direction. Moreover, it was shown that instructors' professional competency explains the students' self-direction. In a study entitled "Faculty Competencies in Vocational Colleges", Zhang and Jianhu (as cited in Qiuan & Keen, 2009) stated that the competencies of faculty members in higher vocational colleges include professional competency, psychological competency, and functional competency. Milner, Gossick, and Thorndike (2011) proposed a model for organizational competencies of faculty members at University of Medical Sciences in USA that included four main components (social competency, cognitive competency, functional competency, and meta-competency). The indicators of dimensions and components of instructors' professional competencies have been investigated by Blaskova (2014), Chen (2005), Chitsaz (2011), Ismail et al. (2018), Missouri (2014), Oliva and Hansen (2011), Robert et al. (2009), Sangari (2017), and Siluiachung (2009).

Therefore, achieving the goals of the country's higher education system is not possible without paying attention to professional competency of instructors. Unfortunately, lack of an appropriate model for the education of applied-science instructors has caused many problems in the higher education system, and has reduced the motivation, efficiency and effectiveness of instructors and, consequently, has reduced the quality of students' education. Although a special attention has been paid to instructors in the strategic plan of the university and some steps are being taken in this regard, designing a model of professional competencies of instructors is very necessary and crucial. The Strategic Document and Tasks of the Sixth Development Plan regarding the Higher Education System confirm this issue. The present study was an attempt to identify the dimensions, key components and indicators, to provide an

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appropriate model of professional competencies of instructors at the University of Applied-Science. Accordingly, the main objective of the present study was designing a model of professional competencies of instructors and the sub-objectives of the study were identifying the components and indicators of professional competencies of instructors, prioritizing and weighting of components and indicators of professional competencies of instructors of the Comprehensive University of Applied-Science. Given what was stated, the conceptual model was developed based on the literature and research background, as shown in Figure 1.

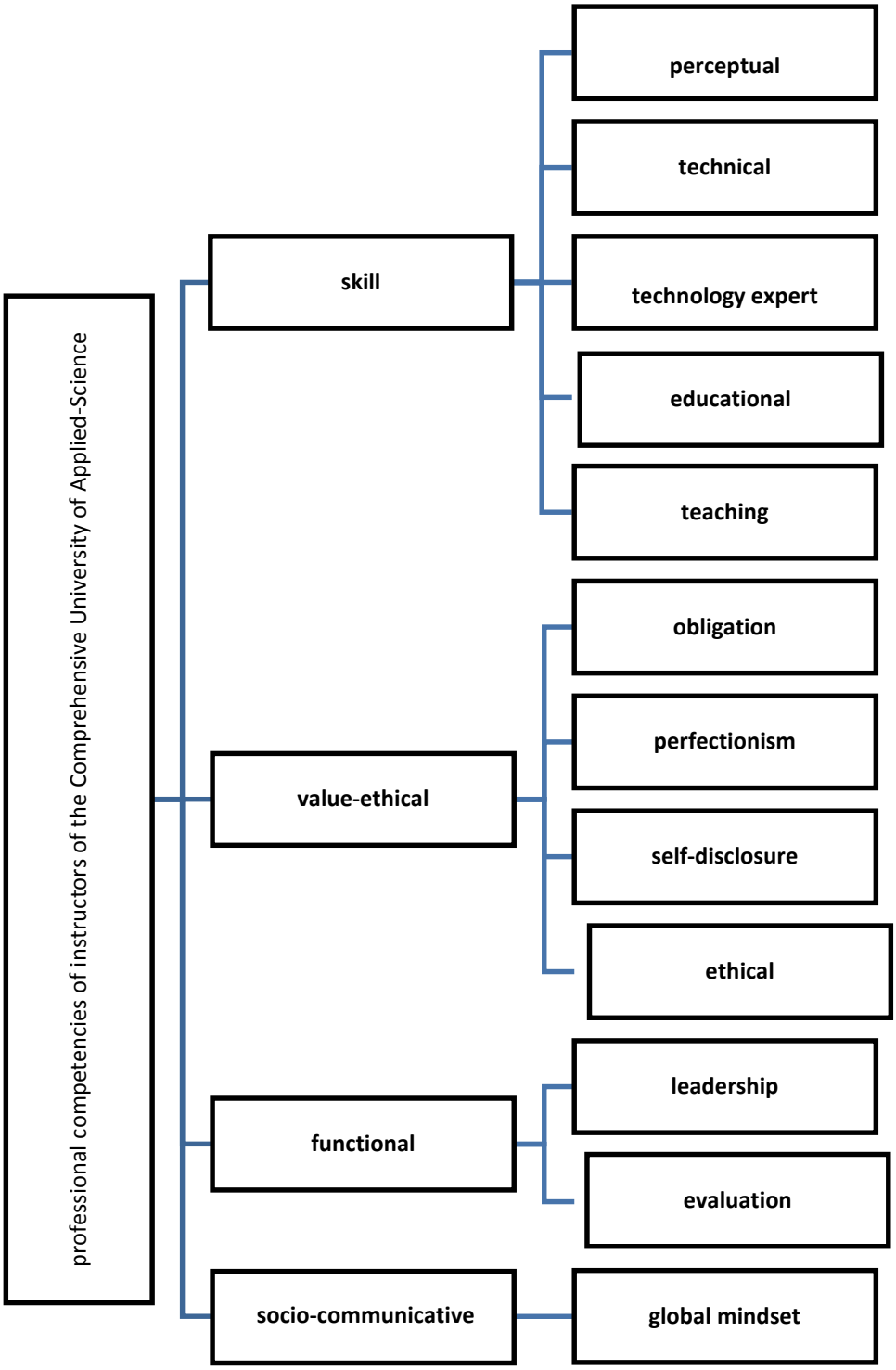

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Figure 1. Conceptual model based on literature and research background

In the skill dimension and its components (perceptual, technical, teaching, technology expert, educational), the results showed that this dimension is quite appropriate in terms of appropriateness to the concept and its importance is moderate to high. Also, adding of classroom management components as well as technologist and virtual to this dimension was one of the new suggestions of experts and thinkers. In the value-ethical dimension and its components (obligation, perfectionism, self-disclosure, ethical), the results showed that this dimension is quite appropriate in terms of appropriateness to the concept and its importance is moderate to high. Adding the component of positive perfectionism and removing the component of self-disclosure to this dimension was also one of the new suggestions of experts and thinkers. In the functional dimension and its components (leadership, evaluation), it was shown that this dimension is quite appropriate in terms of appropriateness to the concept and its importance is moderate to high. Also, adding the assessment component instead of evaluation was new suggestions of experts and thinkers. Concerning the socio-communication dimension and its component (global mindset), it was shown that this dimension is quite appropriate in terms of appropriateness to the concept and its level of importance is moderate to high.

Material and Methods

The Comprehensive University of Applied Science, established 27 years ago with the aim of providing skills training in the real work environment, has 31 provincial units, 573 centers of applied science training with about 300000 students and 54000 instructors. The present study was conducted with the aim of designing and testing of the model of instructors' professional competencies. This research was an applied study in terms of aim and exploratory in terms of method. The data were collected by quantitative method. To analyze the data, inferential analysis method and data description and exploratory factor analysis were used with the aim of discovering structure for shaping variables and classifying them by assuming that each variable may be related to each factor, and confirmatory factor analysis was used to measure the questionnaire data. As its questions were confirmed by the experts, the content validity of the questionnaire was also confirmed. The statistical population of this study included all instructors of the comprehensive university of applied-science of Iran, which included 54000 people. Cochran's formula was used to calculate the sample size. In this study, 391 university instructors from 10 provinces and 30 centers participated. In this study, to collect data related to literature and theoretical foundations, formulate hypotheses and provide initial model of the research, library (study of books, articles, journals, research projects and databases (internet) as well as a researcher-made questionnaire were used.

Cronbach's alpha coefficient for the whole questionnaire of professional competency of instructors was obtained at 98 %, indicating a good reliability.

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The collected data were analyzed by descriptive and inferential methods through SPSS 16 and Smart PLS software. Smart PLS software is one of the major and important software for path modeling (path analysis). This software can process and analyze raw data and design and test the model. In this research, descriptive statistics, including frequency, frequency percentage, frequency distribution table, and charts were used to describe the data. In inferential analysis section, factor analysis method was used to analyze the data.

Results

The subjects of this study included 391 people whose demographic characteristics are as follows. Investigating the gender of the selected respondents in the sample shows that male respondents had the highest frequency in this study. Investigating the age of the selected respondents in the sample shows that the lowest percentage of respondents was aged between 20 and 30 years and the highest percentage of respondents was aged between 31and 40 years. Investigating the level of education of the selected respondents in the sample shows that the lowest percentage of respondents had associate's degree, and the highest percentage of respondents had master's degree. Investigating the employment history of the selected respondents in the sample shows that the highest percentage of respondents had an employment history of between 6 and 10 years and the lowest percentage of the respondents had an employment history of 21 years and higher. Investigating the academic rank of the selected respondents in the sample shows that the lowest percentage of respondents had the academic rank of professor and the highest percentage of respondents had the academic rank of instructor.

Tables 1 and 2 present the path coefficients of the components of professional competency model of the instructors of the comprehensive university of applied-science and its significance.

Table 1. Path coefficients of the components of professional competency model

Component	Factor load	Indicator	Path coefficient	*p*
Leadership	.827	5-Ability to identify different methods of student learning	.743	.001
	.825	6-Ability to implement practical teaching methods in accordance with the objectives of applied science education		
	.808	7. Ability to guide the educational process through the proper use of technology		
	.807	8-Setting time with content and learning conditions		
assessment	.892	12. Ability to report assessment results and appropriate feedback to stakeholders	.790	.001
	.887	13- Ability to develop entrance assessment programs to determine the starting point in each session		
	.910	14Ability to implement various assessment methods (individually, group, etc.)		
Perceptual	.883	15-Awareness and mastery of the educational rules and regulations of the applied science system	.735	.001
	.827	16. Having extensive knowledge and awareness about real work environments		
	.878	17. Having up-to-date and comprehensive knowledge about the applied-science education system		
Classroom management	.878	18. Formulation of goals in teaching (long-term, short-term and immediate)	.792	.001
	.904	19. Familiarity with new and innovative teaching models and approaches		

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	.859	20. Ability to use students' sensory-analytical mechanisms correctly in learning		
	.884	21-Combining practice and theory to apply what has been learned in students' practical and social activities		
Technological and virtual	.895	22- Ability to use up-to-date educational and research technologies to enhance students' learning	.741	.001
	.894	23. Ability to guide the educational process through the proper use of virtual environments		
	.549	24. Familiarity with virtual tools, resources and educational applications in the system of applied science education		
Educational	.439	25. Play the role of facilitator instead of presenting material and lecturing	.749	.001
	.901	26. Continuous learning about the latest scientific findings and skills in the applied science education system		
	.910	27. Strengthening innovative and creative methods in the processes of the applied science education system		
obligation	.811	28. Belief in the values and goals of the applied science education system	.733	.001
	.902	29. Aligning your personal goals with the goals of the applied science education system		
	.867	30. Strengthening the values of the system of applied science education system in students		
Positive perfectionism	.890	31. Feeling successful and satisfied with the results of their activities	.746	.001
	.911	32- Welcoming criticism and comments of coworkers and students with openness		
	.891	33. Belief in job identity and motivation to strengthen it		
Ethical	.912	34. Belief in and adherence to professional ethical in accordance with socio-cultural values in applied science education environment	.802	.001
	.883	35. Scientific and moral humility		
	.880	36.tendency for lifelong learning		
Global mindset	.904	55. Ability to guide and train graduates with the ability to compete at global level	.571	.001
	.575	56. Familiarity with the inputs, processes and consequences of globalization and playing a role in the global network of education, research and technology		
	.589	57. Ability to use data sources, databases and transfer the latest knowledge and skills of the world to the system of applied science education		

Table 2. Significance of the path coefficient of the components of the professional competency model of instructors of the comprehensive university of applied-science

Row	Component	Path coefficient	*p*
1	Ethical	.895	.001
2	Classroom management	.890	
3	assessment	.889	
4	Educational	.865	
5	Positive perfectionism	.864	
6	Leadership	.862	
7	Technological and virtual	.861	
8	Perceptual	.857	
9	obligation	.856	
10	Global mindset	.756	

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As shown, all components have factor load and the path coefficient of greater than 0.3, and the whole model is significant, so no component is removed from path analysis. In Table 3, the priority of each component based on its factor load is presented from highest priority to lowest priority.

Table 3. Priority of components based on the factor load of each component

Row	Priority	Component	Factor Load
1	first priority	Ethical	.802
2	second priority	Classroom management	.792
3	Third priority	assessment	.790
4	Fourth priority	Educational	.749
5	fifth priority	Positive perfectionism	.746
6	sixth priority	Leadership	.743
7	seventh priority	Technological and virtual	.741
8	eighth priority	Perceptual	.735
9	ninth priority	obligation	.733
10	tenth priority	Global mindset	.571

Finally, according to the model of factor analysis of indicators of professional competencies of instructors of the University of Applied-Science in Figure 2, the "model of professional competencies of instructors of the University of applied science" is presented as follows:

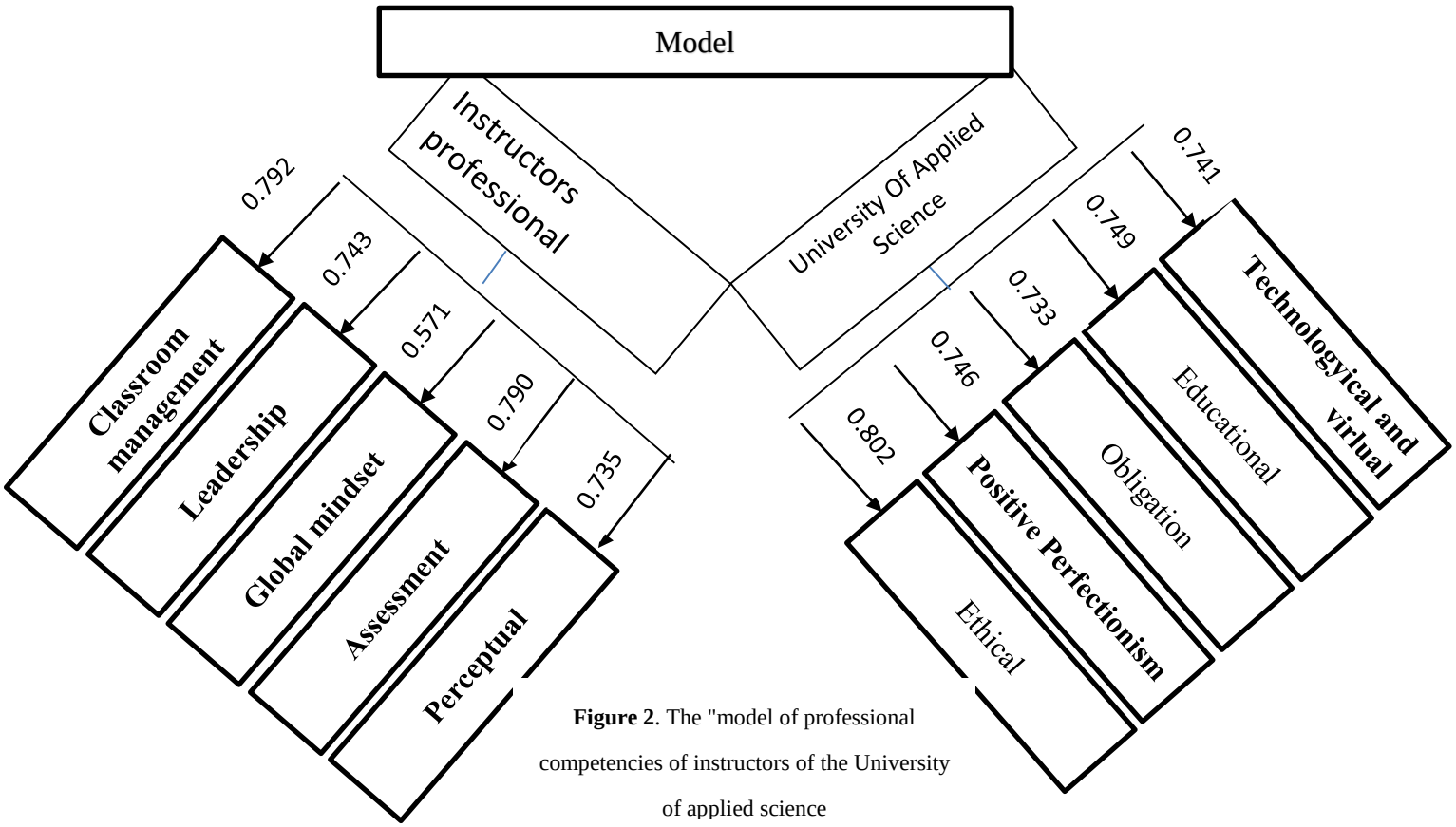

Figure 2. The "model of professional competencies of instructors of the University of applied science

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What are the components and indicators of the model of professional competency of the instructors of the comprehensive university of applied-science? Based on previous studies, the factors, dimensions and components of the model of professional competencies of instructors of the University of Applied-Science were obtained. These factors include leadership, assessment, perceptual, classroom management, technological and virtual, educational, obligation, positive perfectionism, ethical, and global mindset. Then, the researcher evaluated the dimensions and components of these factors in the questionnaire and examined the factor loads using factor analysis. Since factor load and their path coefficient of all components are more than 0.3 and the whole model is significant, no component was removed from the path analysis and all components with their indicators under the title of dimensions and components of model of professional competency of instructors of University of Applied-Science were accepted. To examine the fitness of the model, χ^2 was examined. Low χ^2 and the ratio of chi-square to the degree of freedom which was lower than 3 indicate a good fitness of the model.

Table 4. Model fit indices

Index	Acceptable Range	Leadership	Assessment	Perceptual	Classroom Management	Technologic And Virtual
X^2	-	22.41	14.05	93.96	17.39	33.55
df	-	32	39	34	37	35
X^2/df	≤ 3	.70	.36	2.76	.47	.96
RMSEA	≤ .08	.033	.039	.058	.088	.080
RMR	≤ .08	.011	.035	.046	.026	.025
NFI	close to 1	.81	.89	.85	.88	.83
CFI	close to 1	.83	.87	.88	.89	.81
GFI	close to 1	.85	.86	.89	.83	.87
AGFI	close to 1	.86	.82	.87	.81	.89
X^2	-	61.15	34.26	49.76	34.41	61.59
df	-	33	31	30	40	23
X^2/df	≤ 3	1.85	1.11	1.66	.86	2.68
RMSEA	≤ .08	.023	.129	.057	.080	.028
RMR	≤ .08	.036	.023	.022	.039	.022
NFI	close to 1	.86	.83	.82	.89	.88
CFI	close to 1	.87	.88	.88	.83	.86
GFI	close to 1	.86	.89	.89	.85	.87
AGFI	close to 1	.82	.87	.79	.86	.87

Lastly, it should be noted that the values of RMSEA and RMR less than 0.8, GFI and AGFI above 90% and close to one indicate the validity of the model. All these indices have desirable values. In the present model, the components of professional competency (leadership, assessment, perceptual, classroom management, technological and virtual, educational, obligation, positive perfectionism, ethical, and global mindset) were considered as observed variables and the variable of professional competency was considered as a latent variable 2. Model fitness indices in factor analysis confirm the model fit.

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Discussion

In the present study, by identifying the dimensions, components and key indicators, the model of professional competencies of the instructors of the Comprehensive University of Applied Science was presented, which can solve the most important challenges. This model takes into account all the basic requirements of the university with a focus on instructors. The results of the present study are in line with the results of the research conducted by Zhang and Jianhu (as cited in Qiuan & Keen, 2009) under the title of "The competencies of faculty members in higher professional colleges and the results of the research conducted by Blend et al. (2006) as cited in Milner, Gossick, & Thorndike, 2011) in the United States, as well as the results of the research conducted by Pofianko (2019), who sought to achieve competency standards for 21st century instructors and provided a model for the organizational competencies of the faculty members of the University of Medical Sciences in the United States. The results are also in line with the results of the research conducted by Blazkova et al. (2014) to analyze the individual-professional characteristics of faculty members of University of Zilina in Slovak Republic and the results of the research conducted by Blazkova et al. (2015) to examine the competencies of faculty members of universities in the Czech Republic and Poland. These results are also in line with those of the research conducted by Robert et al and Chitham and Chivers (2010 as cited in Hashemi et al., 2016) and Zolkifki (2016) under the title of training programs for professional instructors and the research conducted by Diep and Hartmann (2016). Also, the results are in line with the results of some domestic studies such as Salimi et al. (2015), Jafari et al. (2011, as cited in Sangari, 2017), Farzaneh et al. (2015), Jalili and Niknam (2014), Nasiri and Abdolmaleki (2014), Hashemi et al (2016), Chitsaz (2011), and Salimi, Heidari and Keshavarzi (2015). Given what was stated above and considering the previous studies and the analysis of data and information as well as the study of factors, dimensions and components of the model of professional competency of University of Applied-Science, the following suggestions can be made based on findings and in accordance with the mechanisms and prioritization of components appropriate for the model of instructors' professional competency:

• Suggestions based on findings in accordance with mechanisms

Suggestions based on mechanisms: Types of learning skills (observation, questioning, thinking and reflection, hypothesizing, predicting, tool application skills, measuring and calculating skills, effective social relationships, designing and constructing, interpreting findings, and finally repetition).

• Appropriate mechanisms to strengthen instructors' ethical skills

-Creating and strengthening belief in and adherence to professional ethics in accordance with socio-cultural values in applied-science environment

- Creating and strengthening scientific and ethical humility

-Creating and strengthening the desire for lifelong learning

• Appropriate mechanisms to strengthen instructors' classroom management skills

- Creating and strengthening skills for setting goals in teaching (long-term, short-term and immediate)

- Creating and strengthening work skills with new and innovative teaching models and approaches

- Creating and strengthening skills of correct application of sensory-analytical mechanisms of students in learning
- Creating and strengthening skills of combining practice and theory to apply what has been learned in practical and social activities of students

• Appropriate mechanisms to strengthen instructors' assessment skills

- Creating and strengthening skills of formulating the assessment results report and appropriate feedback to stakeholders
- Creating and strengthen skills of formulating entrance assessment programs to determine the starting point in each session
- Creating and strengthening skills of implementing various assessment methods (individual, group, etc.)

• Appropriate mechanisms to strengthen instructors' educational skills

- Creating and strengthening skills of playing the role of facilitator instead of presenting material and lecturing
- Creating and strengthening continuous learning skills about the latest scientific findings and skills in the applied science education system
-Creating and strengthening skills of innovative and creative methods in the processes of the applied science education system

• Appropriate mechanisms to strengthen instructors' positive perfectionism skills

-Creating and strengthening skills of feeling successful and satisfied with the results of your activities
- Creating and strengthening skills of welcoming criticism and comments of coworkers and students with openness
-Creating and strengthening belief in job identity and motivation to strengthen it

• Appropriate mechanisms to strengthen instructors' leadership skills

- Creating and strengthening skills of identifying and recognizing different methods of students' learning
-Creating and strengthening skills of implementing practical teaching methods in accordance with the objectives of applied-science education
- Creating and strengthening skills to guide the educational process through the proper use of technology
- Creating and strengthening time management skills with content and learning conditions

• Appropriate mechanisms to strengthen instructors' technological and virtual skills

- Creating and strengthening skills of using up-to-date educational and research technologies to enhance students' learning
-Creating and strengthening skills of leading the educational process through the proper use of virtual environments
-Creating and strengthening skills of working with virtual tools, resources and educational applications in the applied science education system

• Appropriate mechanisms to strengthen instructors' perceptual skills

-Creating and strengthening skills of awareness and mastery of the educational rules and regulations of the applied scientific system

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-Creating and strengthening skills to have extensive knowledge and awareness of real work environments

-Creating and strengthening skills to have up-to-date and comprehensive knowledge about the applied science education system

• Appropriate mechanisms to strengthen instructors' obligation skills

-Creating and strengthening belief in the values and goals of the applied science education system

-Creating and strengthening skills to align their personal goals with the goals of the applied science education system

-Creating and strengthening values of applied science education system in students

• Appropriate mechanisms to strengthen instructors' global mindset skills

- Creating and strengthening leadership skills and training of graduates with the ability to compete at global level

- Creating and strengthening skills to work with the inputs, processes and consequences of globalization and play a role in the global network of education, research and technology

- Creating and strengthening skills for using databases and transferring the latest knowledge and skills to applied science education system.

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