

A STUDY ON INSTRUCTORS' INFORMATION TECHNOLOGY INSTRUCTIONAL COMPETENCY IN ZHENGZHOU UNIVERSITY OF INDUSTRIAL TECHNOLOGY, HENAN PROVINCE, CHINA

Xinran Wang^{1*}

Yan Ye²

¹ Master's candidate in Educational Administration, Stamford International University of Thailand

² Assistant Professor, Lecturer, Stamford International University

* Corresponding Author, E-mail: wxr15539164534@outlook.com

Abstract: This study focused on the development concept of education power and education modernization, takes the information application competency as the starting point, based on based on TPACK framework as the guidance, and took the current situation of information Instructional Competency at Zhengzhou Institute of Industrial Application Technology as the research goal. The study analyzed the instructors' informatization technology instructional competency level which was regarded as high; and determined there were significant differences in instructors' information Instructional Competency of Zhengzhou Institute of Industrial Applied Technology under different demographic factors. This study concluded that the Instructors of Zhengzhou Institute of Industrial Applied Technology in the field of Instructors in the background of teaching years. Thought is the forerunner of behavior, and the decisive factor of the effective application of information technology to improve teaching is instructors' self-efficacy.

Keywords: Instructors, Information Technology Instructional Competency

Introduction

Higher education is an important part of China's education system, which undertakes the important task of cultivating tens of millions of high-quality talents and plays an important and fundamental role in building a modern education system with Chinese characteristics. Instructors are the key elements in the development of educational informatization, and instructors' competency to apply information technology directly affects the reform of information technology to education and teaching (Chen, 2020).

In 2010, China's Outline of Education Planning pointed out that "information technology has a revolutionary impact on education and must be highly attached to it". In 2018, the Ministry of Education issued the Action Plan for Education Informationization 2.0, which takes education

informationization as an endogenous variable of the reform of the education system. The new generation of information technology and its application in education will get more attention, and the education administrative department will continue to introduce new policies to promote the in-depth development of education informationization (Ren, 2023).

The sudden outbreak of COVID-19 in 2020 has forced college Instructors to adopt online teaching to ensure "no suspension of classes". After experiencing the big test of information teaching, the information Instructional Competency of university Instructors has attracted widespread attention and attention, and higher requirements have been put forward for the application of information technology of university Instructors (Yang, 2022).

In 2023, the Digital Literacy of Teacher education industry standard was released, aiming to enhance instructors' awareness, competency and responsibility to optimize, innovate and transform educational and teaching activities by using digital technology. To this end, we have made new arrangements for the integration of new technologies and teacher work and decided to launch the pilot action of artificial intelligence. Promoting the construction of teacher team. In addition to improving the technical literacy of Instructors, we have promoted the exploration of new paths and new modes of artificial intelligence, the big data, 5G and other new technologies to help instructors' information Instructional Competency. At the same time, under the social background of industrial upgrading and economic structure adjustment, higher education needs to connect with the latest development of the industry. Therefore, the information Instructional Competency of university Instructors is an urgent task at present, and also the ardent expectation of the society for college education reform.

Research Objectives

The following objectives were developed for this study:

- 1) To identify the demographic factors of Instructors in Zhengzhou Institute of Industrial Applied Technology.
- 2) To identify the level of the information Instructional Competency of Instructors in Zhengzhou Institute of Industrial Application Technology.
- 3) To compare the differences in instructors' information Instructional Competency of Zhengzhou Institute of Industrial Applied Technology under different demographic factors.

Literature Review

The Concept of Information Technology for College Instructors

Scholars usually use "TPACK", "Technology Integration" and "ICT integration" to express instructors' information Instructional Competency, and they have rich research on their conceptual connotation.

Markauskaite & Goodwin (2006) believed that information-based Instructional Competency is Instructors 'competency to use information and communication technology (ICT) to carry out students' learning situation analysis, organize, manage and implement classroom teaching, and evaluate and give feedback on the teaching process. Linda, Francesc (2018) suggested that information Instructional Competency is the teacher to effectively realize the technology of education management and deployment of all the knowledge and skills, for Instructors can realize the important role of technology to teaching practice, can use the information and communication technology rich teaching strategy and teaching content, can use the opportunity of technology environment for autonomous learning and reflection, can use the information and communication technology to assist students in the key environment education work. Lueg (2019) agreed that information Instructional Competency is a kind of multidimensional competency, Instructors can use information and communication technology search, critical selection, obtaining and processing information, and turn it into knowledge, at the same time by using different technology and digital media to exchange information, respect social rules, and use these technical tools in different interactive scene learning and solve problems.

Related Studies on the TPACK Framework

Research on the TPACK framework (the framework of subject pedagogy knowledge based on integrated technology) dates back to 2005. Two scholars, Mishra and Koehler from Michigan State University, integrated technical knowledge into the teacher knowledge framework and proposed the TPACK framework. The TPACK framework provides new ideas and methods in improving the information Instructional Competency of university Instructors (Li, 2015), which has been gradually promoted in universities after being introduced into China. The research on TPACK theory in China was first started by Professor Jiao Jianli and its Progress published by Jiao (2010) in the journal of Distance Education. At present, although scholars do not agree on the knowledge category of each component of TPACK knowledge framework, they generally agree with the importance of TPACK knowledge framework and believe that TPACK knowledge framework is the knowledge base of information teaching design competency (Hu, 2022). Therefore, the research based on the TPACK knowledge framework will be helpful to cultivate and develop the information teaching design competency of high school English Instructors.

Related Research on Information Instructional Competency

Since the 1960s, with the rapid development of global science and technology, computer technology has been gradually applied to education and teaching, resulting in computer-aided teaching. This teaching method integrates pictures, audio, and video into teaching, and improves the teaching quality to a great extent (Ren, 2023).

Song (2020) analyzed the existence of instructors' information Instructional Competency, and pointed out that the low integration of technology and teaching is embodied in two situations. One is

traditional teaching and applying information technology in classroom teaching, but not combined with teaching mode and teaching content. At present, Chinese researchers have begun to apply artificial intelligence technology to education informatization 2.0, explore new fields of education big data, intelligent evaluation, virtual simulation and so on, promote AI courses, and realize AI teaching. The Chinese research results have provided useful ideas and guidance for the practical application of "Education Informatization 2.0" and promoted the modernization and digital transformation of education (Ren, 2023).

Therefore, from the perspective of the development trend of information-based teaching, information-oriented teaching pursues more connotative development, pays attention to the structural reform of the teaching process, meets the students' learning demands, and improves the teaching quality. Therefore, the information-based Instructional Competency of university Instructors needs to be improved urgently.

Research on Instructors' Information Instructional Competency with Different Demographics

Through empirical exploration, many scholars have analyzed that the factors affecting instructors' information Instructional Competency mainly include personal background and personal attitude. Alsharief (2018) stated the attitude and self-efficacy towards information technology are the main factors affecting the level of individual information Instructional Competency. Agyei (2011) found that positive attitude, technical competency and other aspects are the basic elements that can effectively influence the integration of information technology into classroom practice.

Setiawan (2018) found with the help of empirical research, found that gender, education level and age significantly affect the instructors' information Instructional Competency, and points out that the lack of resources access channels, time and training learning activities is the development of Instructors external Instructional Competency, and lack of technology application consciousness, self-efficacy and negative attitude to technology update is the internal obstacle. Filiz and Yasemin (2009) claimed that instructors' information Instructional Competency is influenced by age, education level, information technology level and other factors. Wu (2023) found that Instructors 'working years were negatively correlated with instructors' information Instructional Competency, while other factors had a positive impact on instructors' information Instructional Competency. The information Instructional Competency of university Instructors is influenced by the individual level (years of work, subject background, self-efficacy and information ethics) and the school level (school type).

Methodology

This study of Zhengzhou Industrial Application Technology Institute of instructors' information teaching factors, the questionnaire survey, using the quantitative research method, using SPSS 26.0 software data analysis, understand the instructors' information Instructional Competency in the

demographic differences, inspection of industrial application technology institute of Zhengzhou Instructors informatization Instructional Competency correlation. The questionnaire is 5-point Likert scale, which consists of five options: fully conforming, conforming, inconsistent, and nonconforming, with 5,4,3,2 and 1 respectively. A total of 278 questionnaires were issued, and 160 valid questionnaires were recovered.

As the study's scale was an adaptation of the previous questionnaire, the investigators conducted a pilot test of 40 people to determine the reliability of the study before surveying the entire sample. The results of the pilot test showed that the Cronbach alpha coefficient was 0.965. Subsequently, KMO and Bartlett tests were used to evaluate construct validity. The findings showed that the Kaiser-Meyer-Olkin (KMO) value exceeded 0.5 (KMO = 0.731) and the p-value was below 0.05 ($p=0.000$).

Results

Demographic factors analysis

According to the data of respondents, in terms of gender distribution, there were 84 female samples, accounting for 70.6%, and 35 male samples, accounting for 29.4%, which is basically the same as the actual gender ratio of Instructors in Zhengzhou Institute of Industrial Applied Technology and is in line with the actual situation.

Table 1: Descriptive statistics for the demographic information

Demographics	Group	Number	Percentage
Gender	Male	84	29.4
	Female	35	70.6
Educational degrees	Bachelor's degree or below	27	22.7
	Master's degree or above	89	74.8
Professional titles	Senior Title	30	25.2
	Medium Title	47	39.5
	Junior Title	26	21.8
	No title	16	13.4
Working experiences	Under 5 years	46	38.7
	6-10 Years	21	17.6
	11-15 Years	15	15.1
	16-20 Years	26	21.8
	More than 20 years	8	6.7

In terms of education distribution, there are only 3 students with doctoral degree or above, accounting for the lowest 2.5%, 74.8% for master's degree, and 22.7% with bachelor's degree or below. In terms of the distribution of professional titles, the proportion from high to low was less than 25.2%, 39.5%, 21.8% and 13.4%, respectively. In terms of the distribution of teaching age, the number of people in the stage of 5 years or less is large, accounting for 38.7%, while the remaining 4 teaching age groups accounted for 17%, 15.1%, 21.8% and 6.7% respectively.

Descriptive analysis results

As can be seen from Table 2. The average value of the dimension of teacher information teaching awareness is the highest among all dimensions (M=3.80), which shows that Instructors in Zhengzhou Institute of Industrial Application Technology have a strong awareness of information teaching. Information teaching knowledge is the higher one of all variables, ranking the second (M=3.68), which indicated that the Instructors at Zhengzhou Institute of Industrial Application Technology had a higher knowledge competency. The mean value of the informatization application competency (M=3.64), which indicates that the informatization application competency was relatively high. The mean value of information teaching innovation (M=3.47). As mentioned above, the Instructors at Zhengzhou Institute of Industrial Application Technology have a strong sense of information teaching, and can consciously design teaching activities in teaching practice, so as to constantly improve the competency of information teaching innovation.

Table 2: The level of Instructors’ Information Instructional Competency

Dimensions	Mean	SD
Information teaching awareness	3.80	0.85
Information teaching knowledge	3.68	0.90
Information application competency	3.64	1.25
Information teaching innovation	3.47	0.87
Overall	3.71	0.93

Difference Analysis based on Hypothesis Testing Results

Table 3 shows the independent sample t-test analysis of gender in the four dimensions of instructors’ information Instructional Competency and the total score. It can be found that college Instructors of different genders: (1) there was no significant difference in informatization Instructional Competency; (2) there was a significant difference in informatization application competency dimension, and male Instructors score higher.

Table 3: Comparison of instructors’ information Instructional Competency with Gender

Dimensions	Gender	M	SD	T	P
Overall	Male	3.83	0.62	1.662	0.70
	Female	3.60	0.64		
Information teaching consciousness	Male	3.91	0.58	1.016	0.311
	Female	3.79	0.63		
Information teaching knowledge	Male	3.60	0.55	1.0453	0.204
	Female	2.87	0.61		
Information application competency	Male	3.83	0.69	1.989	0.049*
	Female	3.57	0.66		
Information teaching innovation	Male	3.95	0.67	1.961	0.052
	Female	3.66	0.78		

Noted: *P<0.05; **P<0.01; ***P<0.001

Table 4 shows the independent sample t-test of the four dimensions of the Instructional Competency of information technology of Instructors with different educational levels. The data results show that Instructors with different degrees have significant differences in information application competency ($t=2.705$, $p=0.008 < 0.01$), the higher the degree, the stronger the information application competency; there is no significant difference between Instructors with different degrees in the other two first-level dimensions. In conclusion, there is no significant difference in information Instructional Competency, information application competency.

Table 4: Comparison of instructors’ information Instructional Competency with Educational Levels

Dimension	Educational Level	M	SD	T	P
Overall	Bachelor’s degree and below	3.78	0.63	2.016	0.071
	Master's degree or above	3.58	0.64		
Information teaching consciousness	Bachelor’s degree and below	3.86	0.59	.588	.557
	Master's degree or above	3.80	0.64		
Information teaching knowledge	Bachelor’s degree and below	3.76	0.78	.766	.455
	Master's degree or above	3.65	0.82		
Information application competency	Bachelor’s degree and below	3.83	0.67	2.705	.008**
	Master's degree or above	3.52	0.65		
Information teaching innovation	Bachelor’s degree and below	3.88	0.77	1.788	.076
	Master's degree or above	3.64	0.75		

Noted: * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$

Table 5 shows the four dimensions of information Instructional Competency of Instructors with different professional titles and the total score. After one-way ANOVA, it was found that there was no significant difference in information Instructional Competency of university Instructors with different professional titles ($F=2.199$, $p=0.091$). In terms of each level dimension, the scores of Instructors with different professional titles ($F=4.451$, $p=0.005 < 0.01$) and information teaching innovation competency ($F=2.935$, $p=0.036 < 0.05$) were significantly different. After LSD post-test, it is found that the score of junior and intermediate Instructors is significantly higher than that of senior Instructors, and the score of primary information teaching innovation competency is significantly higher than that of senior Instructors. It is speculated that the reason is that because most of the senior Instructors are older teaching Instructors, information technology is a new concept for them, and the acquisition of technology and the change of ideas have certain challenges for them. On the one hand, it is difficult for older Instructors to keep up with the updating speed of information technology in the new era. On the other hand, old Instructors have certain teaching inertia and are more active in traditional teaching methods.

Table 5: Comparison of Instructors' information Instructional Competency with Professional Titles

Dimension	Professional Titles	M	SD	F	P
Overall	Senior Title	3.42	0.73	2.199	0.091
	Medium Title	3.67	0.67		
	Junior Title	3.81	0.49		
	No title	3.58	0.73		
Information teaching consciousness	Senior Title	3.62	0.68	1.364	0.256
	Medium Title	3.82	0.58		
	Junior Title	3.91	0.52		
	No title	3.92	0.87		
Information teaching knowledge	Senior Title	3.42	0.73	2.199	0.091
	Medium Title	3.67	0.67		
	Junior Title	3.81	0.49		
	No title	3.58	0.73		
Information application competency	Senior Title	3.30	0.59	4.451**	0.005
	Medium Title	3.65	0.69		
	Junior Title	3.86	0.57		
	No title	3.53	0.82		
Information teaching innovation	Senior Title	3.45	0.84	2.935*	0.036
	Medium Title	3.78	0.74		
	Junior Title	3.93	0.64		
	No title	3.50	0.91		

Noted: *P<0.05; **P<0.01; ***P<0.001

Table 6 shows the four dimensions and the single-factor variance analysis of the information Instructional Competency of Instructors with different working experiences. As can be seen from the table, the information Instructional Competency of college Instructors with different teaching ages showed significant differences ($F=2.944$, $p=0.015 < 0.05$). To explore which there are significant differences between the pairing group, the LSD multiple comparison.

The results found: 5 years and below, 6 to 10 years, 11 to 15 years teaching Instructors informatization Instructional Competency is significantly higher than 20 years of teaching age, the teaching age within 15 years of young and middle-aged Instructors information Instructional Competency to obviously high old Instructors, the young and middle-aged Instructors to accept new things faster. At the same time, Instructors of different teaching ages showed significant differences in informatization application competency ($F=3.770$, $p=0.003 < 0.01$), informatization teaching innovation competency ($F=3.254$, $p=0.008 < 0.01$) and informatization teaching professional development competency ($F=2.665$, $p=0.025 < 0.05$).

Discussion

First, in the process of studying whether the background variables of Instructors in Zhengzhou Institute of Industrial Applied Technology differ from Instructors in the information Instructional Competency of Instructors in the Province of Henan Province. These findings are consistent with the

research results of Liu (2023), namely, there is no significant difference in four dimensions; no different Instructional Competency of different qualifications in different dimensions and overall level; different education Instructors in informatization Instructional Competency; and no different Instructors in different dimensions and overall level.

Table 6: Comparison of Instructors' information Instructional Competency with with different Educational Experiences

Dimension	Educational Experiences	M	SD	F	P
Overall	Under 5 years	3.552	0.761	4.737	0.006
	6-10 Years	3.901	0.801		
	11-15 Years	3.861	0.766		
	16-20 Years	3.614	0.586		
	More than 20 years	3.766	0.712		
Information teaching consciousness	Under 5 years	3.87	0.57	1.960	0.089
	6-10 Years	4.00	0.58		
	11-15 Years	3.97	0.76		
	16-20 Years	3.70	0.51		
	More than 20 years	3.88	0.60		
Information teaching knowledge	Under 5 years	3.52	0.68	1.481	0.025
	6-10 Years	3.62	0.67		
	11-15 Years	3.76	0.74		
	16-20 Years	3.33	0.90		
	More than 20 years	3.18	0.87		
Information application competency	Under 5 years	3.78	0.64	3.770**	0.003
	6-10 Years	3.75	0.54		
	11-15 Years	3.93	0.80		
	16-20 Years	3.53	0.71		
	More than 20 years	3.50	0.63		
Information teaching innovation	Under 5 years	3.78	0.74	3.254*	0.008
	6-10 Years	3.91	0.57		
	11-15 Years	4.18	0.79		
	16-20 Years	3.48	0.72		
	More than 20 years	3.62	0.70		

Noted: *P<0.05; **P<0.01; ***P<0.001

Second, the score of Instructors 'information teaching knowledge is second only to instructors' teaching consciousness, which can be seen that Zhengzhou Institute of Industrial Application Technology pays more attention to the training and publicity of information teaching. From Table 4-6, in the information teaching knowledge dimension, different teaching of college Instructors informatization Instructional Competency presents a significant difference, low teaching Instructors informatization teaching knowledge, information application competency and teaching innovation competency is better than high teaching Instructors, Zhu (2016) found that its influence factors from individual conclusion consistent with external factors. Aslan (2016) concluded that Instructors

information communication technology integration perception, computer anxiety, technology perception and teaching knowledge of these factors significantly on instructors' information Instructional Competency. From the perspective of information software development, colleges and universities pay attention to improving the basic professional knowledge of information teaching, the knowledge that Instructors must teach, and how to use the knowledge of information technology.

Third, in the dimension of instructors' information application competency, the data analysis results show that Instructors are familiar with the use of general teaching software and hardware at present, while the application competency of old Instructors to use software and hardware is obviously insufficient. At the same time, Instructors with different background variables are significantly different from the application competency of information technology. Filiz and Yasemin (2009) believed that instructors' information Instructional Competency is influenced by age, education level, information technology level and other factors. Zhengzhou industrial application technology institute facing this situation and it's similar to Setiawan's (2018) research finding, male Instructors application competency significantly higher than female Instructors, degree higher the information application competency, because the senior title of Instructors is mostly teaching older old Instructors, information technology is a new concept for them, acquire technology and changing ideas, there are certain challenges for them. On the one hand, it is difficult for older Instructors to keep up with the updating speed of information technology in the new era. On the other hand, old Instructors have certain teaching inertia and are more active in traditional teaching methods.

Fourth, the overall lowest in Instructors information teaching innovation dimension, Instructors in Zhengzhou industrial application technology institute of the existing technical resources to master certain access channels, according to the teaching objectives and classroom situation to choose appropriate resources and teaching methods, but according to the need of existing resources for secondary processing or creation competency is weak, especially the independent development to create. And Instructors informatization teaching innovation competency and title is significant difference, as Liu (2023) also found different titles of higher vocational Instructors in various dimensions and overall level there is no significant difference in the conclusion is inconsistent, Instructors informatization teaching innovation competency and teaching age is significant difference, Wu's (2023) research found no significant difference. In the face of this situation, Liu (2023) proposed that there are significant differences in the overall level of information Instructional Competency of higher vocational Instructors with different teaching ages. Consistent with the findings of this study.

Fifth, the differences in different background variables and information Instructional Competency of Instructors of Henan Zhengzhou Institute of Industrial Application Technology are discussed. According to the aforementioned literature discussion, Wu (2023) found that independent variables such as gender, age and attitude have no significant influence on the information Instructional

Competency of university Instructors. Setiawan (2018) scholars with the help of empirical research, found that gender, education level and age significantly affect the instructors' information Instructional Competency, and points out that the lack of resources access channels, time and training learning activities is the development of Instructors external Instructional Competency, and the lack of technology application consciousness, self-efficacy and negative attitude to technology update is the internal obstacle. Such results analyze the relationship between Ding (2020) and school atmosphere, Instructors 'achievement motivation and instructors' innovation behavior, determine instructors' achievement motivation, and play an intermediary role between school atmosphere and teaching innovation. Yasin (1996) studied corporate employees in Jordan and found a high correlation between achievement skills and job satisfaction. This study concluded that the Instructors of Zhengzhou Institute of Industrial Applied Technology in the field of Instructors in the background of teaching years. Thought is the forerunner of behavior, and the decisive factor of the effective application of information technology to improve teaching is instructors' self-efficacy.

Conclusions

Based on the results of this study, we have reached the following conclusions: The level of instructors' information application competency in Zhengzhou Institute of Industrial Application and Technology was high. However, the instructors have better information teaching awareness and teaching innovation performance. The low-title instructors have better and information application. The level of junior instructors in Zhengzhou Institute of Industrial Applied Technology is generally higher than that of senior Instructors. Under the condition of different demographic factors, there are significant differences in the information Instructional Competency of Instructors in Zhengzhou Institute of Industrial Applied Technology.

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