

Digital Competence of College Teachers and Its Influencing Factors: Inputs for Teachers Technical Training

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Abstract: This research aims to investigate the level of digital competence and provide insights into the many aspects that impact the digital competence of teacher among instructors at many colleges in China. It provides a detailed examination of their ability to effectively use digital technology for teaching and learning purposes. The study used a mixed-methods methodology, integrating both survey and interview techniques, in order to get a comprehensive comprehension of educators' viewpoints and encounters. The results emphasize the need of implementing customized training programs in order to effectively handle the diverse range of digital skills among educators. This highlights the need of developing tailored professional development programs to enable educators to proficiently use digital technology into their instructional approaches. The findings of the study could help develop an effective improvement program to improve college teachers' digital competence. Ultimately, this study aimed to achieve the continuous and sustainable improvement in the quality of higher vocational education via improving college teachers' digital competence.

1. Introduction

Information technology has developed greatly and rapidly since the first decade of the 21st century. The updates and renewal in information technologies like big data and AI, based on data technology and algorithm models, have directly promoted the transformation of the original IT (Information Technology) society into a DT (Data Technology) society. Under such circumstance, the education field needs to think deeply and continuously about the talents' digital or intelligent abilities and competence required for the future society, which can be obviously reflected by the fact that emergency distance learning (ERT) was urgently adopted instead of face-to-face learning due to the pandemic crisis. As a result, digital competence plays more and more important role in future labor competition all around the world, which requires the transformation into and the strategic adoption of digital education in China. Therefore, it's quite important to improve college teachers' digital competence in China.

The development of educational informatization these years have shifted from developing

teacher literacy into developing teacher competence in China. China has made great progress in developing information-based education infrastructure, but college teachers have limited abilities and competence in using a wide range of information technologies and integrating technology into teaching to carry out expected teaching activities and achieve excellent teaching goals, which means that college teachers' actual digital competence is not enough to meet the needs of current teaching. This study aims to assess the factors that affect the digital competence of teachers in Chinese higher vocational colleges gearing toward designing an effective technical training for teachers, which aimed to achieve the continuous and sustainable improvement in the quality of higher vocational education via improving college teachers' digital competence.

2. Methodology

2.1 Research Design

This study used the descriptive research with quantitative techniques. The questionnaire was designed as a checklist to ensure an appropriate response situation for the respondents. The questionnaire will collect information from the interviewees in terms of sex, age, educational background and specialization. The researcher explored the factors that influence the teacher respondents' digital competence. The researcher further figured out the challenges teachers face on digital competence in teaching. The researcher interviewed some professional teachers who are required to have digital competence for teaching to test some of these problems and learn more about how these factors affect their teaching. The results of this analysis will form the basis for researchers to propose a development program to improve college teachers' digital competence.

2.2 Sampling Technique

The respondents of this study were teachers from 5 colleges in a province of southeast China. All respondents were full-time teachers and were obtained by random sampling. Using Qualtrics, the total samples at 5% margin of error from the population of 3325 should be 345 teachers. This study intends to collect 378 questionnaires from five sample colleges. Sampling is the process of selecting some samples from a large population to be the foundation for calculating or predicting the frequency of unrecognized information or results about the population.

Questionnaires were distributed via both online and offline ways. After collecting the questionnaires, the researcher identified and filtered them and eliminated the invalid ones. Then the researcher used the data statistics and analysis software of SPSS to make statistical analysis on the questionnaire data.

2.3 Data Gathering Procedure

Data for this study will be collected by carefully selecting five representative Chinese colleges. The researcher had completed all required consent forms before conducting a survey at the selected colleges in China. The respondents clearly knew that this study was only for academic purposes and would do no harm to their safety and privacy. The questionnaire was used as the main data collection tool. In addition, three open ended questions were designed to supplement the data from the closed questionnaire used. Before the actual data collection, a pilot test will be conducted among a small participant sample to assess the clarity and effectiveness of the questionnaires, with necessary adjustments made to enhance their reliability and validity. Then the researcher collected data, took effective measures to avoid data loss and interference of false data, and made statistical processing and tabulation. Upon the analysis and interpretation of the data, the researcher followed

up the research to identify and handle research problems. Finally, the researcher proposed and developed strategies to improve college teachers' digital competence.

3. Analysis and Interpretation of Data

3.1 Profile of the Respondents

Table 1 presents the frequency distribution of the Program participant respondents' profile in terms of Sex, Age, Gender, Educational Background and Specialization.

Table 1: Frequency Distribution of Student Respondents' Profile

Profile	Program participant	
	f	%
Sex		
Male	208	55.03%
Female	170	44.97%
Total	378	100%
Age		
Below 30	73	19.31%
31-40	153	40.48%
41-50	97	25.66%
Above 51	55	14.55%
Total	378	100%
Educational Background		
Doctor	46	12.17%
Master	280	74.07%
Undergraduate	52	13.76%
Below Undergraduate	0	0%
Total	378	100%
Specialization		
Literature	88	23.28%
Philosophy	94	24.87%
Economic	53	14.02%
Management	84	22.22%
Science	59	15.61%
Total	378	100%

In this command, the proportion of Program participant is 378.

Sex. 45% of the respondents were female while 55% were male. This means that most of the teachers are men.

Age. 19% were below 30 years old, 40% were between the ages of 31 and 40, 26% were between the ages of 41 and 50, and only 15% were 51 and older. Analysis of the data revealed that the majority of teachers are between the ages of 31 and 40.

Educational Background. 2% completed a doctoral degree, 74 %completed a master's degree, and 14 % were undergraduates. The descriptive data revealed that the vast majority of the respondents finished their master's degree.

Specialization. 14 % of them specialized in economics, 23 %specialized in literature, 22 % specialized in management, 22 % specialized in philosophy, and 16 % specialized in science. It indicates that the majority of those who responded have some level of expertise in philosophy.

3.2 Respondents' Assessment of their Vocational Skills

Table 2 shows the summary of Program teacher participants of the dimensions of their digital

competence from the view of the 4 aspects.

As shown in Table 2, in a holistic assessment, the Composite Mean of respondents' evaluations regarding the extent of effects on teachers' digital competence is calculated as 1.83. This score indicates that teacher participants perceive the impacts of the plan across the four aspects to be of Low Extent.

Table 2: Summary of teacher Respondents' of the Dimensions of Their Digital Competence

Variables	Program Participant				
	Mean	SD	Rank	QD	Int.
1. Professional Participation	1.77	0.47	4	A	HE
2. Teaching and Learning	1.85	0.60	1	A	HE
3. Assessment	1.85	0.60	2	A	HE
4. Enabling Learners	1.85	0.53	3	A	HE
Composite Mean	1.83	0.55		A	HE

Program participants, as a whole, hold the view that all four dimensions - Professional Participation (1.77), Teaching and Learning (1.85), Assessment (1.85). Enabling Learners (1.85) - don't reach the level of High Extent. The Composite Mean for these dimensions collectively is 1.83. Within this, Professional Participation receives the comparatively lower average score (1.77).

According to the analysis, these results imply that there may be difficulties in successfully incorporating digital technologies and platforms into their professional practices. It also highlights the urgent need for specific interventions designed to improve instructors' digital literacy and competence in using technology into educational methods, and a prevalent trend, namely, the significance of implementing focused training activities. These findings are consistent with the current emphasis on teachers' digital competence in vocational education, as highlighted by Morante^[1] and Fernandez, J. et al^[2] researches. In addition, Tzafilkou, Perifanou, and Economides^[3] support the idea that digital competence plays a key role in improving the professional competence of teachers, a view that is echoed in the perceptions of project participants observed in this study.

3.3 Respondents' Assessment on the Factors that Influence Teacher' Digital Competence

Table 3 shows the summary of Program teacher participants evaluation of the factors that influence teacher' digital competence from the view of the 4 aspects.

Table 3: Summary of Teacher Respondents' Assessment of the Factors that Influence Teacher' Digital Competence

Variables	Program Participant				
	Mean	SD	Rank	QD	Int.
1. Identified Distraction	1.94	0.41	1	A	HE
2. Digital Teaching-Purpose	1.79	0.61	4	A	HE
3. School Management	1.94	0.52	2	A	HE
4. Social Impact	1.87	0.48	3	A	HE
Composite Mean	1.89	0.51		A	HE

As showed in Table 3, the composite mean of the respondents' evaluation of the factors that influence teacher' digital competence is 1.89, which is interpreted as teacher participant believe that the effects of the four aspects can reach the level of Low Extent. Program participant generally believe that the 4 dimensions of Identified Distraction (1.94), Digital Teaching-Purpose (1.79), School Management (1.94), Social Impact (1.87) are at the level of Low Extent. Among them, the Value of Identified Distraction and School Management are the highest (1.94), and the Digital Teaching-Purpose is the lowest (1.79).

Scheel, Vladova, and Ullrich^[4], posted similar results with this study specifically on higher education digital learning share themes and goals. Additionally, the findings affirm the same footing with the study of Hinojo-Lucena et al^[5]. Both studies acknowledge the profound impact of technology improvements on several facets of society, namely within the realms of schooling and adult learning. Moreover, the study of Basilotta-Gómez-Pablos, Matarranz, Casado-Aranda, and Otto^[6] has a shade of similarities with the current finding. Both studies provide insight into the prominent position of digital competence within the field of education, highlighting the need for educators to proficiently use technology for educational objectives. This study expands upon these insights by underscoring the persistent need for continuing research and practical approaches to provide teachers with the requisite abilities for successful integration of digital technology in education.

4. Conclusions

(1) While a considerable proportion of educators demonstrate competence in effectively utilizing digital tools across different aspects such as professional engagement, teaching, learning, assessment, and supporting student learning, there is a subset of teachers who could potentially benefit from specific training and resources aimed at improving their digital proficiency. This highlights the need of customized professional development programs in order to guarantee that educators are able to proficiently use digital technology into their teaching methods, therefore fostering more comprehensive and inventive learning settings.

2) The observed variations in the evaluation of digital competence across different profiles underscore the need for tailored training initiatives that cater to the distinct requirements of diverse age cohorts, educational histories, and areas of expertise. Tailored methodologies will guarantee that educators acquire pertinent assistance in order to boost their digital competencies and proficiently use technology into their pedagogical methodologies.

3) As to the factors that influence teacher' digital competence, the results underscore the significance of mitigating identified sources of distraction, strengthening pedagogical tactics for digital instruction, optimizing school administration practices, and acknowledging the societal implications of digital proficiency in educational environments. The successful integration of digital technology in teaching and learning may be achieved by addressing these elements via focused training, support, and policy. This approach has the potential to enhance educational results and increase teacher competency.

4) Regarding the obstacles faced by instructors, the findings of the research emphasize the need of providing customized training and resources to cater to the diverse degrees of technology adoption among teachers. This would empower them to proficiently use digital technologies into their instructional methods. Furthermore, it is essential to emphasize student-centered approaches and cultivate cooperation among educators in order to address the difficulties connected with complexity and guarantee the effective integration of digital instructional techniques.

5. Recommendations

(1) Customized professional development: Because teachers have different levels of digital knowledge, schools should make and run programs that are tailored to their needs. These programs should take into account the unique needs of teachers, who may need more training and tools to use digital tools in their lessons successfully.

(2) Targeted Training for Different Profiles: To make up for the different ways people of different ages, educational backgrounds, and areas of expertise are judged on their digital skills, schools should offer training that fits the needs of people of different ages, educational backgrounds,

and areas of expertise. This method will make sure that teachers get the right help to improve their digital competence in their own settings.

(3) Reduce Distractions and Improve Teaching Methods: Educational institutions should focus on reducing distractions and improving teaching methods for digital learning. To successfully integrate technology into education, it is important to improve the way schools are run and think about how digital skills affect society as a whole.

(4) Customized Help for Different Viewpoints: Institutions should make professional development programs that take into account the different ways that digital skills can be understood. Educators will be better able to improve their digital skills if they use methods that take into account their individual needs and reviews.

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