

# Obstacles and Influencing Factors in The Use of Information Technology By University Teachers from The Perspective of TPACK

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## Abstract

With the advent of the information age, the role of information technology in educational development has become increasingly prominent, which has also raised higher requirements for teachers' use of information technology. This research is based on the TPACK theoretical model and introduces seven types of knowledge from the TPACK theory as independent variables; it also introduces three dependent variables, namely teachers' attitude towards technology adoption, operational behavior, and usage effect, to explore the obstacles to the use of information technology by college teachers and the factors influencing the occurrence of these obstacles. The research results show that the teachers' mastery of TPACK has an impact on the obstacles to the use of information technology, and the integration of any two types of knowledge has a more significant impact than a single dimension. The integration of the three types of knowledge has the most significant impact. This research demonstrates that the teachers' mastery of TPACK can significantly affect all aspects of the obstacles to the use of information technology by college teachers. At the same time, it provides operational suggestions for teachers to improve their use of information technology and promote the organic integration of teaching and technology.

## Keywords

Information technology usage; TPACK; Technology Acceptance Model; Task-Tech Adaptation Model; Technology Behavior Theory.

## 1. Introduction

In February 2022, China proposed to implement an education digitalization strategy, guiding and promoting pilot and demonstration projects for new fields and new models of educational informatization, improving the standard and specification system of educational informatization, and establishing an auditing system for educational informatization products and services entering schools. In order to achieve the development goals of "three all-round, two high, one big", we have been committed to developing new models of educational service based on the Internet and exploring new models of educational governance in the information age. In the new stage of educational informatization 2.0, school education has put forward new demands for informatization transformation, which also puts forward higher requirements for teachers' information literacy[1]. Improving teachers' information technology application ability has become the demand of the country to cultivate innovative talents and is also the need for the professional development of teachers. University teachers undertake teaching tasks at the higher education stage. In recent years, platform resources have become increasingly abundant, classroom equipment and teaching methods have also been changing accordingly.

The requirements for university teachers' information technology application ability are constantly increasing in such an environment.

However, existing studies show that the current situation of university teachers' use of information technology is lower than the expected level[2]. Many teachers have insufficient information technology application ability and their current level cannot meet the classroom needs in actual teaching. There are various types of usage obstacles and factors that cause these obstacles to occur. Therefore, this paper will explore the phenomenon of obstacles in university teachers' use of information technology based on the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), and the Task-Tech Adaptation Model (TTF), and using the TPACK theoretical model, it will conduct a more comprehensive analysis of the factors that affect the occurrence of these obstacles from the single dimension of its three core knowledge and the integration dimension, in an attempt to seek strategies to resolve this predicament, improve the use of information technology by university teachers, and promote the development of educational informatization and modernization, and further improve teaching quality and level.

## 2. Conceptual Definition and Theoretical Foundation

### 2.1. The Conceptual Explanation of the Obstacles to Teachers' Use of Information Technology

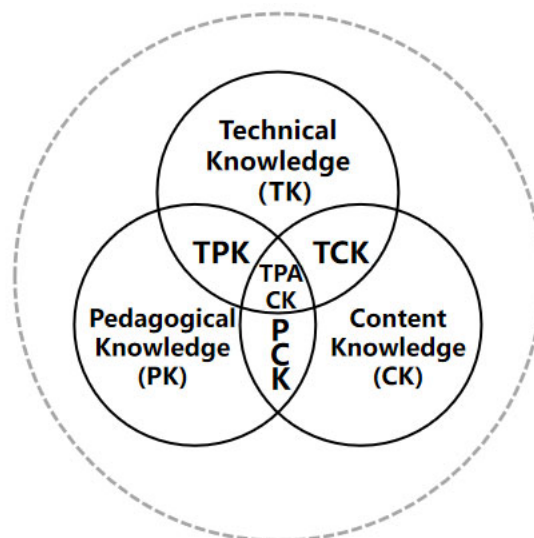
The concept of "teacher information technology usage obstruction" has not been clearly defined in the research conducted by scholars at home and abroad. Thomas and Joann M. Palmer defined it as "anything that hinders the appearance of entities that generate economic capabilities in the classroom", thus they believed that in the context of discussing information technology, physical hardware might become a burden, while the origin of teachers' tools, available course time and content were limitations, and the lack of funds and negative attitudes of teachers would also have an impact on it [3]. Athina Minaidi, a Greek scholar, defined the obstruction of teaching information technology usage as "all factors that hinder teachers' attempts to familiarize themselves with the use of information and information technology", and based on this viewpoint, he conducted research on teacher training related to information technology in Greece [4].

This paper defines the concept of "obstacles to the use of information technology by university teachers" based on the Technology Acceptance Model, the Theory of Planned Behavior, and the Task-Tech Adaptation Model. The Technology Acceptance Model holds that the motivation for individuals to use a certain new technology mainly depends on three factors: perceived ease of use, perceived usefulness, and usage attitude. This theory assumes that the attitude of individuals towards the use of new technologies is the most decisive factor, determining whether they will use or reject new technologies [5]. Therefore, this study classifies the obstacle of teachers' attitude towards technology use as one of the dimensions of technological use obstacles. The Theory of Planned Behavior proposes that the use of technology is influenced by perceived behavioral control from the perspective of information processing. It is the degree of difficulty that the subject feels when implementing a certain behavior [6]. In the research on teachers' willingness to teach based on the TPB theory, it was found that perceived behavioral control has the strongest positive impact on action intention. Therefore, this study classifies teachers' technical operation behavior as the second dimension for testing the obstacles to their technological use. The Task-Tech Adaptation Model holds that whether users choose to use information technology is judged by the degree of support of information technology for the task requirements. The higher the adaptability between the function of the technology and the task requirements, the higher the work efficiency, and the more inclined individuals are to use this technology [7]. Therefore, this study uses the support and adaptation degree between the

use of technology and the teaching task requirements as the third dimension for testing the technological use obstacles through the teachers' technological use effect. The TAM and TTF models study the operational behavior of information technology from different perspectives of users, tasks, and technology. The two models have complementary roles. Integrating these two models can better explain and predict teachers' acceptance and use of information technology. The Theory of Planned Behavior precisely compensates for the deficiency in the Technology Acceptance Model that does not reflect external factors that affect perceived usefulness and perceived ease of use. Finally, based on the above three theories and combined with the previous interviews, this study classifies the manifestations of teachers' obstacles to technological use into three aspects: teachers' attitude towards technology use, technical operation behavior, and technological use effect for testing.

## 2.2. The influence relationship between TPACK and the obstacles to teachers' use of information technology

TPACK, which stands for Technological Pedagogical Content Knowledge, is a concept proposed by scholars Koehler and Mishra in 2005 based on Shulman's PCK (Pedagogical Content Knowledge). Since 2005, scholars have conducted extensive theoretical and practical research on TPACK. Through their studies, it has been unanimously agreed that the research on TPACK will be beneficial for enhancing teachers' ability to master and apply information technology. It is an understanding of the interaction among content, teaching, and technological knowledge, transcending the meanings of these three core components themselves [8]. Pedagogical knowledge refers to the knowledge of the techniques or methods that teachers use in the classroom, including understanding how students learn, general classroom management skills, curriculum planning, and student assessment, etc.; content knowledge refers to the subject knowledge that teachers need to learn or teach; technological knowledge is defined as going beyond traditional computer knowledge, requiring people to understand information technology and apply it widely in effective work and daily life, constantly adapting to changes in information technology. The relationship among the three is shown in Figure 1.



**Figure 1:** TPACK Theory Model Relationship Diagram

When the three elements interact and integrate with each other, TPACK becomes a new form of knowledge. It is not equivalent to the knowledge of these three concepts themselves. Instead, as the foundation of effective teaching with technology, TPACK requires understanding how to better use technology to represent the content of concepts; how to use technology in a

constructive way in teaching; understanding what makes concepts difficult or easy to learn, and how to use technology to help solve some problems faced by students [9]. Therefore, as a theoretical model for integrating technology, education and content knowledge, the TPACK model generates complex interactions in specific environments. Ignoring the inherent complexity of each knowledge component or the complexity of the relationships between components may lead to overly simplistic solutions or failure. Therefore, this paper uses the TPACK model as the theoretical basis for exploring the factors that hinder teachers' use of information technology and conducts research on the influence relationships among teachers' technical knowledge(TK), pedagogical knowledge (PK), content knowledge(CK), technical content knowledge(TCK), technical pedagogical knowledge(TPK), pedagogical content knowledge(PCK), and integrated subject teaching knowledge(TPACK) and the obstacles that arise during the process of college teachers' use of information technology.

### 3. Research Design

#### 3.1. Research Framework

This research adopts the questionnaire survey method. Based on the previous interviews and literature review, the questionnaire was designed. The survey was conducted among the on-the-job university teachers in all provinces and cities across the country. The questionnaire mainly consists of three parts: basic information of teachers, the current situation of teachers' obstacles in using information technology, and the mastery of TPACK by teachers. The current situation of teachers' obstacles in using information technology is composed of three parts of questions: teachers' attitude towards using technology, technical operation usage, and usage effect. It adopts the Likert five-point scoring method, ranging from "very inconsistent" to "very consistent", with scores ranging from 1 to 5. The higher the score obtained by the respondents, the smaller the obstacles in using information technology at this level. The mastery of TPACK includes seven parts of questions: technical knowledge(TK), pedagogical knowledge (PK), content knowledge(CK), technical content knowledge(TCK), technical pedagogical knowledge(TPK), pedagogical content knowledge(PCK), and integrated subject teaching knowledge(TPACK) .It adopts the Likert five-point scoring method, ranging from "very inconsistent" to "very consistent", with scores ranging from 1 to 5. The higher the score obtained by the respondents, the better their mastery of the knowledge in this part.

#### 3.2. Variable Measurement and Analysis Methods

##### 3.2.1. Independent Variable

The independent variable in this study is the teachers' mastery of Technological Pedagogical Content Knowledge(TPACK) in subject teaching. It is measured by referring to the scale compiled by Schmidt et al. [10], which includes seven types of knowledge and their definitions and sample questions as shown in Table 1. There are a total of 40 items in this part of the questionnaire. The Cronbach  $\alpha$  coefficient of this questionnaire is 0.892. The reliability of the research data is high, and the CITC values of each analysis item are all greater than 0.4, indicating a good correlation among the analysis items. The KMO value is 0.856, and the validity is good.

##### 3.2.2. Dependent Variable

In this study, the dependent variable is the obstacles to the use of information technology by teachers, which consists of three parts: usage attitude, technical operation behavior, and usage effect, with a total of 26 items.

Usage attitude refers to the tendency of college teachers to use or refuse information technology based on their intentions. This study refers to the feedback from teachers in previous interviews on their attitudes towards technology usage and the scales developed by

Davis (1989)[11] and Venkatesh [12] and others, and sets up a total of 8 items. The Cronbach  $\alpha$  coefficient of this part of the questionnaire is 0.871, indicating high reliability of the research data, and the CITC values of each analysis item are all greater than 0.4, indicating a good correlation between the analysis items. The KMO value is 0.863, and the validity is good.

Technical operation behavior refers to the operational ability of college teachers to apply information technology in teaching practice. This study refers to the relevant content of teachers' operation behavior in previous interviews and the "Teacher Information and Communication Technology Competence Framework (Third Edition)" released by UNESCO in 2018, and sets up a total of 9 items. The Cronbach  $\alpha$  coefficient of this part of the questionnaire is 0.894, indicating high reliability of the research data, and the CITC values of each analysis item are all greater than 0.4, indicating a good correlation between the analysis items. The KMO value is 0.898, and the validity is good.

Usage effect refers to the matching situation between the actual effect and the pre-expected effect after teachers use information technology, and the adaptability between teachers' teaching tasks and technology. This study refers to the model framework of Jeyaraj et al. [13] and sets up a total of 9 items. The Cronbach  $\alpha$  coefficient of this part of the questionnaire is 0.869, indicating high reliability of the research data, and the CITC values of each analysis item are all greater than 0.4, indicating a good correlation between the analysis items. The KMO value is 0.849, and the validity is good.

### 3.2.3. Analytical Methods

In the previous stage, this study conducted interviews with 5 in-service college teachers about the obstacles encountered by them in the process of using information technology in teaching. Based on the sorting and analysis of the interview contents, this study referred to the technology acceptance model, the task technology adaptation model, and the TPACK theory model to design the questionnaire. The questionnaire was distributed to in-service college teachers across all provinces and cities in China, using a combination of online and offline methods. After obtaining the questionnaire data, SPSS data analysis software was used to conduct reliability and validity analysis, descriptive statistics, correlation analysis, and linear regression analysis to process and analyze the data and obtain the research results.

## 4. Research Results and Analysis

### 4.1. Data sources and sample conditions

The questionnaire was distributed to the on-the-job university teachers across all provinces and cities in China for investigation. A total of 378 questionnaires were distributed, and 373 were retrieved, with 370 being valid. Among them, there were 136 male teachers (36.8%) and 234 female teachers (63.2%); teachers with less than 3 years of teaching experience accounted for 92 (24.86%), those with 3-5 years of teaching experience accounted for 116 (31.35%), those with 5-10 years of teaching experience accounted for 124 (33.51%), and those with more than 10 years of teaching experience accounted for 38 (10.27%); the average age was 35.69 years old.

### 4.2. Analysis of the Current Situation of Obstacles to the Use of Information Technology by University Teachers

Based on the data obtained from the questionnaire, the simple descriptive statistical results of the obstacles currently faced by university teachers in three aspects - attitude towards using, operational behavior, and usage effect - are shown in Table 1. The results indicate that university teachers are hindered to varying degrees in these three aspects. Among them, the obstacle in the aspect of attitude towards using is the least, while the obstacle in the aspect of operational behavior is the greatest. This is consistent with the situation reflected by the

teachers in the previous interviews. Most teachers have an active attitude towards using information technology in teaching, believing that technology can bring positive changes to teaching methods, teaching content, and classroom atmosphere. However, in the process of actually operating and using technology, more than half of the teachers reported obstacles such as operational errors caused by outdated computer hardware and software, lack of technical practice opportunities, and lagging technical capabilities of teachers. In terms of the usage effect, the obstacles faced by teachers are between those in the aspect of attitude towards using and operational behavior. More than 85% of the teachers believe that the teaching effect after actual use of information technology has not reached the expected level, but more than half of the teachers agree that the use of technology has promoted the improvement of teaching quality, especially in the aspect of interaction between teachers and students. More than 75% of the teachers believe that the use of technology has increased students' attention and participation in the classroom and made the interaction between teachers and students more frequent.

**Table 1:** A simple descriptive statistics of the current situation of obstacles to the use of information technology by teachers

Variable	Sample size	Mean (Standard Deviation)
Attitude usage	370	3.940 (1.204)
Operational behavior	370	3.720 (1.344)
Usage effect	370	3.870 (1.109)

After analyzing the overall situation of the hindrance caused by the use of information technology, the analysis results of the gender differences in the hindrance are shown in Table 2. By using the independent sample t-test to study the differences in the use of information technology by teachers in the classroom teaching process based on the gender of teachers, it can be seen that: for all the situations of teachers' use of information technology in the classroom teaching process, different genders do not show significant differences ( $p > 0.05$ ), which means that different genders all show consistency in the use of information technology by teachers in the classroom teaching process, and there is no difference.

**Table 2.** Analysis of Gender Differences in the Use of Information Technology by Teachers

The situation of hindrance in the application of information technology	Gender of teachers (average $\pm$ standard deviation)		t	p
	Male(n=136)	Female(n=234)		
	3.92 $\pm$ 1.10	3.88 $\pm$ 1.14	0.804	0.422

The analysis results of the differences in teaching experience among teachers using obstacles are shown in Table 3. By using one-way analysis of variance to study the differences in the situation of teachers using information technology obstacles according to different teaching experiences, it can be seen that: Different teaching experiences show a significant difference at the 0.01 level ( $F = 5.142$ ,  $p = 0.002$ ). And the specific comparison results show that there are more obvious differences in the average scores of the groups: "Teaching experience of 3-5 years > Teaching experience of less than 3 years; Teaching experience of 5-10 years > Teaching experience of less than 3 years; Teaching experience of 3-5 years > Teaching experience of more than 10 years". Teachers with more than 10 years of teaching experience have the greatest obstacles in using information technology in teaching. When they were receiving education, they had formed a teaching mode without information technology, and were accustomed to this

mode. When the original teaching schema was changed, teachers often felt excluded. Teachers with less than 3 years of teaching experience are not familiar with the teaching environment and are still in the stage of survival concern. They are more concerned about whether they can adapt and survive. Some new teachers are relatively familiar with the current new technologies, but lack practical experience and confidence in integrating technology with teaching, and therefore are also more reluctant to incorporate technology use into teaching, resulting in obstacles in the use of information technology.

**Table 3.** Analysis of the Differences in the Use of Information Technology by Teachers According to Their Length of Teaching Experience

The situation of hindrance in the application of information technology	Teacher's age (average $\pm$ standard deviation)				F	P
	Less than 3 years of teaching experience	Teaching experience of 3 to 5 years	Teaching experience of 5 to 10 years	More than 10 years of teaching experience		
	3.67 $\pm$ 1.38	3.98 $\pm$ 1.36	3.79 $\pm$ 1.39	3.40 $\pm$ 1.51	5.142	0.002**

#### 4.3. Correlation Analysis on the Impact of TPACK on the Obstacles to the Use of Information Technology in Subject Teaching

A correlation analysis was conducted on the mastery of the seven parts of TPACK knowledge by teachers and the overall situation of their use of information technology in universities. The results are presented in Table 4. The questionnaire results show that the mastery of the three single-dimensional knowledge of TPACK (PK, TK, CK) and the knowledge integrated from two of them (PCK, TPK, TCK), as well as the integrated knowledge of the three (TPACK), all have significant positive correlations with the situation of teachers' use of information technology. The better the mastery of the knowledge of the three single-dimensional dimensions of TPACK, the better the situation of teachers' use of information technology. Among them, the correlation between the mastery of technical knowledge and the situation of information technology use is the most significant among the three single-dimensional knowledge; the correlations between the three kinds of knowledge integrated from the two and the situation of information technology use are all stronger than those of the single-dimensional knowledge, among which the correlation between technical teaching knowledge is the most significant; the correlation between TPACK integrated from the three and the situation of information technology use is stronger than that of the single-dimensional knowledge and the knowledge integrated from any two, and it is the most significant among all the variables.

**Table 4.** Correlation Analysis of TPACK Mastery and Teachers' Use of Information Technology

	PK	TK	CK	PCK	TPK	TCK	TPACK
r	0.787	0.791	0.693	0.798	0.835	0.824	0.847
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000

#### 4.4. Linear Regression Analysis of the Impact of TPACK Integrating Technology on the Obstacles to the Use of Information Technology

Utilizing the SPSS data analysis software to conduct a linear regression on the data results of each part of TPACK and the overall data results of teachers' use of information technology, the results are presented in Table 5. Before analyzing each set of data, it is noted that the VIF values

in the table are all less than 5, indicating that there is no serious multicollinearity among the seven independent variables. This, in turn, corroborates that the data used in this study is relatively authentic and reliable.

**Table 5.** Linear Regression Analysis of the Impact of TPACK on the Obstacles to the Use of Information Technology

Model	Non-standardized coefficient		Standardized coefficient	t	p	VIF
	B	Standard error	Beta			
(Constant)	0.433	0.271	-	1.966	0.012	-
PK	0.193	0.112	0.192	1.428	0.000	4.319
TK	0.240	0.083	0.246	1.484	0.000	2.424
CK	0.106	0.081	0.105	1.307	0.000	2.322
PCK	0.266	0.096	0.267	2.389	0.000	2.445
TPK	0.361	0.103	0.360	2.517	0.000	3.090
TCK	0.318	0.113	0.319	2.508	0.000	3.829
TPACK	0.374	0.104	0.375	3.328	0.000	3.225
R <sup>2</sup>	0.482					
Adjusted R <sup>2</sup>	0.458					
F	128.220					
P	<0.001					
Dependent variable: Teachers' usage of information technology						

The data show that the goodness of fit of the current linear regression model is good, with  $R^2 = 0.482$ . The TPACK mastery of teachers can explain 48.2% of the variation in teachers' use of information technology; the regression equation is significant, and the F-test of the model yields  $F = 128.220$ ,  $P < 0.001$ , indicating that at least one of the seven independent variables can significantly affect the dependent variable, teachers' use of information technology; from the  $\beta$  values in the table being all  $> 0$  and  $P < 0.05$ , it can be known that all seven independent variables can significantly positively affect the dependent variable, teachers' use of information technology.

Based on this, further linear regression was conducted on the seven independent variables and the dependent variables of each refined dimension, namely, use attitude, technical operation behavior, and use effect. The results are shown in Table 6. The data in the table show that among the three single-dimensional knowledge variables, pedagogical knowledge has the most significant impact on use attitude, which can explain 23.2% of the variation in teachers' technical use attitude; technical knowledge has the most significant impact on technical operation behavior and technical use effect, which can explain 32.6% and 31.2% of the variation in teachers' technical operation behavior and technical use effect; subject content knowledge has the least significant impact on the dependent variable. Moreover, the impact of any two of the three types of knowledge integrated from the single-dimensional knowledge on the use attitude, technical operation behavior, and use effect is more significant than that of the

single-dimensional knowledge or the integrated knowledge of the two. Among these three types of knowledge, technical teaching knowledge has the most significant impact on use attitude and technical operation behavior, which can explain 31.8% of the variation in teachers' use attitude and technical operation behavior and 37.3% of the variation in technical operation behavior; technical content knowledge has the most significant impact on use effect, which can explain 35.4% of the variation in teachers' use effect. And the integrated TPACK of technology and subject teaching has a more significant influence relationship in the dimensions of use attitude, technical operation behavior, and use effect than the above single-dimensional, integrated knowledge dimensions.

**Table 6.** Linear regression analysis of the influence of TPACK on attitudes towards use, technical operation behaviors, and usage effects

Independent variable	Dependent variable		
	Attitude of use	technical operation behavior	usage effect
PK	0.232	0.206	0.218
TK	0.224	0.326	0.312
CK	0.178	0.165	0.205
PCK	0.286	0.296	0.308
TPK	0.318	0.373	0.342
TCK	0.237	0.341	0.354
TPACK	0.351	0.382	0.364

## 5. Conclusions and Recommendations

### 5.1. Research conclusion

This study takes on-the-job university teachers as the research subjects, mainly based on the TPACK theoretical model, to explore the obstacles existing in the process of current university teachers' use of information technology and the influence of teachers' mastery of TPACK on the use of technology. Through preliminary interviews, questionnaire data collection and processing analysis, some findings were obtained.

First, in the process of using information technology, university teachers encounter obstacles in terms of usage attitude, technical operation behavior, and usage effect. Among them, the obstacle in technical operation behavior is the greatest. Most teachers have a positive attitude and willingness to use information technology, but they are not proficient in the actual teaching operation when using technology. In terms of usage effect, there are situations where teaching tasks and technology are not matched, and the expected effect cannot be achieved. Moreover, there is no significant difference in the use of information technology among university teachers of different genders, but there are differences in teaching experience. Teachers with 3-5 years of teaching experience have the best usage situation. Teachers with shorter and longer teaching experience encounter greater obstacles.

Second, the knowledge of the three single dimensions of teachers' TPACK will all have an impact on teachers' use of information technology. Among them, technical knowledge has the most significant impact; the knowledge type integrated by any two dimensions is more significant than the knowledge of a single dimension; among them, technical teaching knowledge has the most significant impact. The integration of TPACK knowledge for teachers' use of information technology has a greater impact on the usage attitude, operation behavior, and usage effect than the knowledge of the two integrated dimensions or the three knowledge of a single dimension.

This also puts forward higher requirements for teachers' ability to integrate technology, teaching, and subject content.

Third, by closely examining the three aspects of the obstacles to teachers' use of information technology, technical knowledge has the most significant impact on technical operation behavior and usage effect, teaching method knowledge has the most significant impact on usage attitude, and overall, the integration of TPACK knowledge has a greater impact on usage attitude, operation behavior, and usage effect than the integration of the two or three knowledge of a single dimension. The latter is again greater than the three knowledge of a single dimension. Based on the above survey results, the obstacles to teachers' use of information technology are influenced by the mastery of knowledge of multiple dimensions by teachers, and the integrated knowledge type can better determine the usage situation of each link. Simply enriching the knowledge of a single dimension of teachers is not effective. It is necessary to view TPACK as a whole and improve teachers' use of information technology in classroom teaching, truly making technology serve education and provide assistance to education.

## 5.2. Suggestions and Countermeasures

Based on the above research results, the following suggestions and countermeasures are proposed to address the problem of obstacles in the use of information technology by university teachers:

Firstly, in the process of university teacher training and professional development, more emphasis should be placed on the training of pedagogical knowledge, technical knowledge, and subject content knowledge, especially technical knowledge. Currently, the textbooks and teaching aids used in teacher training are not updated quickly enough, lagging behind the development speed of technology itself. This further leads to problems such as equipment not being compatible with teaching and a lack of connection between teaching and technology when teachers use information technology in their teaching activities. To further promote the mastery of teachers' technical knowledge, new forms of training methods should be developed, such as mobile learning for teachers, micro-lesson training, and mooc training based on Web 2.0 environment, so as to make up for the shortcomings of traditional training that only focuses on subject content knowledge and pedagogical knowledge, and promote the specialization, systematization, and scientificization of teachers' technical knowledge training. Moreover, more attention should be paid to teachers' practical operation learning of information technology, and relevant technical experts should be hired for targeted training, which can only be achieved by staying at the theoretical level and cannot enable teachers to truly and fully master the technology.

Secondly, when university teachers use information technology in teaching, they should pay more attention to the integration of technical knowledge, pedagogical knowledge, and subject content knowledge, and should not keep the three in isolation. During the use of technology, teachers need to understand which knowledge in the subject content is worth learning and learnable, and also need to improve their ability to use technology to represent conceptual content; at the same time, they should consider both the understanding of the technical knowledge itself and the ability to apply technology to integrate it with teaching. These three forms of knowledge will have complex interactions in specific environments. If the inherent complexity of each single dimension of knowledge or the complexity of the relationships between different knowledge is ignored, it will lead to obstacles in the use of information technology. Therefore, teachers not only need to develop knowledge in each independent dimension, but also need to develop in the way of mutual association between these dimensions and other dimensions, so as to achieve a deeper understanding and use of information technology.

Finally, after university teachers use information technology in teaching, they should pay more attention to feedback, review, and reflection on whether the integration of teaching, subject content, and technology is organic, and think about the compatibility between teaching tasks and technology and make adjustments. The questionnaire in the research shows that the positive attitude of teachers towards the use of information technology is largely based on the advantages of technology itself, but they lack confidence in the compatibility between teaching tasks and technology. Although information technology has its advantages, it is not possible to achieve good teaching effects by blindly using it in all aspects. Different teaching goals, contents, and objects have different requirements and restrictions for the use of technology. Teachers need to think about at what level and scope to apply technology and how to apply it[14]. This requires teachers to monitor teaching situations in time, obtain feedback, and based on their own teaching practice, judge whether the teaching task requirements are matched with the use of technology, and further adopt and use truly beneficial information technology for teaching.

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