ISSN: 1813-4890

Research on Influencing Factors of Pre Service Physics Teachers' Technical Inclination

Qingqing Lei[1], Fangyin Zhang[2] and Bing Xue[3]

[1]School of Information Technology and Engineering, Tianjin University of Technology and Education, Tianjin 300222, China;

[2]School of Physical Science and Technology, Tangshan Normal University, Tangshan 063000, China;

[3]School of Information Technology and Engineering, Tianjin University of Technology and Education, Tianjin 300222, China.

Abstract

At present, pre service teachers' awareness of using information technology to improve teaching has generally increased, but there are still problems such as insufficient technology integration teaching ability. In this context, research on the influencing factors of pre service physics teachers' technology orientation is of great significance for the cultivation of pre service physics teachers' technology-integrated teaching ability. Based on the relevant theories of teachers' technical orientation, this study takes pre service physics teachers as the research object, uses SPSS26.0 to conduct correlation analysis and regression analysis on the collected data, and explores the influencing factors of pre service physics teachers' technical orientation. In order to provide rationalization suggestions for the education and training of pre service physics teachers, and further verify the relevant theories of teachers' technical orientation.

Keywords

Pre service physics teacher,teachers' technical tendency,physics normal students .

1. Introduction

With the rapid development and popularization of science and technology, information technology has been widely used in daily life and education, and has become an indispensable core quality for high-quality teachers. Although pre service teachers generally mentioned the significance of using information technology in teaching, their technical comprehensive teaching ability is still insufficient[1], and teachers' technical orientation is the key reason for the high teacher's technical comprehensive teaching ability. This study takes pre service physics teachers as the research object, investigates their technical inclination and influencing factors, and studies the main factors affecting their technical inclination. The research conclusions will provide theoretical basis and implementation suggestions for the education and training of pre service physics teachers, help them better transition from the study of professional theory and educational technology theory to the teaching mode of technology integration teaching, and improve their information technology application ability.

2. Concepts and Related Studies

2.1. Teacher Technology Orientation

Teachers' technology orientation is the motivation for teachers to carry out technology-integrated teaching. It is related to the knowledge and skills mastered by teachers. It exists in

ISSN: 1813-4890

teachers' consciousness and reflects the tendency of teachers' technology-integrated teaching behavior[1]. In 1985, Katz & Raths. (1985) introduced "teacher orientation" into the field of teacher education research[2]. Since then, Jung. (2006) and others have constructed a conceptual framework of "teachers' technical orientation"[3], and they believe that there is a close relationship between this technical orientation of teachers and the motivational orientation of teachers themselves. Based on the theories of Jung. (2006) et al. On teachers' technology orientation and technology-integrated teaching, this paper defines the influencing factors of teachers' technology orientation as: teacher innovation, computer self-efficacy, computer anxiety level, and computer attitude aspect. Computer attitude is the positive or negative reaction of teachers to the computer itself and the application of computer teaching[4]; computer anxiety is the fear and worry that arises when individuals expect or actually use computers[5]; The judgment of their ability to use computers for teaching behavior involves their self-confidence in computer ability and computer-assisted teaching ability; the teacher's innovation mainly refers to the teacher's adoption of new ideas, new methods, and new technologies for teaching tendency[6].

2.2. Related Research

At present, foreign scholars' research on the influencing factors of teachers' technical orientation is mainly based on the theoretical model of technology acceptance, to determine the reasons that affect pre-service teachers' technical orientation, analyze the relationship between various influencing factors, and propose relevant strategies[7]. Compared with foreign research, there are relatively few domestic studies on the influencing factors of teachers' technical orientation, among which the representative results are the research on the influencing factors of the teaching orientation of technology integration based on teachers' beliefs and teachers' technical orientation to theory. At present, domestic research on teachers' technical orientation is mainly concentrated on the basis of theoretical models related to technology acceptance. There are relatively few studies on the factors affecting teachers' technical orientation, and there are few studies on the influencing factors of pre service teachers' technical orientation. There are few studies on the influencing factors of pre professional physics teachers' technical orientation[8].

3. Research Design

3.1. Research Objects and Research Questions

This study takes the physics normal students of a university in 2023 as the research object, and studies the influencing factors of their technical inclination. The main question of the research is: What are the main factors that affect the technical orientation of pre service physics teachers? And based on the research results, put forward corresponding strategies, hoping to provide some reference for the training of pre service physics teachers' technology integration teaching ability.

3.2. Research Hypothesis

This study is based on Christensen[9](2009), Sang[10](2010), Robin H. Kay[11](1993) and others' research on teachers' technical tendency, computer attitude, computer anxiety level, etc. Several factors that may have an impact on the technical orientation of pre service physics teachers are summarized. Based on this, the assumptions of the following dimensions are designed (Table 3.1).

Table 3.1Hypotheses on Influencing Factors of Teachers' Technical Inclination

serial number	Research hypothesis

ISSN: 1813-4890

H1	Teacher innovation has a positive impact on the technical orientation of pre service physics teachers.
H2	Computer attitudes positively influence pre service physics teachers' technological orientation.
H3	Computer self-efficacy positively affects pre service physics teachers' technological disposition.
H4	Computer anxiety levels negatively affect pre service physics teachers' technological disposition.

3.3. Research Samples and Research Tools

3.3.1. Research Sample

The subjects of this survey are physics normal students in a university. 223 questionnaires were distributed online, and 223 were returned, with a recovery rate of 100.00%. After excluding 26 invalid questionnaires, 197 valid questionnaires were obtained, with an effective rate of 88.34%.

3.3.2. Research Tool

This study analyzed and integrated the scales of Jung (2006), Christensen (2009), Sang (2010), Zhang Zhe (2016), Robin H. Factor Survey" scale. The scale mainly includes teachers' technical orientation and its possible influencing factors (teachers' innovation, computer self-efficacy, computer anxiety level, and computer attitude), with a total of 36 items, which are used to investigate the information of the research object and conduct data analysis.

3.4. Data Collection and Analysis

This study adopts the method of online survey, which will start in January 2023, and 197 valid questionnaires will be returned. Using SPSS 26.0 to analyze the recovered data, draw the research results.

3.5. Reliability and Validity Analysis

3.5.1. Reliability Analysis

This study uses SPSS 26.0 to analyze the reliability of the recovered data and obtain the following data (Table 3.2). The overall Cronbach' α coefficient of the scale is 0.923, and the reliability coefficient of each variable is greater than 0.7, which has good consistency and high reliability.

Table 3.2 Items and reliability analysis results of each dimension

Variables	Number of items	Cronbach' α coefficient
computer anxiety level	10	0.971
computer attitude	10	0.908
computer self-efficacy	6	0.884
teachers' innovativeness	6	0.908
teachers' technical orientation	4	0.752
	total	overall reliability
	36	0.923

ISSN: 1813-4890

3.5.2. Validity Analysis

The validity of the study was analyzed by exploratory factor analysis. The KMO value of the sample is 0.905, and the Bartlett sphericity test value is 0.000 (Table 3.3), which shows a high degree of fitting and is suitable for exploratory factor analysis. The study uses principal component analysis and maximum variance rotation method to conduct exploratory factor analysis on pre-service physics teachers' technical orientation and its influencing factors. The principal components with eigenvalues greater than 1 and factor loadings exceeding 0.50 were retained as factors, and 36 valid items were obtained (Table 3.4), with a total variance explanation rate of 68.314% (Table 3.5). The factor loadings after each rotation were all over 0.50, indicating that The questionnaire has good construct validity.

Table 3.3 Analysis results of KMO value and Bartlett sphericity test

KMO and Bartlett test		
KMO sampling suitability quantity		.905
Bartlett sphericity test	Approximate chi-square	5851.132
	degree of freedom	630
	significant	.000

Table 3.4 Rotated component matrix

	Rotated component matrix a element				
	1	2	3	4	5
27	.903				
36	.898				
35	.893				
30	.892				
28	.889				
33	.876				
34	.876				
29	.871				
32	.861				
31	.849				
8		.750			
11		.715			
9		.715			
7		.709			
10		.685			
1		.684			
16		.605			
2		.587			
20		.540			
19		.534			
14			.831		
15			.812		
13			.751		

ISSN: 1813-4890

12	.735		
17	.644		
18	.546		
24		.765	
26		.764	
23		.755	
21		.699	
22		.670	
25		.641	
6			.642
4			.639
5			.602
3			.573

Extraction method：Principal component analysis.
Rotation method：Caesar normalized maximum variance method.a
a. The rotation has converged after 6 iterations.

Table 3.5 Total variance explained

total variance explained									
element	initial eigenvalue			extract Loading Sum of Squares			rotational load sum of squares		
	total	percent variance	accumulation %	total	percent variance	accumulation %	total	percent variance	total %
1	11.112	30.866	30.866	11.112	30.866	30.866	8.126	22.571	22.571
2	8.708	24.188	55.053	8.708	24.188	55.053	5.942	16.505	39.076
3	2.260	6.279	61.332	2.260	6.279	61.332	4.389	12.192	51.268
4	1.435	3.985	65.317	1.435	3.985	65.317	4.275	11.876	63.144
5	1.079	2.997	68.314	1.079	2.997	68.314	1.861	5.171	68.314
6	The following data is omitted								

4. Result Analysis

4.1. Related Analysis

Correlation analysis shows that the correlation coefficients among variables are shown in Table 4.1. The results show that there is a strong correlation between the pre service physics teachers' technical orientation variable and teachers' innovativeness, computer self-efficacy, and computer attitude (significantly correlated at the $p < 0.01$ level). Among them, the relationship between computer attitude and teachers' technical orientation was the strongest ($r = 0.594$), while the relationship between computer anxiety level and it was the weakest ($r = 0.094$).

Table 4.1 The relationship between pre service physics teachers' technical orientation and its influencing factors

		computer anxiety level	computer attitude	computer self-efficacy	teachers' innovativeness	teachers' technical orientation
computer anxiety level	pearson correlation	1				
	Sig.（two-tailed）					
	Cases	197				

ISSN: 1813-4890

computer attitude	pearson correlation	-.123	1			
	Sig.（two-tailed）	.085				
	Cases	197	197			
computer self-efficacy	pearson correlation	.247**	.493**	1		
	Sig.（two-tailed）	.000	.000			
	Cases	197	197	197		
teachers' innovativeness	pearson correlation	-.087	.753**	.486**	1	
	Sig.（two-tailed）	.223	.000	.000		
	Cases	197	197	197	197	
teachers' technical orientation	pearson correlation	.094	.594**	.560**	.515**	1
	Sig.（two-tailed）	.189	.000	.000	.000	
	Cases	197	197	197	197	197

**Indicates that the correlation is significant at the 0.01 level；*Indicates that the correlation is significant at the 0.05 level.

4.2. Regression Analysis

4.2.1. Teachers' Creativity and Teachers' Technology Tendency

Taking the teacher's innovation as the independent variable and the teacher's technical tendency as the dependent variable, and adopting the entry regression strategy, the regression model is obtained as follows:

Table 4.2 Regression analysis of teacher innovativeness on teacher technical disposition (Model Summary [b])

model	R	R squared	adjusted R squared	standard estimate error	Durbin Watson
1	.515a	.265	.261	.61338	1.747

a.Predictor variables: (constant), teacher innovation
b.Dependent variable: Teachers' technical orientation

It can be seen from the table that the correlation coefficient between teachers' innovativeness and teachers' technical orientation is 0.515, indicating that the correlation between teachers' innovativeness and teachers' technical orientation is relatively good. The R square is 0.265, indicating that teachers' innovative factors can explain 26.5% of the variability in teachers' technical orientation. In the effect test of regression analysis, the adjusted R square is >0.1, and the D-W value is 1.747 (near 2), so it can be considered that the effect of regression analysis is relatively good.

It can be seen from Table 4.3 that the F test value is 70.321, the accompanying probability P=0.000, and the significance level is 0.01. It can be considered that the regression coefficient is not 0, and There is a significant linear relationship between teachers' innovativeness and teachers' technical orientation, and a linear model can be established.

Table 4.3 Regression analysis of teachers' innovativeness on teachers' technology tendency (ANOVA [a])

model	sum of square	degrees of freedom	mean square	F	significant

ISSN: 1813-4890

1	return	26.457	1	26.457	70.321	.000[b]
	residual	73.366	195	.376		
	total	99.823	196			

a.Predictor variables: (constant), teachers' innovativeness
b.Dependent variable: Teachers' technical orientation

Table 4.4 Regression analysis of teachers' innovation on teachers' technical inclination (coefficient [a])

model		unnormalized coefficient		standardized coefficient	t	significant	collinearity statistics	
		B	standard error	Beta			tolerance	VIF
1	(constant)	1.693	.246		6.875	.000		
	teachers' innovativeness	.518	.062	.515	8.386	.000	1.000	1.000

a.Dependent variable: Teachers' technical orientation

The regression model shown in Table 4.4: Teacher's technical orientation = 1.693+0.518*Teacher's innovativeness. The accompanying probability of the t test is P=0.000, and the significance level is 0.01, which proves that there is a linear relationship between teachers' innovativeness and teachers' technical tendency.

Research Hypothesis H1: Teachers' innovativeness has a positive impact on the technical orientation of pre service physics teachers. was tested, and the hypothesis was established.

4.2.2. Computer Attitudes and Teachers' Technology Tendency

Taking the computer attitude as the independent variable and the teacher's technical tendency as the dependent variable, and adopting the entry regression strategy, the regression model is obtained as follows:

Table 4.5 Regression analysis of computer attitudes on teachers' technology disposition (Model Summary [b])

model	R	R squared	adjusted R squared	standard estimate error	Durbin Watson
1	.594[a]	.353	.349	.57560	1.780

a.Predictors: (constant), computer attitude
b.Dependent variable: Teachers' technical orientation

It can be seen from Table 4.5 that the correlation coefficient between computer attitudes and teachers' technical orientation is 0.594, indicating that computer attitudes and teachers' technical orientation have a good correlation. The R square is 0.353, indicating that the computer attitude factor can explain 35.3% of the variability of teachers' technical preference. In the effect test of regression analysis, the adjusted R square is >0.1, and the D-W value is 1.780 (near 2), so it can be considered that the effect of regression analysis is relatively good.

It can be seen from Table 4.6 that the F test value is 106.288, the accompanying probability P=0.000, and the significance level is 0.01. It can be considered that the regression coefficient is not 0, and there is a significant linear relationship between computer attitudes and teachers' technical tendencies, which can be established linear model.

ISSN: 1813-4890

Table 4.6 Regression analysis of computer attitudes on teachers' technology inclination (ANOVA [a])

model		sum of square	degrees of freedom	mean square	F	significant
1	return	35.215	1	35.215	106.288	.000[b]
	residual	64.608	195	.331		
	total	99.823	196			

a.Predictors: (constant), computer attitude

b.Dependent variable: Teachers' technical orientation

Table 4.7 Regression analysis of computer attitudes on teachers' technology tendency (coefficient [a])

model		unnormalized coefficient		standardized coefficient	t	significant	collinearity statistics	
		B	standard error	Beta			tolerance	VIF
1	(constant)	1.087	.259		4.194	.000		
	computer attitude	.665	.065	.594	10.310	.000	1.000	1.000

a.Dependent variable: Teachers' technical orientation

The regression model shown in Table 4.7: Teachers' technology orientation =1.087+0.665*computer attitude. The accompanying probability of the t-test is P=0.000, and the significance level is 0.01, which proves that there is a linear relationship between computer attitudes and teachers' technical tendencies.

Research Hypothesis H2: Computer attitudes have a positive impact on the technical orientation of pre service physics teachers. was tested, and the hypothesis was established.

4.2.3. Computer Self-efficacy and Teachers' Technical Orientation

Taking the computer self-efficacy as the independent variable and the teacher's technical tendency as the dependent variable, adopting the entry regression strategy, the regression model is obtained as follows:

Table 4.8 Regression analysis of computer self-efficacy on teachers' technological disposition (Model Summary [b])

model	R	R squared	adjusted R squared	standard estimate error	Durbin Watson
1	.560[a]	.313	.310	.59294	1.805

a.Predictors: (constant), computer self-efficacy

b.Dependent variable: Teachers' technical orientation

It can be seen from Table 4.8 that the correlation coefficient between computer self-efficacy and teachers' technical aptitude is 0.560, indicating that computer self-efficacy and teachers' technical aptitude have a good correlation. The R square is 0.313, indicating that the computer

ISSN: 1813-4890

self-efficacy factor can explain 31.3% of the variability of teachers' technical preference. In the effect test of regression analysis, the adjusted R square is >0.1, and the D-W value is 1.805, which is around 2. It can be considered that the effect of regression analysis is relatively good.

It can be seen from Table 4.9 that the F test value is 88.933, the accompanying probability P=0.000, and the significance level is 0.01. It can be considered that the regression coefficient is not 0, and there is a significant linear relationship between computer self-efficacy and teachers' technical tendency. A linear model can be built.

Table 4.9 Regression analysis of computer self-efficacy on teachers' technological disposition (ANOVA [a])

model		sum of square	degrees of freedom	mean square	F	significant
1	return	31.266	1	31.266	88.933	.000[b]
	residual	68.557	195	.352		
	total	99.823	196			

a.Predictors: (constant), computer self-efficacy

b.Dependent variable: Teachers' technical orientation

Table 4.10 Regression analysis of computer self-efficacy on teachers' technological disposition (coefficient [a])

model		unnormalized coefficient		standardized coefficient	t	significant	collinearity statistics	
		B	standard error	Beta			tolerance	VIF
1	(constant)	1.971	.191		10.328	.000		1.971
	computer self-efficacy	.506	.054	.560	9.430	.000	1.000	.506

a.Dependent variable: Teachers' technical orientation

The regression model shown in Table 4.10: Teachers' technical propensity= 1.971+0.506*computer self-efficacy. The associated probability of the t test is P=0.000, and the significance level is 0.01, which proves that there is a linear relationship between computer self-efficacy and teachers' technical tendency.

So far, this research hypothesizes H3: Computer self-efficacy has a positive impact on the technical orientation of pre service physics teachers. was tested, and the hypothesis was established.

4.2.4. Multiple Regression

Simply considering the influence of a certain variable cannot explain the technical orientation of pre service physics teachers very well. In order to further study the influencing factors of teachers' technical orientation and the size of their effects, this study takes teachers' technical orientation as the dependent variable, teachers' innovation, Computer self-efficacy and computer attitude were independent variables, and the regression model was obtained by "stepping" method.

In the analysis, only the independent variables whose partial correlation coefficient reached a significant level of 0.05 were included in the regression equation. The results showed that only constants, computer attitudes, and computer self-efficacy entered the model successively

ISSN: 1813-4890

(Table 4.11). In this model, the overall R-square of the model is 0.447, indicating that 44.7% of the influence of teachers' technical orientation can be explained by this model (Table 4.12). The regression equation obtained from the study is: teacher's technical disposition= 0.724+0.310*computer self-efficacy+0.421*computer attitude. Among them, the impact of computer attitude and computer self-efficacy on teachers' technology orientation is 0.421 and 0.310 respectively.

Table 4.11 Multiple linear regression analysis of influencing factors of teachers' technical inclination

model		unnormalized coefficient		standardized coefficient	t	significant	collinearity statistics	
		B	standard error	Beta			tolerance	VIF
1	(constant)	.724	.250		2.892	.004		
	computer attitude	.421	.093	.376	4.514	.000	.412	2.426
	computer self-efficacy	.310	.057	.343	5.461	.000	.726	1.377

Table 4.12 Summary of Multiple Linear Regression Model of Influencing Factors of Teachers' Technical Inclination

model	R	R squared	adjusted R squared	standard estimate error
1	.668[a]	.447	.441	.53352

a.Predictors: (constant), computer attitude, computer self-efficacy
b.Dependent variable: Teachers' technical orientation

5. Analysis Conclusion

From the regression analysis of a single variable, the three variables of teacher innovation, computer self-efficacy and computer attitude all have an impact on teachers' technical orientation. However, simply considering the influence of a certain variable cannot explain the technical inclination of pre service physics teachers very well. Therefore, this study conducted multiple regression analysis and comprehensively considered various factors.

First of all, the multivariate regression model obtained in this study is: teachers' technical disposition=0.724+0.310*computer self-efficacy+0.421*computer attitude. The results of multiple regression analysis in this study show that under the influence of various factors, the technical orientation of pre service physics teachers is jointly affected by constants and variables such as computer attitude and computer self-efficacy. It shows that pre service physics teachers' value judgment on computer use and attitude towards computer-aided teaching are the main reasons that affect teachers' technology orientation, and their computer self-efficacy also has a more obvious discriminant role. The findings of this study are consistent with the conclusions of Niederhauser & Perkmen[12], Sadaf (2016) [13], Sang (2010), etc., but contrary to the conclusions of Van Braak (2001), Teo[14], etc. The reason for this phenomenon may be that there are certain differences in computer attitudes, computer application levels, and teacher teaching skills between pre service teachers and post-service teachers.

Secondly, the study found that although there is a strong correlation between the factors of teachers' innovativeness and teachers' technical orientation, when they work together with variables such as computer attitude and computer self-efficacy on teachers' technical orientation, the impact is not significant. The reason for this phenomenon is likely to be the influence of various variables, which can be analyzed in future research.

Finally, although there is a certain correlation between the computer anxiety level of pre service physics teachers and their technical disposition, the discriminative significance is not significant. The reason for such a result may be related to the learning situation of information technology related courses during the undergraduate period.

In conclusion, there are certain differences among variables affecting the technical orientation of pre service physics teachers, and these variables have different influences on the technical orientation of pre service physics teachers. In the absence of more computer-assisted physics teaching experience, the technical orientation of pre service physics teachers depends in a sense on their computer self-efficacy and computer attitude.

6. Implications

Teachers' technical orientation is a key factor in improving teachers' technology-integrated teaching ability. From the conclusion, the technical orientation of pre service physics teachers is mainly affected by their computer self-efficacy and computer attitude. Therefore, this study proposes the following pre service physics teacher education training Suggestions:

First, rationally arrange the teaching of computer-related courses to enhance the computer self-efficacy of pre service physics teachers. Through the questionnaire, it can be seen that the computer self-efficacy of pre service physics teachers mainly depends on their self-confidence in using computers. Therefore, teacher educators can reasonably arrange course training for pre service physics teachers on the use of computers for physics teaching, guide pre service physics teachers to understand the significance of technology for future teaching work during course learning, and then effectively carry out technology-integrated teaching.Second, rationally arrange educational practice and focus on cultivating the computer attitude of pre service physics teachers. It can be seen from the multiple regression formula that the computer attitude of pre service physics teachers can also have a significant impact on their technical orientation, and the computer attitude can be learned. Therefore, when educating and training pre service physics teachers, we should provide them with sufficient opportunities to practice technology-integrated teaching.

References

[1] J.F. Ying, C.Q. Wang: Research on the current situation and countermeasures of junior high school English teachers' technical orientation under the background of educational informationization,Research on Foreign Language Teaching in Basic Education, (2020)No.1,p.24-33.

[2] Katz, L.G.,J.D.Raths:Dispositions as goals for teacher education,Teaching and Teacher Education, Vol. 1(1985)No.1,p.301-307.

[3] E.Jung, D. M.Rhodes,W. P. Vogt:Disposition Assessment in Teacher Education: A framework and instrument for assessing technology disposition,The Teacher Educator,Vol. 41(2006)No.4,p.207-233.

[4] Van Braak: Individual characteristics influencing teachers'class use of computers,Journal of Educational Computing Research, Vol. 25(2001)No.2,p.141-157.

[5] A.C.Raub:Correlates of Computer Anxiety in College Students(Ph.D.,University of Pennsylvania,U.S. 1981)

[6] E.M.Rogers:Diffusion of Innovations (4th edn)(Free Press, U.S. 1995)

ISSN: 1813-4890

[7] Z.Zhang:Pre-service Teachers' Collection Technology Teaching as an Influencing Factor Research(Ph.D.,Northeast Normal University,China 2016)

[8] T.Li,H.H.Ouyang:Research on the technical orientation of pre-service foreign language teachers under the background of educational informationization,Foreign Language Audio-visual Teaching,(2017)No.6,p.78-83.

[9] R.W.Christensen,G.A.Knezek:Construct validity for the teachers' attitudes toward computers questionnaire,Journal of Computing in Teacher Education,Vol. 25(2009)No.4,p.143-155.

[10] G.Y.Sang, Valcke , M.Valcke, J.V.Braak, J.Tondeur:Student teachers'thinking processes and ICT integration:Predictors of prospective teaching behaviors with educational technology, Computers & Education, Vol. 54(2010)No.1,p.103-112.

[11] R.H.Kay:An exploration of theoretical and practical foundations for assessing attitudes toward computers: The computer attitude measure (CAM),Computers in Human Behavior,Vol. 9(1993)No.4,p.371-386.

[12] D.S.Niederhauser,S.Perkmen:Beyond self-efficacy:Measuring pre-service teachers' instructional technology outcome expectations, Computers in Human Behavior,Vol. 26(2010)No.3,p.436-442.

[13] A.Sadaf,T.Newby,P.Ertmer:An investigation of the factors that influence preservice teachers' intentions and integration of Web 2.0 tools,Educational Technology Research and Development,Vol. 64(2016)No.1,p.37-64.

[14] Timothy Teo:Factors influencing teachers' intention to use technology:Model development and test,Computers&Education,Vol. 57(2011)No.4,p.2432-2440.