Research on User Acceptance of Network Teaching Platform Based on UTAUT Model and Optimization Suggestions

-- Taking the Students of Yibin University During the " COVID-19 " Period as An Example

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Abstract

This paper studies the influencing factors of students' acceptance of online teaching platform in Yibin University. The theoretical model of this study is constructed based on UTAUT model, and put forward the corresponding assumptions. Through the sampling survey and data analysis of students, the results show that: Performance factors and promotion factors will have a significant positive impact on behavior intention, voluntary factors have a positive impact on behavioral intention. Finally, based on these influencing factors, this paper puts forward some suggestions to improve the effect of Yibin University students receiving online teaching platform.

Keywords

Network platform; Influencing factors; UTAUT.

1. Introduction

The spread of COVID-19 has delayed the opening of all schools in the country, today, with the development of information technology. China's institutional advantages enable students in different regions to receive the same education through the network. Facing the great impact of COVID-19 on traditional offline teaching methods, Yibin University has also issued timely and effective response measures. A scientific and reasonable undergraduate curriculum adjustment plan has been formulated. The school has organized and learned a variety of online teaching methods, QQ, DingDing, Tencent, rain class and other online teaching methods are widely used. Quickly complete the teaching transformation from "offline" to "online". However, the popularization and use of online courses is still a precedent in China. There are still some problems that can't be ignored in the specific practice of online courses. Such as the teaching effect of online teaching, the effect of students' online learning, the Acceptance Intention and improvement suggestions of teachers and students on the online teaching platform, etc. We need to explore effective solutions.

2. Theoretical Model and Research Hypothesis

2.1. UTAUT Model

User's Acceptance Intention of online teaching platform, it belongs to the category of individual user technology adoption theory. This theory is mainly summarized on the basis of organizational behavior and social psychology. Researchers are usually from the perspective of the audience, study individual use intention and behavior with individual attitude and choice.

Assuming individual differences, only through the individual's internal value and belief system can the system function of external factors affect the use and usage of individual intention. User technology acceptance model theory has been widely used in many fields, such as e-commerce, software engineering, e-banking, etc. In the technology acceptance theory, the unified theory of acceptance and use of Technology (UTAUT) is based on the user's willingness to use, explain the user's behavior intention and use behavior. It includes four core concepts: Performance Expectation, Effect Expectation, Social Influence and Facilitating Conditions, as well as four regulatory variables: Gender, Age, Experience and Voluntariness of use, UTAUT model further summarizes the influence of control variables on main variables in each model through correlation analysis.
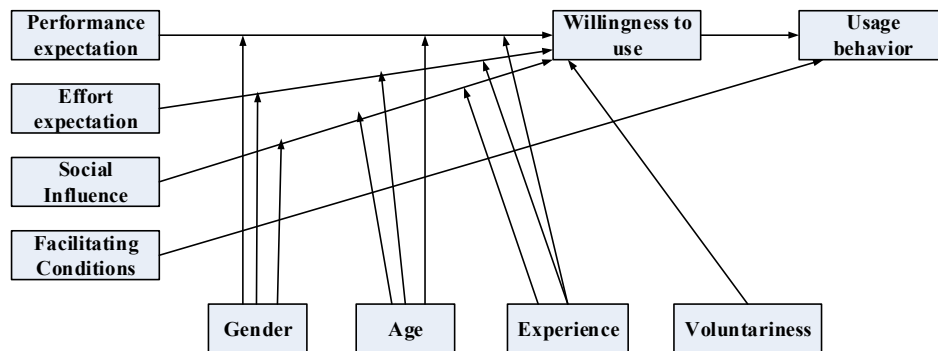

Figure 1. Schematic diagram of UTAUT

2.2. Theoretical model

In order to quantitatively study the relationship between variables in UTAUT model, the relationship between these variables is verified by structural equation modeling.Structural equation modeling is an effective method to establish, estimate and test causality models, the model integrates factor analysis and path analysis, the relationship among Explicit variables, potential variables and error variables in the model can be verified.In this study, by drawing the structural equation model diagram, the residual error is corrected according to the fitting degree of the model. Finally, clarify the variable relationship and verify the research hypothesis.Structural equation modeling is divided into two important parts: measurement equation and structural equation, the measurement equation is used to describe the relationship between potential variables and observation indicators. Structural equation is used to describe the relationship between potential endogenous variables and potential exogenous variables.

The measurement equation is essentially a confirmatory factor analysis model used to quantify the correlation between potential variables and their corresponding observable variables. It can also be regarded as a regression model, that is the regression of potential variables with fewer logarithm of observed variables. The expression method is as follows:

$$y_i = \Lambda\omega_i + \varepsilon_i, i = 1,...,n \tag{1}$$

Where, y_i is an observable random vector of $p \times 1$, Λ is an observable random vector of $p \times q$, $\omega_i = (\eta_i^T, \xi_i^T)$ s the potential variable, η_i^T s the potential dependent variable , ξ_i^T is the potential independent variable, ε_i is the relative independent error term assuming $N[0, \Psi_\varepsilon]$ distribution, which is a $p \times 1$ matrix.

Structural equation is essentially a linear regression equation model of endogenous potential variables to several endogenous potential variables and exogenous potential variables. The expression method is as follows:

$$\eta_i = \Pi \eta_i + \Gamma \xi_i + \delta_i, i = 1, ..., n \tag{2}$$

Where, η_i is an endogenous potential variable, which is a $q_1 \times 1$ matrix, ξ_i is an exogenous potential variable, which is a $q_2 \times 1$ matrix, Π and Γ are unknown regression coefficient matrices of $q_1 \times q_1$ and $q_1 \times q_2$ respectively, δ_i is a relative independent error term, which is a $q_1 \times 1$ matrix, and obey $N[0, \Psi_\delta]$ distribution. Where Ψ_δ is a diagonal matrix and independent of δ_i.

2.3. Research assumptions

Based on the above theoretical model, establish the assumptions of various influencing factors on the online teaching platform, as shown in Table 1.

Table 1. Research assumptions

Serial number	Research hypothesis content
H1	Performance expectation has a positive impact on University Students' willingness to accept online teaching
H2	Effort expectation has a positive impact on University Students' willingness to accept online teaching
H3	Effort expectation has a positive impact on performance expectation
H4	Social expectation has a positive impact on University Students' willingness to accept online teaching
H5	Social expectation has a positive impact on performance expectation
H6	Promoting factors have a positive impact on University Students' willingness to accept online teaching
H7	Promotion factors have a positive impact on effort expectation
H8	Gender plays a moderating role in the research model of University students receiving online teaching
H9	Age plays a moderating role in the research model of University students receiving online teaching
H10	Experience plays a moderating role in the research model of University students receiving online teaching
H11	Voluntariness plays a moderating role in the research model of University students receiving online teaching

2.4. Variable Definition

According to the assumptions made in Table 1, combined with the theoretical model of the study, the definition of study variables is shown in Table 2.

3. Questionnaire Survey and Analysis

3.1. Questionnaire and Item Design

The questionnaire design consists of two parts, first, research on the influencing factors of online teaching platform, second, the personal characteristics of the investigated students. Among them, questions 1-17 are designed with five options of "very high, high, average, low and low". The corresponding score is 5 to 1.18 questions design "male and female" options, corresponding to "1, 2" points.19 design questions "freshman, sophomore, junior and senior", corresponding to 1 to 4 points.20 questions "experienced" = 1, "not experienced" = 2.21 questions "voluntary" = 1, "involuntary" = 2. The specific questionnaire design is shown in Table 3.

Table 2. Definition of study variables

Variable	Definition of research variables
Behavioral intention	Students' willingness to accept online teaching
PE: Performance Expectation	The extent to which students believe that online teaching can provide learning performance
EE: Effect Expectation	How hard do students think online teaching needs to be done
SI: Social Influence	The extent to which people who are important or influential to students think online teaching should be carried out
FC: Facilitating Conditions	How much do students think online teaching can promote learning result
G: Gender	Student gender ("male" = 1, "female" = 2)
A:Age	Student age ("freshman" = 1, "sophomore" = 2, "junior" = 3, "senior" = 4)
E: Experience	Have students experienced online teaching ("experienced" = 1, "not experienced"
VU: Voluntariness Use	Whether students are willing to give online teaching ("voluntary" = 1, "involuntary" = 2)

Table 3. Questionnaire design

Number	First level hypothesis	Item	Describe
1		PE1	Network platform teaching will improve my learning efficiency
2	Performance Expectation	PE2	Network platform teaching can facilitate access to learning resources anytime and anywhere
3		PE3	Network platform teaching can complete the teaching task
4		PE4	Network platform teaching can meet the learning requirements
5	Effect Expectation	EE1	Network platform software or tools are easy to operate
6		EE2	I can skillfully use network platform teaching software and tools
7		EE3	I think I can quickly adapt to teaching on the network platform
8		SI1	If the teacher requires or recommends a certain network platform for teaching, I will also try to use it
9	Social Influence	SI2	The students around me use some kind of network platform for teaching, so I will try to use it
10		SI3	The choice of the surrounding people to teach on a certain network platform will have a selective impact on me
11		FC1	Teaching on network platform can improve learning achievement
12	Facilitating Conditions	FC2	Teaching on the network platform can enhance my interest in learning
13		FC3	Teaching on the network platform can stimulate my curiosity
14		FC4	Teaching on the network platform can attract me to explore knowledge
15		SC1	I think the closing of network platform is a good way to promote learning
16	Willingness to use	SC2	I am willing to recommend the network platform I use to my classmates
17		SC3	I am willing to use the network platform more frequently
18	Gender	G	My gender is
19	Age	A	My grade is
20	Experience	E	Have I ever experienced online platform teaching
21	Voluntariness Use	VU	The degree to which I am willing to teach on the network platform

3.2. Reliability and Validity Analysis

(1) Reliability analysis:Yibin University has about 20000 students,according to the proportion of 5%, 1000 design questionnaires were randomly distributed,942 valid questionnaires were collected, performance expectation, effort expectation, social impact, promotion factors and use intention are measured by spss17. Cronbach α The coefficients are 0.747, 0.805, 0.716, 0.784 and 0.691 respectively, overall scale Cronbach α The coefficient is 0.884. It shows that the standard of the questionnaire is good and the reliability is high.

(2) Validity analysis:In the analysis of the scale,KMO value is 0.802, with validity, the variance interpretation rates of the four factors were 19.827%, 17.189%, 11.643% and 11.106% respectively, the cumulative variance interpretation rate was 59.765%, it shows that the amount of information can be extracted effectively and the questionnaire items are effective.

3.3. Regression Analysis

Regression analysis is used to conduct regression analysis on the dimensions of performance expectation, effort expectation, social impact, promotion factors and use intention, as shown in Table 4.

Table 4. Regression analysis of influencing factors

	Non standardized coefficient		coefficient	t	p	VIF	R2	Adjustment R2	F
	B	standard deviation	Beta						
constant	-0.386	0.514	-	-0.917	0.382	-	0.542	0.380	5.823
PE1	0.167	0.120	0.179	1.544	0.122	1.877			
PE2	0.063	0.090	0.071	0.839	0.470	1.825			
PE3	0.378	0.134	0.350	2.760	0.009**	2.613			
PE4	-0.208	0.098	-0.192	-1.733	0.062	2.107			
EE1	-0.044	0.124	-0.042	-0.405	0.747	2.539			
EE2	-0.205	0.133	-0.155	-1.695	0.090	2.029			
EE3	0.103	0.144	0.089	0.706	0.460	2.854			
SI1	0.062	0.080	0.068	0.811	0.472	1.259			
SI2	0.089	0.097	0.070	0.925	0.399	1.244	0.542	0.380	5.823
SI3	0.075	0.099	0.068	0.786	0.456	1.586			
FC1	-0.032	0.130	-0.025	-0.233	0.762	1.708			
FC2	0.108	0.109	0.087	0.800	0.378	1.898			
FC3	0.231	0.106	0.223	2.135	0.040*	1.756			
FC4	0.388	0.106	0.371	3.053	0.002**	1.769			
SC1	0.181	0.104	0.182	1.927	0.071	1.727			
SC2	-0.056	0.119	-0.043	-0.482	0.580	1.453			
SC3	0.074	0.137	0.062	0.598	0.522	2.341			
Dependent variable: behavioral intention									
y: The degree to which I am willing to study on the network platform									
*p<0.05 **p<0.01									

According to R^2 =0.542 in Table 4, 54.2% are willing to study on the network platform, it is found that the multicollinearity of the model is tested, the VIF values in the model are less than 3, which means that there is no collinearity problem, means the model is good.

The verification value f of the model is 5.823, it can be seen that the model formula is:
$$y = -0.386 + 0.167 \times PE1 + 0.063 \times PE2 + 0.378 \times PE3 - 0.208 \times PE4 - 0.044 \times EE1$$

$$-0.205 \times EE2 + 0.103 \times EE3 + 0.062 \times SI1 + 0.089 \times SI2 + 0.075 \times SI3 - 0.032 \times FC1$$ It can be

$$+0.108 \times FC2 + 0.231 \times FC3 + 0.388 \times FC4 + 0.181 \times SC1 - 0.056 \times SC2 + 0.074 \times SC3$$

seen that PE3, FC3 and FC4 will have a significant positive impact on behavior intention y.(The regression coefficient value of PE3 is 0.378, P value is 0.009; the regression coefficient value of

FC3 is 0.231, P value is 0.040; the regression coefficient value of PC4 is 0.388, P value is 0.002).It can be seen that PE and FC in the performance period will have a significant positive impact on behavior intention y.Other factors do not have a significant impact on behavioral intention y.

3.4. Hypothesis Verification Results

The research hypothesis is verified through analysis, as shown in Table 5.

Table 5. Hypothesis test results

Research hypothesis content	Significance
Performance expectation has a positive impact on University Students' willingness to accept online teaching	significant
Effort expectation has a positive impact on University Students' willingness to accept online teaching	non-significant
Effort expectation has a positive impact on performance expectation	significant
Social expectation has a positive impact on University Students' willingness to accept online teaching	non-significant
Social expectation has a positive impact on performance expectation	non-significant
Promoting factors have a positive impact on University Students' willingness to accept online teaching	significant
Promotion factors have a positive impact on effort expectation	significant
Gender plays a moderating role in the research model of University students receiving online teaching	non-significant
Age plays a moderating role in the research model of University students receiving online teaching	non-significant
Experience plays a moderating role in the research model of University students receiving online teaching	non-significant
Voluntariness plays a moderating role in the research model of University students receiving online teaching	non-significant

3.5. Research Results

According to the above hypothesis test conclusion, the relevant analysis is as follows:

(1) Performance expectation PE and promotion factor FC are important factors affecting students' acceptance of online teaching platform in Yibin University. Performance expectation PE reflects the degree to which students of Yibin University pay attention to the practicability and value of the online teaching platform. The promotion factor FC reflects the technical advantages of network-based teaching platform. Experience E is also an important factor affecting the students of Yibin University to accept the online teaching platform, it shows that experiential learning with personal participation can produce deeper cognition and is more conducive to the reception and promotion of online platform teaching.

(2) Try to expect that EE has no significant impact on Yibin University students' acceptance of online teaching platform.This shows the difficulty of using the network platform technology itself, it is not a key factor affecting user acceptance, this should be related to the platform construction.

(3) Social impact Si also has no significant impact on Yibin University students' acceptance of online teaching platform. Considering the abnormal development of network platforms and the requirements of school teachers during the epidemic, there are many kinds of platforms, in these special cases, it leads students to passively accept the online teaching platform, lack of subjective choice.

(4) Gender and experience have no impact on the acceptance behavior of online teaching platform, which may be related to the sudden rise of online teaching, students' passive participation and not yet widely recognized.

(5) Although the significance of voluntary VU does not meet the test criteria, it has had an impact on behavior choice to a certain extent compared with other influencing factors. Generally speaking, perceived voluntariness should be a secondary influencing factor.

(6) Age also has no significant effect on students' acceptance of the online teaching platform, this may be related to the short time of mobile learning in the school.

4. Optimization suggestions

As performance expectation and promotion factor are important factors affecting Yibin University students' acceptance of online teaching platform, voluntary is a secondary factor.In view of this situation, it is suggested that students of Yibin University should focus on:

(1) Strengthen the construction of online teaching platform and teaching resources, introduce high-quality public online course resources, make students better feel the practicability of e-learning platform.

(2) By increasing the pilot construction of online teaching platform, or carry out e-learning experience exchange activities, enable students to establish and enrich their experience and recognition of learning on the network platform.

(3) Create a good learning atmosphere, strengthen the cultivation of students' self-study ability, provide necessary quality for students to better adapt to independent and open learning, avoid the negative effects caused by the mismatch between ability and confidence.

(4) Appropriately enhance the interest of educational resources on the network platform, try to teach in fun.This research method has a good representativeness, and has a certain reference value when carrying out network teaching research in other University s and universities.

However, it should be noted that different universities adopt different conditions, duration and resource richness to carry out network teaching, therefore, it needs to be adjusted in combination with the actual situation before it can be applied.

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