

## **Analysis of the virtual learning community user adoption behavior based on perceived risk.**

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### **Abstract**

**Purpose:** The virtual learning community plays an important role in the distance education. In the modern distance education, student's learning process is a student's interacting process with other network teaching components, including human-computer interaction, interaction of contents and interpersonal interaction.

**Design/methodology/approach:** This paper is to explain the adoption behavior of virtual learning community users, through the questionnaire data collection, and usage the structural equation model to verify the perceived risk of virtual learning community user adoption behavior effect, thus put forward the strategy to reduce the user perceived risk.

**Findings:** In this paper, it uses Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to measure the scale reliability and validity of the model. In order to test whether scale is suitable for exploratory factor analysis, it needs to calculate KMO and Bartlett sphere test in advance. The results show KMO value is 0.804, and the test results show that it is suitable for factor analysis. Based on TAM theory, the article analyses user adoption behavior of virtual learning community for real-time interaction and completes the learning task in the distance education from the user perceived risk perspective.

**Originality/value:** This paper puts forward the relationship between perceived risk model of user in virtual learning community utilizing structural equation modelling and regression testing of hypotheses.

**Keywords:** The virtual learning community, User adoption behavior, Perceived risk.

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### **Introduction**

The virtual learning community with the carrier of internet has experienced the fast growth in the recent years, which has the advantages of assisting the users to be able to complete the study task in the case of time and space are not unified. The virtual learning community plays an important role in the distance education.

In the modern distance education, student's learning process is a student's interacting process with other network teaching components, including human-computer interaction, interaction of contents and interpersonal interaction [1]. In the process of human-computer interaction, students choose courses mainly through the remote education platform website. In the process of the content interaction, the students watch the video, audio, data and various kinds of counselling information, including teaching information, teaching documents and complete assignments formative assessment. When encountering problems, they discussed by means of retrieval or creating a new post and coming into the course BBS, which belongs to the stage of interpersonal interaction. From the point of reality, the students in interactive activities

are not so active, especially in the interpersonal interaction of the virtual learning community. In both of the interaction between teachers and learners and the interaction between the learner and the learner, the student's participation is not high.

Perceived risk should be brought into the perceived value model, and this paper is to explain the adoption behavior of virtual learning community users, through the questionnaire data collection, and usage the structural equation model to verify the perceived risk of virtual learning community user adoption behavior effect, thus put forward the strategy to reduce the user perceived risk.

### **The Theory Basis**

Through literature search, this paper finds that the researches on information technology adoption have a very wide range, and with the development of information technology constantly updated, some emerging adopted technologies such as mobile learning, virtual learning community, become the hot topics. Although these emerging technologies can effectively improve the efficiency of the people to learn in the very great degree, but there must be a premise that is accepted by people.

Scholars have a lot of practical models on the adoption of information technology, and the most representative model is the Technology Adoption Model (TAM).

TAM model was proposed by Davis [2] and others in the University of Arkansas in 1989, which is mainly to explain the individual behavior to acceptance of information technology. Davis' technology adoption model puts forward two decisive factors, namely the useful erogenous (PU) and ease of perception (PE). TAM theory poses that the information technology use is determined by people's behavior intention. This kind of behavior intention and attitude are effected by people if they want to use and perceived usefulness factors, while the use of attitude is determined by the perceived usefulness and perceived ease of use. The perceived ease of use and the information technology in existing attitudes and opinions, and the difference between different individuals, environmental constraints can control the interference factors such as external variables of perceived usefulness and decisive role.

In recent years, the TAM model has been widely used in network learning research [3]. Online learning is mainly the autonomous learning of the users through the network education platform [4]. The actual use of the users on the network education platform is determined by the use intention of decisions of the students [5]. The usefulness and ease of use of the learners' network of the education platform have a great influence on whether they are willing to adopt the network education platform, and it ultimately affects the students' learning effects and the use effect of the network education platform. From the above aspects, this paper adds two external variables on TAM model, obtaining the expansion of the network learning model of technology adoption as shown in Figures 1 and 2.

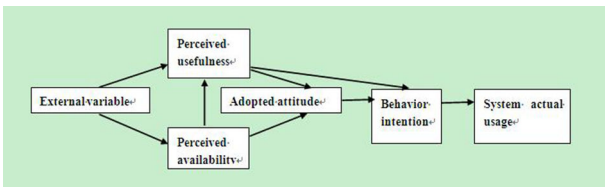


Figure 1. Technology adoption model.

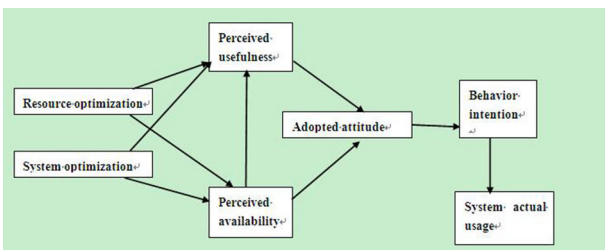


Figure 2. Expanded technology adoption model.

All models above is to review the adoption behavior of users based on the information technology, and the variables involved have positive influence on user adoption of network education platform, ignoring the negative factors hindering the user adoption.

Harvard University's Bauer extended the concept of perceived risk from the psychological perspective [6]. He believes the users' adopted behavior hidden the uncertainty of the results, which could make users unhappy. Following Bauer study, Cox embodied the concept of perceived risk [7]. In his research on the theory of perceived risk, the basic assumption is that the user's behavior is goal oriented. When a user is in adopting some technology, subjective cannot determine whether can achieve its goal or may produce adverse consequences, producing the risk perception. Mitchell suggested that perceived risk is derived from the user's perception of uncertainty, including the uncertainty of demand for its ambiguity and decision results, and the users tend to reduce the perceived risk in making decisions [8].

**Research Model and Hypothesis**

On the basis of the review of the literature, this paper gives the following definition on the users perceived risk of the virtual learning community: when users consider adopting virtual learning community, some uncertain factors such as privacy, functionality or content will lead the failure of the achievement of the expected purpose and the time loss, thus produce the perceived risk [9].

This article discusses the possible and met risk of the virtual learning community through the focused interview of 100 new college entrance students of a Broadcast Television University in 2013 of distance education learning and 100 graduates in 2013. The discussion results show that more students are concerned about the privacy risk, time risk, performance risk, psychological risk, and function risk. And the cause of the risk is from the technology uncertainty and content uncertainty and service uncertainty of the virtual learning community [10].

The user perceived risk inherent source lies in the specific use environment. Virtual learning community is on a virtual, open platform. During the actual operation process of the users, the characters of the safe, stable and reliable and reaction speed of the platform will cause the user perceived risk. The community system load and response time can cause cost. Platform system links jump is not reasonable and the system instability, which will cause the feeling of discomfort, including the user psychological conflict, depression and so on. The easy use of the interface design, the clear and complete navigation structure also directly affect the user's risk perception of community platform.

The higher the uncertainty of the user perceived technology is, the higher the perceived risk of users is [11].

H1 the user perception technology uncertainty and virtual learning community of users perceive privacy risks are positively related.

H2 the user perception technology uncertainty and virtual learning community of users perceived risk time are positively related.

H3 the user perception technology uncertainty and virtual learning community of users perceived risk performance are positively related.

H4 the users perception technology uncertainty and virtual learning community psychological risk perception is positively related.

Virtual learning community is an “interaction system with equal attention on teaching and learning”. The content structure of the virtual learning community directly determines whether the user can quickly find what he needs to study resources, which can reduce the user search costs for improvement of the interactive performance. The degree of interaction of the content between the teachers and students can improve the sense of entertainment. The interactive space can solve learning problems and reduce the time cost [12].

H5 user perception content uncertainty and the users perceived risk time of the virtual learning community are positively related.

H6 user perception content uncertainty and the users perceived risk performance of the virtual learning community are positively related.

H7 user perception content uncertainty and the psychological risk perception of the virtual learning community are positively related.

Virtual learning community always gives the participants different roles and permissions. The community members can participate in the construction of community, and non-community members can browse some resources. Managers of the community members are in the service of other members, including the registration approval, the behavior of the other members of the constraints; daily members answer solving about the community platform. The teachers are in charge to disabuse and community resources evaluation audit. Students mainly participate in community discussions, asking questions, and completing the task. This ideal state requires the corresponding community specification system, incentive system, disciplinary system, namely the community members can obtain the corresponding service. The uncertainty of service will also bring perceived risk to the user, such as fatigue community resources, reduce of the opportunity of learning resources of students through the virtual learning community, the drift of the discussion topic, more time cost of the users, and the influence of the learning environment construction and the diversification of learning tools on the sense of belonging of the users.

H8 user perception uncertainty and users perceived risk time of the virtual learning community are positively related.

H9 user perception service uncertainty and perceived risk performance are related of the virtual learning community are positively related.

H10 users perceived service uncertainty and risk awareness of the virtual learning community are positively related.

The positive learning attitude can make a positive behavior. The positive learners should be active to find learning resources and learning methods, to satisfy his needs and set up their own points of view, and then produce a series of positive actions, such as willing to participate in virtual learning community. Then they like to go to share their positive learning experience and experience, or would like to recommend to friends by effective virtual learning community, and so on.

H11: user perceived privacy risks and using intend are negatively related.

H12: user perceived time risk and using intend are negatively related.

H13: user perceived performance risk and using intend are negatively related.

H14: user perception psychological risks and using intend are negatively related.

H15: user awareness of risks and using intend are negatively related.

From the above aspects, this paper gets the correlation of each dimension theory model of perceived risk for virtual learning community as shown in Figure 3.

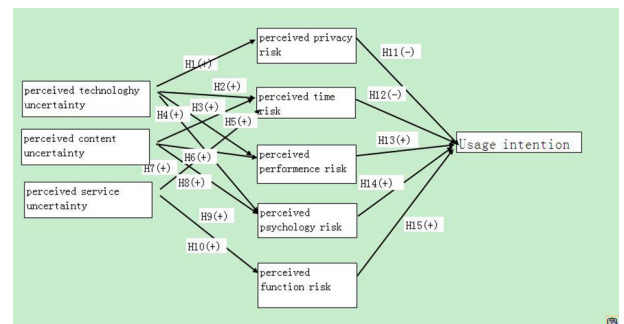


Figure 3. The antecedent and adoption behavior model of users perceived risk of virtual learning community.

### Variable Measurement and Data Collection

This study designs the questionnaires based on the general principles of the structural equation model. First of all, this paper extracts the variable measurement items based on a large number of literature researches, and conducts correction perfect of the initial scale to adapt to the environment of the virtual learning community. Most measurement items are from the existing literatures, in order to improve the content validity of the scale. The variable description and sources are as shown in Table 1.

The main targets of the survey are to select 2013 and 2014 open education students of a Broadcast Television University. Choosing this group as the sample fits the research background in this paper. Questionnaire mainly adopts the mail and returns back in time. With the analysis of the questionnaire and removing of the too much missing value questionnaires, this paper gets a total of 162 effective questionnaires. This paper

uses Likert5 point index scale to measure with the multiple variables. The respondents choose 1 (totally against) 2 (partial against) 3 (not sure/meaningless) 4 (partial agree) 5 (totally agree) to score the questions. Among the above respondents, 17.3% respondents often use the virtual learning community,

45.3% respondents registered a account but rarely use the resources of virtual learning community, 18.5% respondents registered a virtual learning community account but never post questions, and 8.9% respondents never use virtual learning community.

**Table 1.** Variables and measurement items.

Variables	Number	Measurement items	References
Uncertainty of perceived technology	PTU1	Virtual learning community system may exist hidden safety trouble	[13]
	PTU2	Virtual learning community system response speed is slow	
	PTU3	Virtual learning community system function is not complete	
	PTU4	Virtual learning community system navigation structure is fuzzy	
	PTU5	Virtual learning community system links jump is not reasonable	
Uncertainty of perceived content	PCU1	Virtual learning community resources cannot meet the demand of learning	[14]
	PCU2	The learning resources related to my demand are difficult to understand	
	PCU3	Virtual learning community learning resources update slower	
	PCU4	Resources form does not conform to the distance learning environment	
	PCU5	Community interaction can't timely solve problems in learning	
Uncertainty of perceived service	PSU1	The community discussion topics always have nothing to do with learning	[15]
	PSU2	Community members rarely publish learning resources	
	PSU3	Community is lack of the corresponding standard system, incentive system, and disciplinary system	
	PSU4	Learning community is lack of learning atmosphere building and the learning community has simplification character of learning tools	
Perceived risk	PR1	I think that the use of virtual learning community for remote learning will lead the leakage and infringement of my privacy	[16]
	PR2	I think the use of virtual learning community will be a waste of my time	
	PR3	I think the virtual learning community is an inefficient way to learn	
	PR4	I think that the participation in virtual learning community may cause mental worry or anxiety	
	PR5	I don't think virtual learning community can broaden students' horizons and improve the learning efficiency and opportunity	
Use intention	UI1	Distance learning is an effective way of learning	[17]
	UI2	I would like to study by distance learning	
	UI3	I would like to see others in learning study suggest	
	UI4	I am willing to share the distance learning experience	
	UI5	I would like to recommend to friends the distance education platform I like	

## Data Analysis

In this paper, it uses Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to measure the scale reliability and validity of the model. In order to test whether scale is suitable for exploratory factor analysis, it needs to calculate KMO and Bartlett sphere test in advance. The results show KMO value is 0.804, and the test results show that it is suitable for factor analysis.

In the process of factor analysis, after Varimax rotation, six factors were extracted, explaining 79.3% of variance. All indicators on the corresponding factor load are bigger, which is not less than 0.5. The cross variable load is not more than 0.5, and the index of load is as shown in Table 2.

Further analysis of the results is as shown in Table 3, and the results show that all the measure standard load is greater than 0.6, the Composite Reliability (CR) is greater than 0.8, Cronbach 's Alpha value is greater than 0.7, and the extracted

*Analysis of the virtual learning community user adoption behavior based on perceived risk*

Average Variance (AVE) is greater than 0.5. The above indicators show that the data has good convergent validity and reliability.

**Table 2.** Rotate factor matrix.

	Factor					
	1	2	3	4	5	6
PTU1	0.339	0.062	0.815	0.218	-0.054	0.076
PTU2	0.381	-0.069	0.879	0.041	-0.094	-0.019
PTU3	0.378	0.027	0.847	0.003	-0.044	0.07
PTU4	-0.099	0.851	0.071	0.241	-0.011	0.016
PTU5	0.095	0.872	0.243	-0.014	-0.058	0.046
PCU1	0.013	0.858	-0.084	0.131	-0.088	-0.173
PCU2	0.071	0.109	0.279	0.838	-0.077	-0.057
PCU3	-0.155	0.198	-0.089	0.891	-0.068	-0.005
PCU4	-0.037	0.169	0.042	0.913	-0.066	-0.042
PCU5	0.233	0.359	-0.087	0.158	-0.01	-0.243
PSU1	0.253	0.344	-0.112	0.102	-0.137	-0.235

PSU2	0.39	0.489	-0.125	0.183	0.017	-0.327
PSU3	-0.085	0.059	-0.224	0.185	0.091	0.225
PSU4	-0.089	-0.116	-0.039	0.044	0.106	0.269
PR1	-0.032	-0.094	-0.025	-0.067	0.421	0.655
PR2	-0.02	-0.147	0.024	-0.047	0.047	0.883
PR3	-0.103	-0.115	0.087	0.003	0.081	0.872
PR4	-0.16	-0.022	0.067	-0.117	0.89	0.132
PR5	-0.036	-0.041	0.011	-0.039	0.921	0.181
UI1	-0.062	-0.09	-0.264	-0.038	0.816	0.025
UI2	0.786	0.143	0.416	0.055	-0.03	0.016
UI3	0.826	0.064	0.392	-0.006	-0.071	-0.009
UI4	0.864	0.101	0.189	0.045	-0.078	0.108
UI5	0.789	0.114	0.309	-0.107	0.013	0.114
Characteristics root		4.214	2.67	2.493	1.566	1.082
Variance (%)		17.557	11.123	10.288	6.11	4.508
Cumulative (%)		47.201	58.324	68.712	78.822	79.33

**Table 3.** The factor reliability and validity testing result.

Factor	Indicator	Standard load	AVE	CR	$\alpha$	PTU	PCU	PSU	PR	UI
PTU	PTU1	0.839	0.733	0.939	0.782	0.86				
	PTU2	0.934								
	PTU3	0.869								
	PTU4	0.798								
	PTU5	0.835								
PCU	PCU1	0.798	0.692	0.918	0.783	0.21	0.83			
	PCU2	0.806								
	PCU3	0.87								
	PCU4	0.871								
	PCU5	0.81								
PSU	PSU1	0.818	0.52	0.81	0.777	0.33	0.45	0.72		
	PSU2	0.783								
	PSU3	0.616								
	PSU4	647								
PR	PR1	0.621	0.638	0.897	0.791	0.43	0.28	0.38	0.79	
	PR2	0.807								
	PR3	0.799								
	PR4	0.853								
	PR5	0.886								

UI	UI1	0.75	0.634	0.896	0.8	0.18	0.25	0.38	0.26	0.8
	UI2	0.816								
	UI3	0.845								
	UI4	0.813								
	UI5	0.755								

AMOS21 test structure model is adopted to obtain model of Figure 4. In the model, most of the assumptions are supported. Users' perceived privacy risk, perceived performance risk and psychological perceived risk are explained bigger by the variances, and perceived privacy risk and perceived performance risk were the main reason for the influence of user adoption.

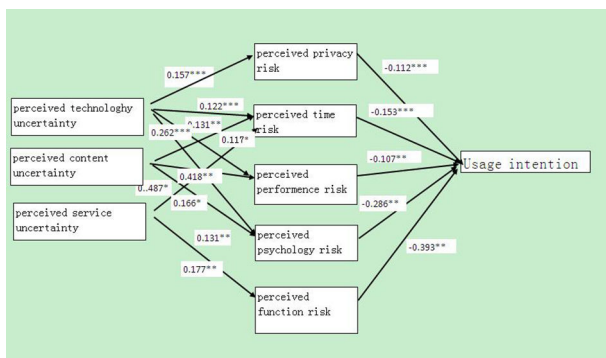


Figure 4. The antecedent variables of users' perceived risk of virtual learning community and the hypothesis testing results of the adoption behavior model.

Model fitting index is as shown in Table 4, the indicators are within the acceptable range, showing that model has good fitting.

Table 4. The recommended value and practical value of the model fitting index.

Fitting index	$\chi^2/df$	RMSEA	GFI	AGFI	CFI	NFI
Recommended value	<3	<0.08	>0.90	>0.80	>0.90	>0.90
Value of this research	1.6	0.05	0.92	0.9	0.96	0.91

### Conclusion

Through model analysis and verification, in the virtual learning community, the uncertainty of sensing technology, the uncertainty of perceptual content and the uncertainty of perceived service influence can bring the perceived risk to the community users. The influence of the uncertainty of the perceived content on the user's perceived performance and the user's perceived psychological risk significantly reached 0.413 and 0.413. Analysis shows that with the continuous development of information technology, the most concerned aspects of the virtual learning community users are still the learning community resources. In the information explosion

time, the user's access to information becomes more diverse and more colourful. If the learning resources provided by the virtual learning community cannot meet the demand of users, in other words, if the community users realize the virtual learning community content will not bring good performance to the user, the user will make negative selection.

Through the study, this paper also found that perceived psychological risk and perceived function risk directly affects the user's use intention, respectively reaching 0.286 and 0.393. The results show that, in the process of initial adoption of information technology, users' use intention influenced by psychology is larger on the one hand. The technology system of merchants can pass the advertisement publicity, especially consensus propaganda, for the support of information technology to shape a common "selling point", attract users, and inspire the user have the related requirements.

The perceived ease of use has significantly positive influence on perceived usage, with the coefficient of 0.19. Therefore, in view of the specific information, technology services and convenience to the extreme, it can significantly enhance user recognition of the information technology services.

The user's perceived risk has not used the significance test of concrete topology awareness in this study. But it does not mean that the factors should be ignored. Its reason is that the most of the investigation objects of this study are younger users. Although the result is consistent with the current reality: a large number of young mobile phone users don't pay attention to risk, but pay more attention to whether the information service satisfies their needs, and a large number of users focus on the safety of the mobile phone, which is far lower than the attention to the safety of the personal computer. But as the change of time, the situation will change. In 2013, for example, CCTV 3.15 International Day for Protecting Consumers' Rights party disclosure the mobile phone privacy risk. More and more users begin to pay close attention to this topic, and they will gradually expand to the attention of the whole mobile phone service risk. Specific mobile service provider, therefore, need to prove himself to the user's safety, through a third party appraisal report, and user evaluation, etc., to reduce the perceived risk of new users.

In addition, perceived cost significantly negatively affects users' use intention. Yet the coefficient between the two is low, only reaching -0.09. That is because a large number of mobile technology services businesses, particularly in the android open source under the system of merchants, in order to fight for market, continue to use the common competition mode in

traditional internet to provide free services. So the users' perceived costs in the survey are very weak. Some people even think that cost is almost monthly flow package fee. However, judging from past experience, perceived cost should have stronger negative impact on users' use intention.

The distance education institutions should conduct some measures on different variables of the model to reduce the perceived risk of the user and increase the perceived value as the provider of virtual learning community. On the one hand, they should actively explore the application of Web2.0 tools in virtual learning community to increase user operability and entertaining, enrich the resource information content, and make resources get more extensive use of carrier form, contributed to the rapid increment of teaching resources and appreciation, bringing to the student resources application on many favourable conditions. Meanwhile, they should conduct the system construction of community actively to guide the community of users have positive rational utilization of virtual community to participate in the construction of the virtual learning community.

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