

## ATTITUDE AND BEHAVIOR STUDY IN WEB BASED LANGUAGE LEARNING

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### Abstract

With the development of information technology , web based instruction is put into practice in China's higher learning institutions nationwide . This paper aims to explore the factors affecting students' use of the learning system , taking Self-Access English Learning System of Dalian University of Technology ( China ) as an example . The technology acceptance model ( TAM ) is employed as the theoretical basis and questionnaire is used to measure the hypothetical model . The results confirm the original technology acceptance model in mandatory usage context . Among the proposed four external variables , only the computer self efficacy indirectly influences actual usage behavior through perceived usefulness and perceived ease of use . And prior computer experience exerts significant influence on perceived ease of use , while excluding perceived usefulness . However , teaching content and communication variables produce direct influence on actual use of the system . From the results , some implications and suggestions can be provided . All these aspects considered , teachers could control these external variables and promote learners' internal perceptions . And then this could contribute to frequent usage behavior . In all , the self access English learning system can be a successful and effective instruction model .

### Key words

factors technology acceptance model usage behavior

### 1 . Introduction

Studies on information technology continuously report that users' attitudes are important factors affecting the success of the system ( Burkhardt 1994 ; Davis 1989 ; Garcia 2001 ; Lucas 1981 ; Rice & Aydin 1991 ) . For the past several decades , many definitions of attitude have been proposed . However , all theories consider attitude to be a relationship between a person and an object ( Woelfel 1995 ) . In the context of information technologies , one of the approaches to study attitude is Technology Acceptance Model ( TAM ) ( Davis 1989 ) , which suggests users formulate a positive attitude toward the technology when they perceive the technology to be useful and easy to use .

Previous research has noted that the TAM was very useful in predicting and explaining technology use in various situations ( Dillon & Morris 1996 ) . And TAM has been extensively tested and validated in areas other than education . There is some mentioning about the fact that studies of the TAM on a non-voluntary basis are rarely conducted . This research is to examine the mandatory usage contexts to test the conditions of the proposed technology acceptance model . Due to the increase of student enrollment , postgraduate English teaching in Dalian University of Technology is confronted with the problem how to implement individualized instruction and construct autonomous learning environment . To solve this problem , the university developed a self-access English learning system for the non-English-major postgraduates . Since the spring of 2005 Self Access English Learning System of DUT is put into use . After two semesters practice , there is a need to know students' attitude toward the system and their acceptance

of the whole system and its effect .

## 2 . Technology acceptance model

### 2 .1 User Acceptance Model

The presence of computer and information technologies in today's organizations has expanded dramatically . Explaining user acceptance of new technology is often described as one of the most mature research areas in the contemporary information systems (IS) literature ( Hu et al .1999 ) . Research in this area has resulted in several theoretical models , with roots in information systems , psychology , and sociology .

The Technology Acceptance Model ( TAM ) is an information system theory that models how users come to accept and use a technology . The Technology Acceptance Model proposes that applications usage and adoption can be predicted based upon the factors of perceived ease of use ( PEOU ) and perceived usefulness ( PU ) ( Davis 1989 ) . Understanding of the predictors of system usage could serve a multitude of stakeholders by helping them to recognize how to promote that usage . The Technology Acceptance Model ( TAM ) suggests that when users are presented with a new software package , a number of factors influence their decision about how and when they will use it . The major ones are :

- I . Perceived usefulness ( PU ) — This was defined by Fred Davis as “the degree to which a person believes that using a particular system would enhance his or her job performance ” .
- II . Perceived ease of use ( EOU ) — Davis defined this as “the degree to which a person believes that using a particular system would be free from effort ” ( Davis 1989 ) .

The Technology Acceptance Model is shown below in Figure 1 .

Figure 1 . The Technology Acceptance Model ( TAM )

The TAM is employed by Management Information Systems ( MIS ) practitioners to predict the success or a failure of an information systems project . The assumptions on which the TAM is based comprise :

- (1) When end users perceive the target system as one that is easy to use and nearly free of mental effort , then they may have a favorable attitude toward using the system .
- (2) When end users perceive the target system as one that is helpful to their job , then they may have a positive attitude toward the used system .
- (3) When users have a favorable attitude toward the target system , they may use the system frequently and intensely , which means that the system is successfully developed .

This technology acceptance model suggests that frequent use of an information system is closely related to perceived ease of use and perceived usefulness . Frequent use of a system indicates its success and popularity . The model may thus help the systems developers to conceptualize and predict its acceptance and to take some measures to control external factors and affect users' perceptions so as to promote the acceptance of the new system by its users .

## 2.2 Attitude behavior relationship

“Attitudes are predispositions to respond to some class of stimuli with certain classes of responses and designate the three major types of responses as cognitive, affective, and behavioral” (Rosenberg & Hovland 1960). “Attitudes are enduring systems of positive or negative evaluations, emotional feelings, and pro or con action tendencies with respect to social objects” (Krech et al. 1962). Schlegel and DiTecco (1982) suggested that attitudes consist of evaluations and knowledge structures.

Fishbein and Ajzen (1974) showed that attitude and behavior are correlated when (a) the observed behavior is judged to be relevant to the attitude, (b) the attitude and behavior are observed at comparable levels of specificity, and (c) mediation of the attitude behavior relationship by behavioral intentions is taken into account. Fazio (1986) showed that attitude and behavior are correlated when (a) the attitude is based on direct experience with the attitude object, and (b) to the extent that the attitude is cognitively accessible.

Without any doubt, there is ample evidence in the broad visions of social psychology for integration of attitude behavior relations in both directions. Attitudes have been shown to affect various kinds of behaviors, such as environmental behavior, consumer behavior, voting behavior, contraceptive use, marijuana use, discrimination and many others (Eagly & Chaiken 1993; Fazio 1995; Kraus 1995). On the other hand, attitudes may be inferred from behavior in accordance with self perception principles (Bem 1972). These self perception effects have also been shown in a variety of domains, such as environmental behavior (Chaiken & Baldain 1981), religious behavior (Salincik & Conway 1975), and humor (Olson 1992).

Attitude behavior relationships with respect to adoption of information systems are well worth our attention. Intuitively, the voluntary behavior of the individual end users determines success in any information system. One of the most important factors, which regulate end user behaviors, is their attitude toward the system. It is assumed that there is a positive correlation between a student's attitude toward course format and his or her learning performance. In other words, students who favor online delivery of English courses tend to perform better in those who do not.

## 2.3 Extension of the technology acceptance model (TAM)

Previous research has indicated that the TAM was very useful in predicting and explaining technology use in various situations (Dillon & Morris 1996). However, Davis (1989) argued that research should explore other variables that could affect perceived usefulness, perceived ease of use and use. Dishaw and Strong (1999) noted that one of TAM's weaknesses is its lack of explicit inclusion of external variables. They found the extended TAM explained the variance of the dependent variable better than the original TAM.

As a matter of fact, many scholars have put forward various kinds of extended TAMs. For instance, Moon and Kim (2001) suggested a model where perceived playfulness was described as one of attitude toward Web surfing.

TAM is employed in educational setting in this research. After a thorough investigation of the self-access English learning system of Dalian University of Technology (DUT), we conceptualized the whole system in terms of two key components, the content and the communication. Next, these two parts will be introduced in detail. DUT implements web based English teaching due to the shortage of English teachers compared with large number of postgraduates. In addition, the average age of the postgraduate students is over 23 years old, which makes it possible to implement web based English teaching. English teachers here in DUT adhere to the task based teaching. Therefore, the teaching content is organized into various kinds of tasks. Besides, any task is consisted of several activities. The teaching content covers many aspects, ranging from listening, speaking, reading to writing. In this research, teaching content part of the system is considered to be one of the external variables affecting perceived usefulness and perceived ease of use. This research aims to verify whether there are correlations between teaching content and perceived usefulness as well as between teaching content and perceived ease of use. Another external variable is communication part of the target system. Communication part here can be classified

into three categories ,which are interaction between teacher and student ,between student and student , between computer and student respectively . After the study of this external variable ,it is hypothesized that communication will have positive influences on perceived usefulness and perceived ease of use . Apart from that ,this research also aims to testify whether computer self efficacy and prior computer experience exert influence on perceived ease of use and perceived usefulness .

### 3 . Methodology

#### 3 .1 Subject

270 Non -English -majors postgraduates in Dalian University of Technology participated in this study on a non -voluntary basis . The majority of them were male (about 80 %) . Regarding academic level ,they were all first year postgraduate students . More than 90 % of the subjects had been using computers for more than four years . Among the 270 subjects ,70 participated in a trial test . The rest 200 participated in the large scale survey .

#### 3 .2 Instrument

The data for this study was collected through printed questionnaire administered in Dalian University of Technology . Questions were selected from previous literature on Technology Acceptance Model . Most of these questions derived from the study of Fred Davis .

In addition ,some questions were designed by the researcher for research purpose . The questionnaire is written in Chinese .

Specifically ,questions were selected and designed upon their relevance to 1 ) Perceived Ease of Use ( PEU ) ,2 ) Perceived Usefulness ( PU ) ,3 ) Attitude Toward Using ,4 ) Actual System Use ,5 ) Computer Self -Efficacy ,6 ) Teaching Content ,7 ) Communication ,8 ) Prior Computer Experience .

#### 3 .3 Data Analysis

The first step in this study was to assess the validity of the measurement scales . The internal consistency and reliability of the measure scale were assessed by Cronbach alpha . To test the research hypotheses ,correlation and regression analysis were performed once the data collected and keyed in . In the path analysis ,we regressed each variable in turn onto the set of variables preceding it in the model . For example ,when testing the possible influence of content on perceived ease of use ,a regression analysis was performed predicting perceived ease of use from content ,communication ,computer self efficacy and prior computer experience . When determining the influence of content and perceived ease of use on perceived usefulness ,a regression analysis was performed predicting perceived usefulness from content ,communication ,computer self efficacy ,prior computer experience and perceived ease of use . By repeating these kinds of regressions ,we created an output path diagram by drawing an arrow for each relation .

### 4 . Result and discussion

This section presents the statistic and analytic results of the proposed model and hypotheses . First of all ,the validity and reliability of the measurement scale are assessed .

#### 4 .1 Validity and reliability of measurement scale

Based on the original model ,38 items were used to measure the seven constructs . Factor analysis method was not employed here to assess the construct validity . Because the proposed model was adopted from the existing model ,the variables were known beforehand . Therefore ,there was no need to perform factor analysis . However ,some experts were invited to assess the content and face validity of the questionnaire .

After the assessment of the validity of measurement scale ,the survey was printed and distributed to the target population in order for the pretest . 70 copies of the questionnaire were selected for internal consistency test . During this process ,some uncorrelated items were cancelled from the questionnaire . After all these had been done ,the survey was printed 220 copies . The survey was distributed to the target population with the response rate of 90 % .

Cronbach s alpha was employed to assess the reliability of the scales . And the cronbach s alpha values were shown below in Table 4 .1 . All these confirm that the measurement scale used were both valid and reliable .

Table 4 .1 Cronbach s alpha value

Variables	Cronbach s alpha value
Perceived usefulness	0 .77
Perceived ease of use	0 .78
Attitude towards using	0 .82
Actual use	0 .81
Teaching content	0 .75
Com munication	0 .70
Co mputer self -efficacy	0 .90

4 .2 Testing of the model

First of all ,descriptive statistics is performed on the collected data in which the means and standard deviation of each variable are shown in the following table .

It requires two steps to test the hypothetic model correlation and regression . Now ,we had a general understanding of the data collected . Next step is to see whether there are correlations between each variable .In order to testify the correlations ,bivariate correlations is performed on the data collected .

Table 4 .2 sum marizes descriptive statistics for variables used in the model . Each scale is based on a five point Likert scale . Figure 2 illustrates the result of path analysis . Arrows with star in the diagram represents a statistically significant relationship ( P <0 .005 ) between variables .

Table 4 .2 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std . Deviation
PCE	200	1	4	2 .65	.694
PU	200	1 .60	5 .00	3 .6590	.67691
PEU	200	2 .20	5 .00	4 .0300	.53754
Attitude	200	1 .25	5 .00	3 .8200	.69100
Self -efficacy	200	2 .77	5 .00	4 .0062	.52088
Actual use	200	1 .25	4 .75	3 .1988	.60218
Content	200	1 .75	5 .00	3 .7838	.57518
Com munication	200	1 .50	5 .00	3 .4675	.62472
Valid N (listwise )	200				

The correlation results are shown in the Table 4 .3 . After investigation of the results ,we find that there are strong correlation between perceived usefulness and perceived ease of use ,perceived ease of use and prior computer experience respectively . In addition ,there are strong correlation between perceived usefulness and attitude ,perceived ease of use and attitude respectively . Besides ,there is a strong correlation between perceived usefulness and actual use of the system . Computer self efficacy has strong correlation with perceived usefulness and perceived ease of use respectively . Furthermore ,teaching

content and communication part have strong correlations with actual use of the system .

From Table 4.3 ,we can also see that teaching content had no significant correlations with perceived usefulness and perceived ease of use . That means hypothesis 1 and hypothesis 2 are not supported . Also , communication did not produce significant relationships with perceived usefulness and perceived ease of use . Therefore ,hypothesis 3 and hypothesis 4 are not supported .

Table 4.3 Correlations

		PCE	PU	PEU	Attitude	Self efficacy	Content	Communication	Actual use
PCE	Pearson Correlation	1							
PU	Pearson Correlation	.043	1						
PEU	Pearson Correlation	.201	.360	1					
Attitude	Pearson Correlation	.070	.719	.431	1				
Self efficacy	Pearson Correlation	.126	.346	.488	.386	1			
Content	Pearson Correlation	.030	-.039	.064	.068	.028	1		
Communication	Pearson Correlation	.130	-.044	-.057	-.003	.022	.341	1	
Actual use	Pearson Correlation	.077	.698	.406	.957	.386	.342	.213	1

After correlation analysis ,the results which are statistically significant enough are labeled in Figure 2 .

Figure 2 . Hypothetic model with Person values

After the test of the correlations between variables ,the Person value of each correlation between two variables is labeled beside of each arrow . Next step is to test the relationships between these variables ,which already have been tested to be correlated . A series of regression are performed on the collected data . From the results of regression ,it is concluded that each significant correlation is proved to be causal relationship .

Table 4 .4 Results of regression analysis

(A)

Dependent variable :perceived usefulness					
Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std Error	Beta		
( Constant )	2 .147	0 .492		4 .364	0 .000
Computer self efficacy	0 .451	0 .088	0 .347	5 .130	0 .000
Perceived ease of use	0 .454	0 .083	0 .360	5 .434	0 .000
R Square	0 .272				
Adjusted R Square	0 .257				0 .000

(B)

Dependent variable :perceived ease of use					
Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std Error	Beta		
( Constant )	1 .820	0 .356		5 .112	0 .000
Prior computer experience	0 .120	0 .048	0 .155	2 .491	0 .014
Computer self efficacy	0 .483	0 .064	0 .468	7 .603	0 .000
R Square	0 .272				
Adjusted R Square	0 .257				0 .000

(C)

Dependent variable :attitude toward using					
Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std Error	Beta		
( Constant )	0 .378	0 .267		1 .415	0 .159
Perceived usefulness	0 .661	0 .052	0 .648	12 .657	0 .000
Perceived ease of use	0 .253	0 .066	0 .197	3 .852	0 .000
R Square	0 .551				
Adjusted R Square	0 .546				0 .000

(D)

Dependent variable ;actual use					
Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std Error	Beta		
( Constant )	1 .325	0 .293		4 .528	0 .000
Attitude	0 .720	0 .048	0 .837	14 .653	0 .000
Teaching content	0 .368	0 .072	0 .351	5 .110	0 .000
Communication	0 .139	0 .066	0 .145	2 .104	0 .037
R Square	0 .179				
Adjusted R Square	0 .170				0 .000

The results showed a strong Person correlation among the original variables of the technology acceptance model ( TAM ). Perceived usefulness ( Pearson's  $r = .719$  ) and perceived ease of use ( Pearson's  $r = .431$  ) both correlate strongly with a user's attitude towards the learning system . The data in addition to the R squared and adjusted R squared values of .551 and .546 supported hypotheses 8 and 9 , that is , there is a positive relationship between both perceived usefulness and perceived ease of use with a user's attitude towards using the system . The strongest relationship between any of the constructs was between attitude towards using and actual use . The positive relationship was found in both the correlation and regression analysis ( Pearson's  $r = .957$  ,  $\beta = .837$  ). Therefore , hypothesis 10 was supported . In addition , there was a positive relationship between perceived usefulness and perceived ease of use ( Pearson's  $r = .360$  ,  $\beta = .360$  ) , affirming hypothesis 7 . In all , compared with all the possible constructs , the strongest Pearson correlation values were between the original technology acceptance model ( TAM ) constructs . And this was not different from previous study on technology acceptance model .

While the new factor computer self efficacy produced significant relationships with perceived ease of use as well as perceived usefulness , but was not as strong as any of the original technology acceptance model ( TAM ) . Computer self efficacy was positively related to perceived usefulness ( Pearson's  $r = .346$  ,  $\beta = .347$  ) and Computer self efficacy was positively related to perceived ease of use ( Pearson's  $r = .488$  ,  $\beta = .468$  ) , as hypothesized . Therefore , hypothesis 5 and hypothesis 6 were supported .

Apart from that , another finding was that prior computer experience had direct influence on perceived ease of use . The positive relationship was found in both correlation and regression analysis ( Pearson's  $r = .201$  ,  $\beta = .155$  ). Therefore , hypothesis 12 was supported . However , prior computer experience did not produce significant relationship with perceived usefulness as we proposed in the hypothetic model . Therefore , hypothesis 11 was not supported .

The relationships between teaching content and perceived usefulness and perceived ease of use were not proved to be statistically significant . Therefore , hypotheses 1 and 2 were not supported . And the relationships between communication and perceived usefulness and perceived ease of use were not proved to be statistically significant . Therefore , hypotheses 3 and 4 were not supported . However , teaching content ( Pearson's  $r = .342$  ,  $\beta = .395$  ) and communication part ( Pearson's  $r = .213$  ,  $\beta = .381$  ) both strongly regressed on actual use of the system . Therefore , it can be regarded as one of the important findings in the research .

## 5 . Conclusion

In this present research , we adopted the technology acceptance model ( TAM ) as the theoretical framework to study the technology adoption . Although the proposed model is not fully confirmed , it

forms a new model . Two hundred data samples were collected through questionnaires from postgraduates of non -English majors in Dalian University of Technology who represent all the postgraduates using the self -access English learning system . The data analysis results partially support the extended model .

The results indicate that implications for teachers and developers . In order to enhance students actual use of the learning system , teachers can control these external variables , which in turn promote their internal perceptions . Finally , all these steps inevitably contribute to the frequent usage behavior . For instance , teachers can help learners promote their computer self efficacies so as to increase perceived ease of use and perceived usefulness . As for prior computer experience , teachers can suggest those students with less computer experience try to use the computers as much as possible . Then it will result in the accumulation of computer experience . In this way , with the accumulation of computer experience , learners perception is promoted and finally increase the usage behavior . Concerning teaching content and communication part of the system , some perfecting improvements on the system are provided according to the methodological principles for computer assisted language learning . After improvement , these two parts are psycholinguistically suitable for learners , which can arouse students interests in online learning and enhance actual use of the learning system .

Before evaluating the effect of the application of self access English learning system , it is fairly good to comprehend students attitude and their acceptance of the system , which is expected to offer unique benefits for teachers and developers .

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