FACTORS INFLUENCING UNIVERSITY ANIMATION STUDENT'S BEHAVIORAL INTENTION TO LEARN THREE - DIMENSIONAL ANIMATION SOFTWARE IN CHENGDU CHINA

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Abstract

The purpose of this study is to explore the factors that influence the behavioral intention in Learning Three-dimensional animation Software of animation majors in universities of Chengdu, China. The conceptual framework constructs the relationship among Perceived ease of use (PEOU), Perceived usefulness (PU), Self-efficacy (SE), Satisfaction (SAT), Enjoyment (ENJ), Social influence (SI), Behavioral intention (BI).The researchers used a quantitative method (n=500) to distribute questionnaires to students of three grades majoring in animation. Non-probabilistic sampling includes purposive sampling when selecting target students of animation major, Probabilistic sampling includes cluster sampling when selecting public universities in Chengdu, and stratified sampling of students of different grades when distributing surveys. The Confirmatory Factor Analysis (CFA) and Structural Equation Model (SEM) were used for the data analysis including model fit, reliability and validity of the constructs. The results of this paper show that perceived usefulness is the biggest factor that affects animation majors' behavioral intention of learning Three-dimensional animation software, while perceived ease of use has a significant impact on perceived usefulness, but has no significant direct impact on behavioral intention. Among other factors, social influence has been proved to have impact behavioral intention, satisfaction has a significant impact on students' behavioral intention of using Three-dimensional animation software, and self-efficacy directly affects satisfaction.

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Enjoyment factor has limited influence on students' learning Three-dimensional animation software. Therefore, the research suggests that in the course design and teaching of Three-dimensional animation major, we should start from the related factors of students' behavioral intention to create a better learning environment of technology and art.

Keywords: Three-dimensional animation software, Learning, Behavioral intention

Introduction

As a sunrise industry in the 21st century, the market potential contained in the animation industry was self-evident. In 2019, China's animation industry scale developed 194.1 billion yuan (Lisa, 2020). The expansion of the animation industry drives the demand for animation professionals, and the importance of animation education has been highlighted. The issue of how to cultivating high-quality animation talents in all aspects had attracted more and more attention from universities that set up animation professionals. Although China's animation education has reached a huge scale in terms of quantity in just a few years, there was still a problem of serious inadequacy between the quality of professional talents and industry needs. Three-dimensional animation teaching in animation education is an interdisciplinary teaching system which that fine arts, film and television, graphics and technology application. At present, the research on Three-dimensional animation (after this referred to as 3D animation) mostly stays at the technical application level, and the research on 3D animation education itself is very few. It is particularly necessary to study the related factors that affect students' learning 3D animation software from the perspective of students' learning behavioral intention, and it is also a field that needs to be explored in animation education research at this stage. Researchers have constructed the conceptual model and related variables through the summary of previous studies. Use questionnaire to collect data. Through the research and analysis of data, the factors influencing students' behavior intention of learning 3D animation software are determined, and the final conclusion is drawn. The research results can inspire animation educators to improve curriculum design and teaching, and improve students' behavior intention of learning 3D animation software. The main purpose of this paper is to study the influencing factors of animation students' behavioral intention of learning

3D animation software in Chengdu public universities. According to the following previous research results, the researcher selected the factors suitable for this study:

Fokides (2017) studied the factors that influence the willingness of Greek pre-service teachers to use computers when they became practicing teachers. The extended TAM theoretical model were used for estimation and testing. The study involved four variables that affect behavioral intentions: perceived usefulness, perceived ease of use, and self-Efficacy and attitude. The researcher selected the perceived usefulness and perceived ease of use in this study. Harun and Mustafa (2016) studied the factors that affect students' willingness to used LMS in Turkish secondary vocational schools. This study uses a three-tier usage model (3-TUM) to tested students' behavioral intentions to use LMS. These three layers include 7 variables such as perceived usefulness, interactivity, perceived ease of use, perceived multimedia instruction, satisfaction, self-efficacy and behavioral intentions. The researcher adopted two factors of self-efficacy and satisfaction in this study. Bardakci (2019) used the Unified Theory of Acceptance and Use Technology (UTAUT) to study the factors that impact Turkish high school students' used of YouTube for studying intention. This study constructed the following predictive factors: social influence; effort expectancy; performance expectancy and facilitating conditions were determinants factors of behavioral intention. The researcher selected the social influence factor in this study. Balouchi et al., (2017) studied the factors influencing consumers' behavior intention when using websites and browsing the Internet for travel planning. Technology Acceptance Model (TAM) is also used in the study, and other variables are put forward according to relevant literatures, namely perceived risk, perceived source credibility and perceived enjoyment. This study adopted enjoyment as one of the factors.

According to the above previous research results, researchers believe that perceived ease of use, perceived usefulness, self-efficacy, satisfaction, enjoyment and social influence may influence the behavioral intention of animation majors to use 3D animation software.

Perceived Ease of Use

Perceived ease of use was referred to the degree to which users believe that the technology would not be laborious (Davis, 1989). Perceived ease of use means that users acquisition higher technical ease of use had a higher chance of benefiting from the performance of the tool (Agrebi & Jallais, 2015).

Perceived Usefulness

Davis et al. (1989) definition of perceived usefulness: referred to people's belief that using this particular tool could enhance their work efficiency and performance to a certain extent. Perceived usefulness mentioned to the perceived effect of improving user efficiency (Wu & Gao, 2011),

Self-Efficacy

The original concept of Self-efficacy was defined as "human being's judement of their ability to organize and implement the process of action needed to achieve a specified type of performance" (Bandura, 1986). Compeau & Higgins (1995) think that in certain technical environments, self-efficacy was also seen as an individual's awareness of their ability to use information technology in completing tasks.

Satisfaction

Previous research had shown satisfaction as a function of overall satisfaction with the system numerous feeling (Bolton & Drew, 1991). Perceived satisfaction was usually used to assess the Valid or invalid of a system. It was used to define as people's feeling about information systems and their comfort in applying these systems (Liaw & Huang, 2013).

Enjoyment

Previous studies was assumed that the reasons for people's efforts to used information technology were external motivation and internal motivation, and internal motivation focuses on the pleasure and satisfaction gained from doing something (Lee, 2009). Perceived enjoyment was an intrinsic motivation that results from an activity because people were interested in that activity (Iqbal & Qureshi, 2012).

Social Influence

Fishbein & Ajzen (1975) regards social influence as a kind of social pressure. Social influence requires individuals to act based on the actions of people important to them, believing that they should or should not complete the activity. Similarly,

Püschel et al., (2010) proposed that social norms describe the pressure exerted on individuals by people who had an important influence on people, requiring them to took specific actions or innovations.

Behavioral Intention

According to Fishbein & Ajzen (1975) regards Behavioral intention could be regarded as the subjective probability of an individual willing to perform a certain behavior. Behavioral intention defined the extent to which people were willing to try to perform a behavior. Behavioral intention was the degree to which people make plans to implement or not implement certain conscious behaviors in the future (Warshaw & Davis, 1985).

Hypotheses

Warshaw & Davis (1985) pointed out that Behavioral intention was the degree to which people make plans to implement or not implement certain conscious behaviors in the future. Clarifying the behavioral intention of students using a system was a key factor, which enhances the use of the system and proves its possible effects. Many factors may affect the learner's behavioral intention to used a system in the learning process (Harun & Mustafa, 2016). Therefore, we propose the following factors and assumptions:

Researchers believe that with the improvement of the perceived ease of use of the information tools, people's behavioral to use the system's utilization was likely to increase (Teo, 2012). Perceived ease of use has also been proved to have a significant impact on perceived usefulness (Davis, 1989). Therefore, our first proposition involves the influence of perceived ease of use on perceived usefulness and behavioral intention:

H1: Perceived ease of use influences perceived usefulness.

H3: Perceived ease of use influences behavioral intention.

Previous research had observed that perceived usefulness had a notable active affect on attitudes and intentions (Çelik, 2008). Some studies by Cigdem and Topcu (2015) also found that perceived usefulness was one of the main reasons that directly affected the behavioral intention of technology usage. Therefore, the second hypothesis is:

H2: Perceived usefulness influences behavioral intention.

Johnson et al. (2008) found that the self-efficacy of electronic technology learners was related to the perceived usefulness of the system, course satisfaction, perceived content value, and course performance. Other research found a clear positive correlation between the three e-tech learning variables (self-efficacy, learner satisfaction, perceived usefulness) (Womble, 2008). The fourth hypothesis is self-efficacy and satisfaction:

H4: Self-efficacy influences Satisfaction.

In the previous CES research, the satisfaction factor had been seen as a major factor affecting students' learning attitude (Drury et al., 2003). Research had also shown that the perception of satisfaction affects people's behavioral intentions with a positive attitude (Lee & Lin, 2005). Damnjanovic et al. (2013) pointed out that perceived satisfaction and perceived usefulness directly influence learners' behavioral intentions for e-learning tools. This allows is to make the following statement for our fifth hypothesis:

H5: Satisfaction influences behavioral intention

It had been discovered very early that if technology could bring more enjoyment, it would affect user acceptance (Davis et al., 1992). When people use pleasant technology, people would feel satisfied and continue to use the technology (Zhou, 2013). Therefore, we put forward the sixth hypothesis:

H6: Enjoyment has influence on behavioral intention.

Social influence has widely regarded as one of the key factors that affecting people's attitudes towards the use of specific technologies (Gallego et al. 2008). Wang & Wang (2010) also believed that social influence could directly impact the intention of using technology. According to the above hypothesis, social influence was one of the direct determinants of behavioral intentions. Thus, our final hypothesis is:

H7: Social influence influences behavioral intention.

The conceptual framework model

In this study, the researcher created the conceptual framework based on three core theories and previous studies. The theory of technology acceptance model (TAM), three-tier use model (3-TUM) and extend unified theory of acceptance and use of technology (UTAUT) were used as the core theories, a conceptual framework is

constructed with seven factors to explain the behavior intention of animation majors in using 3D animation software. (Figure 1).

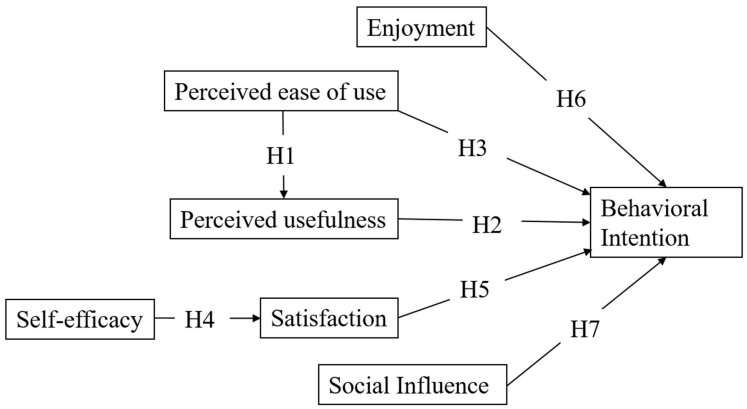

Figure 1 A Conceptual model of behavioral intention to learning 3D animation software

Materials and Methods

The target population of this study is the animation majors in the second, third and fourth grades. Because first-year students may not have enough experience using 3D software, freshmen are excluded from the target population. Employing survey quantitative research and questionnaire, the researchers distributed online and offline questionnaires to the target population. The questionnaire survey is divided into three parts: screening questions, five-point Likert scale measurement and demographic information. The Index of item-objective congruence (IOC) test was conducted to confirm the validity of the questionnaire tool. Among the 30 items in 7 structures, the highest score is 1 and the lowest score is 0.67. Consequently, all of 30 items in this dissertation are qualified for the content validity. According to the expected results and expected statistical ability level, the questionnaire involves 7 variables, 30 items and probability scale, and the minimum sample size obtained by using the above data in the sampling calculator is 425. In order to obtain better statistical results, the researchers increased the sample population by 20%, and finally decided to collect 500 samples from three universities in Chengdu.

The researchers used multi-stage sampling to conduct non-probabilistic and probabilistic sampling. In the first step, three public universities with animation majors in Chengdu, China were selected by cluster sampling, with a total target population of 1013. The selected universities are three local public institutions of higher learning in Chengdu, including Chengdu University, Sichuan Conservatory of Music and Southwest University for Nationalities. In the second step, the animation major students who have at least one month's experience learning 3D software are selected using the purpose sampling method. Finally, using stratified random sampling, 500 people from three grades were selected as the final samples. The internal consistency level of each construct is acceptable, and Cronbach's A estimation value is between 0.72 and 0.93, thus reaching the level above 0.7 recommended by Nunnally (1978).

Results

Confirmatory factor analysis (CFA) was conducted in this dissertation after the data collection process, in order to determine the confirmation of whether the amount of the constructions and loadings for each of the observed variable accord to what is anticipated on the foundation of the hypothesis (Malhotra et al., 2004). Confirmatory Factor Analysis (CFA) is used to determine the adequacy of the measurement model (Zhang et al., 2020). Lewis-Beck et al. (2004) convinced that the CFA as the multivariate analysis procedure which is employed to contemporaneously examine multiple hypotheses which the assumptions construct an evaluation matrix corporately. The measurement model is verified, and the correlation between potential variables and observed variables of the model is checked by confirmatory factor analysis (CFA) (Bashir & Madhavaiah, 2015). Researchers will use SPSS AMOS 24th edition (Figure 2) to test and revise CFA measurement mode.

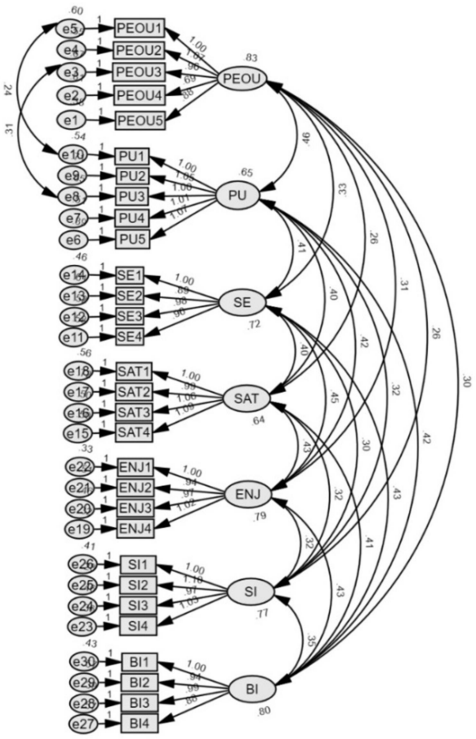

Figure 2 The adjusted measurement model

The adjusted model exposed the chi-square value to degree of freedom (CMIN/DF) was 1.700, lower than 3.00 (Hair et al., 2006). The goodness-of-fit index (GFI) is 0.920, higher than 0.90 (Jöreskog & Sörbom, 1998), and the adjusted goodness-of-fit index (AGFI) is 0.884, higher than 0.85 (Schermelleh-engal et al., 2003). the comparative fit index (CFI) was 0.967 which over 0.95 (Hu & Bentler, 1999), the normalized fit index (NFI) was 0.924 which over 0.90 (Hair et al., 2006), the root mean square error of approximation (RMSEA) is 0.037, less than 0.05 (Hu & Bentler, 1999). Therefore, all these indicators for the goodness of fits in the CFA testing of this study model were acceptable.

According to the statistical results (Table 1 and 2), CR value more than 0.70 and AVE more than 0.50 demonstrate adequate convergence (Hair et al., 2010). The validity of convergence can be confirmed by taking all factor loadings (> 0.50) and AVE (>0.50) for all structures (Fornell & Larcker, 1981). The square root of the extracted mean-variance is determined that all correlations are greater than the corresponding correlation value of the variable. All the relevant data shows that the discriminant

validity of inspection and proof exceeds the critical point value. Thus, the convergence validity and discriminant validity of this study are guaranteed. In addition, these matrix evaluation results consolidate the validity of discrimination and the validity evaluation of subsequent structural model estimation.

Table 1 Confirmatory factor analysis result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Latent variables	Source of questionnaire	No. of Items	Cronbach's alpha	Factors Loading	CR	AVE
Perceived ease of use	Fokides (2017)	5	0.723	0.575-0.796	0.853	0.541
Perceived usefulness	Fokides (2017)	5	0.725	0.706-0.811	0.861	0.555
Self efficacy	Fokides (2017)	4	0.725	0.695-0.783	0.830	0.550
Satisfaction	Harun & Mustafa, (2016)	4	0.765	0.682-0.777	0.828	0.546
Enjoyment	Jung et al., (2018).	4	0,767	0.760-0.847	0.884	0.655
Social influence	Bardakci (2018)	4	0.854	0.782-0.877	0.895	0.681
Behavioral intention	Mikalef et al., (2016)	4	0.931	0.720-0.817	0.855	0.597

Table 2 Discriminant validity

	BI	PU	PEOU	SAT	SE	ENJ	SI
BI	0.772						
PU	0.512	0.735					
PEOU	0.333	0.585	0.744				
SAT	0.494	0.511	0.319	0.738			
SE	0.485	0.504	0.386	0.480	0.741		
ENJ	0.479	0.512	0.341	0.522	0.514	0.809	
SI	0.383	0.379	0.307	0.402	0.346	0.361	0.825

Remark The diagonally listed value is the AVE square roots of the variables

Structural Equation Modeling (SEM) will be processed to estimate specific linear equations and verify the fitting of the model. Structural equation model involves the construction of model, which is the information representation of some observable or theoretical phenomena. In this model, different aspects of a phenomenon are theorized as interrelated through a structure. The structure implies the statistical relationship between variables and error terms and the usual causal relationship, and can include multiple equations. The structural model toolkit includes confirmatory factor analysis, confirmatory compound analysis, path analysis, multi-group modeling, longitudinal modeling, partial least squares path modeling, potential growth modeling and hierarchical or multilevel modeling (Kline, 2016). The use of structural model is usually reasonable in social science, because it is a method to identify potential variables, which are considered to exist but cannot be observed directly in reality. (Bollen, 1989; Kaplan, 2009). Hair et al. (2013) stated that both measurement and structural model is extremely essential for construct the conception, develop the theory, and examine the hypotheses. The statistical implement the measurement pattern and structural pattern are summarized in the following section.

SEM was verified and adjusted by SPSS AMOS 24th edition. after adjustment (Figure 3), The value of Chi-square is 782.011, the value of Degrees of freedom is 385, and the value of chi-square/degrees of freedom (CMIN/DF) is 2.031, GFI is 0.902, AGFI is 0.881, CFI is 0.951, TLI is 0.944 and RMSEA is 0.045 (Table 3). All these values have reached the critical point proposed by previous studies. Therefore, in this study's structural equation modeling verification, every index of goodness of fit is acceptable.

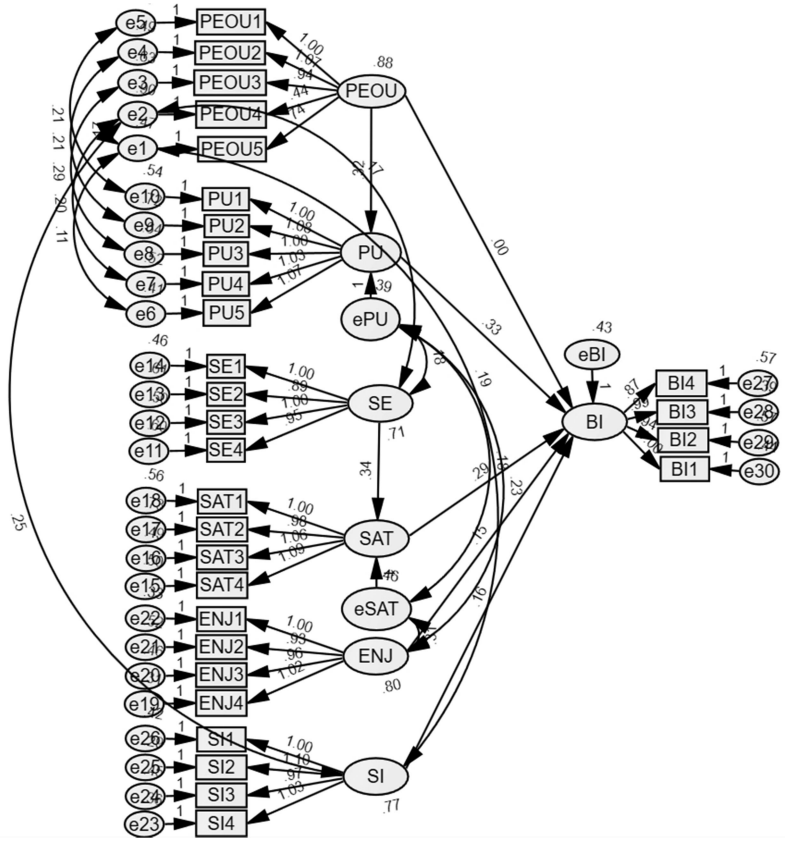

Figure 3 The adjusted structural equation modeling

Table 3 Goodness of fit for structural equation model

Index	Criterion	Source	After Adjustment Values
CMIN/DF	<3.00	Hair et al., (2006)	2.031
GFI	> 0.90	Hair et al., (2006)	0.902
AGFI	> 0.85	Schermelleh-engal et al., (2003)	0.881
CFI	> 0.95	Hu & Bentler (1999)	0.951
TLI	> 0.90	Tucker and Lewis (1973)	0.944
RMSEA	< 0.08	Hayduk (1987)	0.045

The significant results of Standardized Path Coefficien variance calculation research matrix as each variable (Table 4). Perceived usefulness has the greatest influence on behavioral intention, and the standardized path coefficient (β) is 0.284 (t=4.148***). Perceived ease of use strongly influences perceived usefulness, with β

being 0.429 (t=9.066***), but perceived ease of use does not affect behavioral intention, with β being 0.003 (t=0.054). Satisfaction also has the great influence on behavioral intention, β is 0.262 (t=4.070***), while self-efficacy has a significant impact on satisfaction, β is 0.389 (t=7.432***), social influence has an impact on behavioral intention, β is 0.170 (t=3.795***), enjoyment has less impact on behavioral intention, β is 0.165 (t=3.044*). Therefore, all assumptions except perceived ease of use are supported, and the significance of the P-value is less than 0.05.

Table 4 Hypothesis result of the structural equation model

Hypotheses	Paths	Standardized Path Coefficient (β)	S.E.	T-Value	Tests Result
H1	PEOU⟶PU	0.429	0.035	9.066 ***	Supported
H2	PU⟶BI	0.284	0.081	4.148 ***	Supported
H3	PEOU⟶BI	0.003	0.046	0.054	Not supported
H4	SE⟶SAT	0.389	0,046	7.432 ***	Supported
H5	SAT⟶BI	0.262	0,071	4.070 ***	Supported
H6	ENJ⟶BI	0.165	0,049	3.044 *	Supported
H7	SI⟶BI	0.170	0,042	3.795 ***	Supported

Remark *** p<0.001, ** p<0.01, * p<0.05

Discussions

According to the above results, the researcher deduced the following contents. H1 has proved that perceived ease of use has a significant impact on perceived usefulness. In the structured method, the standardized path coefficient is 0.429. Previous studies have shown that Perceived usefulness was determined by perceived ease of use (Agrebi & Jallais, 2015). For H2, the statistical results of this study support the hypothesis that perceived usefulness affects behavioral intention, That is, the descriptive standard coefficient value is 0.284. Previous research had observed that the perceived usefulness had a notable active effect on attitudes and intentions (Çelik, 2008), from the results of the H3 hypothesis, the statistical results of this study do not support the hypothesis that perceived ease of use affects behavioral intention, that is,

the standard coefficient value is 0.003. Among the related factors of learning 3D software for animation majors in Chengdu, China, perceived ease of use does not affect students' behavioral intention of learning 3D software. It is confirmed from H4 that self-efficacy has a significant satisfaction, that is, the descriptive standard coefficient value is 0.389. Johnson et al., (2008) found that the self-efficacy of electronic technology learners was related to satisfaction. In addition, in H5 hypothesis, the research results support the influence of satisfaction on behavioral intention, and the standard coefficient value is 0.262. Lee & Lin (2005) also showed that the perception of satisfaction affects people's behavioral intentions with a positive attitude. In H6 hypothesis, enjoyment influences behavioral intention, and its standard coefficient value is 0.165. Related studies also show that When people use a pleasant technology, people would feel satisfied and continue to use the technology (Zhou, 2013). Finally, the statistical value of the standard coefficient of social influence is 0.137, which supports the positive influence of social influence on behavioral intention in H7. According to the above hypothesis, social influence was one of the direct determinants of behavioral intentions. Even if people do not want to do something, they might be influenced by the ideas of others and participate in certain behaviors (El-Masri & Tarhini, 2017).

Conclusions

The above results suggest that when designing and teaching 3D animation software, students' behavioral intention of learning related technologies should be considered, and the curriculum design of the 3D animation major should be adjusted and reformed adaptively. Students majoring in animation may generally expect the difficulty of learning 3D animation software. However, when students perceive that the usefulness of 3D software is high enough, the difficulty of using 3D software may not be an important influencing factor, although it may not produce perceptual enjoyment because of its learning difficulty. The TAM theoretical model introduced in this study is generally a research and investigation of the general population, while animation students have special psychological expectations and certain technical experience background. Therefore, the influence of perceived ease of use on behavioral intention in this study has not been verified in this special sample population.

Researchers believe that when applying TAM theory, sample population with certain psychological expectations and technical experience background should be considered to conduct more research on the behavioral intention of technology use. Other potential variables can be explored when further expanding the conceptual framework model, other potential variables can be explored, such as psychological expectations, related technical experience, performance expectations, technical anxiety and facilitating conditions. The limitation of this study is that the choice of population and sample is only the students majoring in animation at Chengdu Public University in China. In future research, researcher hope to expand a wider field and a more complex population background.

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