A study on the continuous usage intention of an online education system for students of art colleges

A case study of Beijing Institute of Fashion Technology based on the model of continuous use expectation of information systems

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Abstract. The purpose of this study was to investigate factors influencing students' satisfaction and continued intention to use online learning systems in art schools based on the PST theory. We developed and tested a model extending the ECM-IT model using structural equation modeling. The results showed that perceived usefulness and confirmation positively influenced satisfaction, which in turn positively affected continued usage intention. However, perceived ease of use did not significantly impact perceived usefulness. Further surveys found that students expected one-to-one guidance and more interactive course resources from online systems. Students also preferred a mix of online and offline teaching. This study provides insights into improving online teaching systems for art schools. Specifically, we found that usefulness and confirmation were key drivers of students' satisfaction and sustained use of online learning platforms. Improving these factors could increase students' acceptance and use of online education systems. However, ease of use itself was not enough. Art schools should invest in high-quality interactive course resources, provide personalized guidance, and combine online and offline teaching to meet students' needs.

Keywords: University specialized in arts; PST theoretical model; information system continued usage intention; online education

1 Introduction

In 2001, MIT proposed the MIT Open Courseware program as a pioneer in online education. As of now, the program has been accessed over 30 billion times on its official website and YouTube [1]. Online education promotes the sharing and mutual benefit of educational resources and has profoundly influenced the construction of China's information-based education system, enabling many domestic scholars to conduct localized research on online education. Scholars such as Guo Wenge [2], and Zhang Zhonghua [3] pointed out that online education, as an important part of information-based education, not only has great flexibility for learners, but also puts higher requirements

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on the corresponding education service system. In 2020, the Ministry of Education issued the Guiding Opinions on Doing a Good Job in the Organization and Management of Online Teaching in Ordinary Higher Education Institutions During the Epidemic Prevention and Control Period, stating that "the quality of online learning and offline classroom teaching should be substantially equivalent", catalyzing universities' investment in online education. Three years later now, the construction of online teaching is in its initial stage, and research on it is also relatively rich [4,5]. However, compared to pure offline teaching, there are still obvious disadvantages. Scholars such as Wang Cixiao [6] proposed that educational resources represented by MOOCs can effectively expand the breadth and depth of courses but cannot provide the high-intensity teacher-student interaction and personalized counseling and academic evaluation required in "professional fields" of university teaching, thus unable to meet student needs.

Different from other traditional disciplines, art majors have unique disciplinary characteristics and teaching methods. Art universities in China are rooted in fashion and culture and are committed to cultivating a new generation for a "cultural powerhouse". In the process of learning art courses, a large amount of field construction and teacher-student interaction are needed. However, the prominent advantages of online teaching have also made most teachers choose a mixed online and offline teaching mode to improve teaching effectiveness (such as fashion plate CAD courses) even now that offline courses have resumed. This reflects the continued expectations of teachers and students for online learning systems after the resumption of offline teaching. Therefore, based on previous research, this article focuses on art universities with distinctive characteristics, further refines the research field, and proposes guidance suggestions for subsequent online and offline teaching based on PST theory.

2 Theoretical basis and model assumptions

2.1 Pedagogy-Space-Technology (PST) Theory Model

The PST model was proposed by scholar Radcliffe [7]. He believed that information technology, teaching methods, and learning space would interact with and jointly affect the overall teaching effectiveness, as shown in Figure 1.

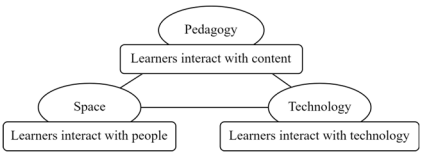

Fig. 1. Pedagogy-Space-Technology (PST) Theory Model

At present, the PST theoretical model has been widely used by scholars to explore various stages of the teaching process [8, 9]. Some scholars have also applied it to explore online courses [5, 10, 11]. However, there is little research on students' willingness to continue using online education systems in the context of art disciplines. Therefore, this study explores students' satisfaction and willingness to continue using from the starting

point of online learning information technology to provide references for subsequent teaching reform.

2.2 Expectation Confirmation Model for Information Technology Continuous Usage (ECM-IT) Theory Model

In 1980, scholar Oliver proposed [12] that expectation confirmation is the comparison between the expectations held by users before using an item and the experiences gained during actual use. By measuring expectation confirmation, users can obtain satisfaction with the purchased product and an overall evaluation of the experience. In 2001, based on the expectancy confirmation theory, scholar Bhattacherjee verified the feelings and cognitive beliefs of information system users' continued use and developed an expectancy confirmation model, the ECM-IT model [13]. As shown in Figure 2, this model can be used to evaluate the continued use of information systems.

Fig. 2. original ECM-IT model

Scholar Zhao Hong [14] used ECM-IT to study the grassroots petition electronic government application system. Scholar Liu Yi [15] et al. used the improved model of ECM-IT model and TAM model (Technology Acceptance Model [16]) to study mobile news applications. He proposed that in addition to the same variable "perceived usefulness" in the ECM-IT model, the TAM model also has a variable that the ECM-IT model does not have, namely "perceived ease of use." Similarly, in previous teaching research from the perspectives of PST or information technology, a large amount of research also shows that incorporating "perceived ease of use" into the research on the "information technology" dimension is necessary [11,17].

In summary, this study will incorporate "perceived ease of use" into the traditional ECM-IT model based on the ECM-IT model and refer to the improved model of scholar Liu Yi for research.

2.3 Research hypothesis

Bhattacherjee pointed out that users' continued use of information systems is similar to consumers' repetitive purchasing or using a product decision process [13]. Chu Chunyang et al. constructed a theoretical model of the influence factors of MOOC learners' continued learning willingness based on the expectancy confirmation theory [18]. Zhao Chengling [19, 20] studied online learners' usage intentions from the perspectives of TAM, SDT and S-O-R, respectively. Chu Hongyu et al. [21] studied the influencing factors of adult learners' satisfaction in the SPOC academic English blended teaching mode. Therefore, based on previous research, the following hypotheses are proposed in the context of online and offline blended teaching in art disciplines, and the conceptual model is shown in Figure 3.

H1: Students' expectation confirmation of the online teaching system positively affects their perceived usefulness.

H2: Students' expectation confirmation of the online teaching system positively affects their satisfaction.

H3: Students' perceived usefulness of the online teaching system positively affects their satisfaction.

H4: Students' perceived usefulness of the online teaching system positively affects their intention to continue using.

H5: Students' perceived ease of use of the online teaching system positively affects their perceived usefulness.

H6: Students' perceived ease of use of the online teaching system positively affects their expectation confirmation.

H7: Students' satisfaction with the online teaching system positively affects their intention to continue using.

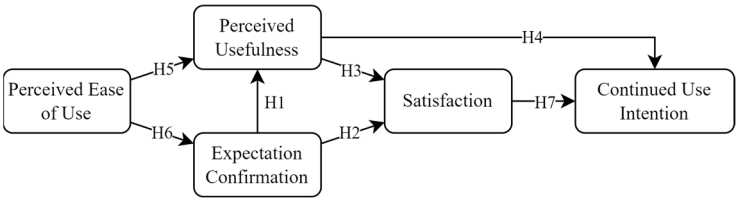

Fig. 3. Theoretical Model of Continuous Use Intention of Online Learning System in Art Colleges and Universities Based on ECM-IT

3 Research design and empirical results

3.1 Questionnaire design

The questionnaire used a 5-point Likert scale, with 1 indicating "strongly disagree" and 5 indicating "strongly agree". To ensure the reliability and validity of the questionnaire, this study referred to the mature scales that have passed empirical tests in relevant domestic and foreign research literature to design the initial questionnaire. The questions that were not applicable to this study were modified. The questionnaire has 5 dimensions, and each variable consists of 4 questions, with a total of 27 questions. 20 undergraduate students were invited to conduct a small-scale pre-survey to adjust the unclear expressions in the questionnaire and form the final questionnaire.

3.2 Statistical analysis of sample description

This study takes students from Beijing Institute of Fashion Technology as the core research group. SPSS is used to statistically analyze the samples. A total of 108 valid questionnaires were collected. The descriptive statistical results are shown in Table 1. Among the subjects this time, all subjects were undergraduate, junior college students

and above, students from art schools accounted for 70.4% of the total, and 50% of students have used online education systems to study art classes.

Table 1. Results of descriptive statistics of the sample

Category	Items	Sample/person	Proportion/%
Gender	Male	23	21.3%
	Female	85	78.7%
Age	18-24 years old	97	89.8%
	24-30 years old	10	9.3%
	30 years old and above	1	0.9%
Length of time using online education system	Half an academic year or less	4	3.7%
	One academic year	10	9.3%
	Two academic years	28	25.9%
	Three academic years and above	66	61.1%
Current Highest Degree	Undergraduate and specialist	68	63.0%
	Master's degree and above	40	37.0%
Are you an art school student?	Yes	76	70.4%
	No	32	29.6%
Have you used online and offline blended teaching?	Yes	105	97.2%
	No	3	2.8%
Have you studied art subjects using an online education system?	Yes	54	50.0%
	No	54	50.0%

3.3 Testing of measurement models

In order to verify the consistency level of the sample data results collected from the questionnaire survey, this study adopts Cronbach's alpha coefficient as the reliability test index. According to the reliability analysis results of the sample data, as shown in Table 2, the Cronbach's alpha coefficient of each variable in the hypothesized model exceeds 0.8, indicating that the credibility of the sample data is good. This study selected KMO measure and Bartlett sphericity test for validity testing, as shown in Table 2. The overall KMO value is 0.941, the KMO value of each variable is greater than 0.7, and the overall and each variable pass the Bartlett test, indicating that the sample validity is good and suitable for extracting data.

Table 2. Reliability and validity test

Latent Variables	Number of Questions	Cronbach α		
PEOU	4	0.957	KMO	0.941
PU	4	0.916		
EC	5	0.947		
S	4	0.931		
CI	4	0.957		
Barlett's Test of Sphericity		Approx. Chi-Square		2683.154
		df		190
		p		0

For this study, the AVE value extracted by the average variance method and the CR value of combined reliability were selected as indicators to test the degree of convergence. The results are shown in Table 3. According to the analysis results of the sample data, the AVE of each factor is above 0.5 and the CR value is all greater than 0.7. The questionnaire data in this study has good convergence validity.

Table 3. Pearson correlation coefficient and square root of AVE

	AVE	CR	PEOU	PU	EC	S	CI
PEOU	0.852	0.958	**0.923**				
PU	0.735	0.917	0.498	**0.857**			
EC	0.827	0.950	0.556	0.786	**0.909**		
S	0.776	0.932	0.523	0.819	0.893	**0.881**	
CI	0.850	0.958	0.540	0.797	0.871	0.866	**0.922**

Note: The black bold text on the diagonal is the square root of AVE value

3.4 Hypothesis test

This study uses PLS-SEM to test the path assumptions in the research model. The Bootstrapping resampling method is used to extract 5,000 samples to calculate parameters and evaluate the significance of model coefficients. The specific results are shown in Table 4. Among them, according to relevant literature [22, 23], the chi-square degree of freedom ratio (X^2/df) of the model is 1.806 <3, the comparative fit index (CFI) is 0.952> 0.9, the standardized root mean square residual (SRMR) is 0.038 <0.1, and the root mean square error of approximation (RMSEA) is 0.087 <0.1. The above indicators show that the model fit is good.

It can be seen from Table 4 that among the 7 hypotheses in this study, except that hypotheses H4 and H5 are not significant, the path coefficient T values of the remaining hypotheses are all greater than 1.960 and significant at the 0.05 level. Therefore, hypotheses H1, H2, H3, H6 and H7 are established.

Table 4. Results of hypothesis path test

Hypothesis	Path	Unstd.	SE	T	P	Std	Result
H1	EC→PU	0.703	0.093	7.529	***	0.8	Established
H2	EC→S	0.623	0.091	6.833	***	0.692	Established
H3	PU→S	0.32	0.089	3.572	***	0.312	Established
H4	PU→CI	0.131	0.142	0.924	0.355	0.118	Not Established
H5	PEOU→PU	0.067	0.079	0.85	0.395	0.065	Not Established
H6	PEOU→EC	0.652	0.111	5.848	***	0.559	Established
H7	S→CI	0.893	0.152	5.888	***	0.823	Established

Note: *** indicates $p < 0.001$

3.5 Analysis of the results

It can be seen from Table 4 that satisfaction can positively affect the intention to continue using, which is consistent with the previous scholars' conclusion through news media, mobile government affairs, mobile search [14, 15, 24] and other studies that there is a positive correlation between users' satisfaction and their intention to continue using. The conclusion that satisfaction is positively correlated with the intention to continue using is also confirmed in this study on the continuous use intention of online learning systems in art schools. Students' expectation confirmation and perceived usefulness have a positive impact on satisfaction, and perceived usefulness mediates between expectation confirmation and satisfaction, indicating that if the use of online education systems does not meet students' learning expectations, it will affect their perception of the usefulness of online learning systems, leading to a reduction in the effectiveness of online learning, and then affect students' satisfaction with online teaching systems, and ultimately unable to make students willing to continue using online learning systems.

Different from previous related research, the perceived ease of use of art school students using online education systems can have a positive impact on expectation confirmation, but the impact on perceived usefulness is not significant. This shows that in the process of using online education for art school students, perceived ease of use can hardly affect perceived usefulness, but it can affect students' usage expectations. This study believes that this may be because although online education can partially meet students' learning expectations, the current online education system is difficult to support the teaching requirements of art schools, so that whether the system is easy to use or not cannot affect students' perception of the usefulness of the system. Therefore, this study conducted further research.

3.6 Extended Investigation

In the process of cultivating students, art schools are not limited to the basic art theory, but also focus on cultivating students' ability of independent learning, practical ability and innovation ability. Facing the future new context and new pattern development, students not only need to master solid multidisciplinary and interdisciplinary theoretical basis and professional knowledge, but also need to have the ability to independently or organize teams to carry out product design and scientific research in multiple professional fields such as apparel and fashion design, fashion management and corporate strategic planning, and become cross-compound management talents in the fashion and cultural and creative industries. Therefore, the disciplinary background affects students' overall demand for online education. In view of the situation that "perceived ease of use" cannot significantly affect "perceived usefulness", this study redeveloped a targeted simple survey questionnaire. A total of 2,562 questionnaires were distributed throughout the school, of which more than 50% (59.56%) of the students were in the art class.

Based on the PST perspective, this study combines "pedagogy" and "learning space" through the results of previous studies. For online education systems, surveys were

conducted from five aspects: "course resources", "display effects", "guidance effects", "targeted counseling" and "learning atmosphere". 40.44% of students believe that the existing online teaching system is difficult to achieve one-to-one guidance. The remaining reasons are "lack of course resources", "poor online guidance effect", "poor sharing display effect" and "poor learning atmosphere" in turn. A survey was conducted on students' online and offline learning inputs. The results are shown in Figure 4. Students believe that "the overall input is basically the same" in the online education process, accounting for about 54.14%, "less than offline input" accounting for about 28.59, and "input greater than 1 time and above" accounting for about 17.17%. Among them, students' input in completing assignments online is significantly greater than other inputs. It can be seen that the results of this expanded survey basically confirm the previous inference, that is, students can obtain certain gains in the online system to meet their learning needs, but the current online education system will still make some students produce redundant inputs, and this phenomenon is reflected in each link. Combined with surveys on system issues, it reflects the insufficient ease of use of the system.

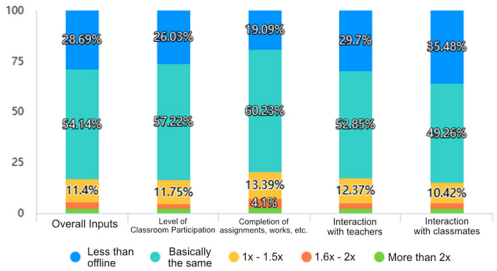

Fig. 4. Comparison of student energy investment between online and offline learning

Based on Wang Cixiao [6] and other scholars' discussions on improving online education, this study surveyed students' satisfaction with the combination of online and offline, 64.87% of students are relatively satisfied with the mixed teaching method of online and offline, which is also consistent with previous scholars' arguments.

4 Conclusion

This study investigated students' intentions to continue using online education systems in the context of art academies through quantitative research. The study found that "perceived ease of use" did not significantly affect perceived usefulness. Further research suggests the following:

(1) Maintain the existing course resource quality. Students' expectations for the system are crucial to their willingness to continue using the system. It is recommended that relevant academies continue to invest in course construction. Students are generally satisfied with the existing course quality. They do not need too much input to produce

corresponding learning effects. It also proves that previous investments have been effective and will need to be maintained in the future.

(2) Ensure that offline courses are conducted to the maximum extent and supplemented by online teaching. At present, offline teaching still has incomparable interactive advantages. However, based on the results of "perceived usefulness" in this study, online teaching can supplement offline teaching, better enhance students' satisfaction and the continuous use of the learning system, and create a teaching loop.

(3) Further explore the ease of use of online teaching systems. It is recommended that relevant academies develop online education systems targeting the high demand for "interaction" in art academies. Existing online learning systems can only meet the needs of general and professional theoretical courses. Further teaching cannot be supported.

This study still has some limitations: (1) Based on the previous research, this study investigated the continuous use intention of the system from the PST perspective, but the selection of latent variables in the model is still relatively conservative. Future research can further expand; (2) Although this article focuses on art academies, the sample size is still small, which may affect the representativeness of the sample to some extent. Future research will increase the number and scope of research.

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