Research on the Influence Factors of the Continuance Intention of Mobile Learning Users

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Abstract

The unique advantages of online education and its broad market prospects have become emerging industries that are generally concerned by the industry. This article takes the mobile learning app as the research object, and studies the factors that affect users' continuance intention. The research results show that user satisfaction and the willingness to share information will have a significant impact on users' intention to continue learning; the system quality, information quality, and service quality of app will affect user satisfaction; social identity will drive users to share information.

Keywords

information system success model, information sharing, social identity, user satisfaction, continuance intention.

1. Introduction

With the popularization of big data, cloud computing, artificial intelligence and other Internet technologies, online education services based on mobile learning platforms are changing people's traditional learning habits, making learning anytime and anywhere possible, and fragmented learning needs are fulfilled. The number of users of online education is growing at an extremely rapid rate. In 2018, the Statistical Report on the Development of the Internet in China [1] released by the China Internet Information Center on August 20 showed that as of June, the number of online education users in China reached 172 million, an increase of 16.68 million from the end of 2017; the user utilization rate of online education was 21.4%, an increase of 13 percentage points from the end of 2017. Among them, the number of mobile online education users was 142 million, accounting for 82.6% of the total users; the user utilization rate of mobile online education was 18.1%, an increase of 2.3% compared with the end of 2017. It can be seen that online education has become a generally accepted learning method, and mobile-based online learning methods have also become the development trend of digital education and life-long learning.

Beginning in 2018, many learning app punch-in activities appeared on people's social media platforms, such as Mint English, Poetry Learning, Keep Movement, etc. In order to attract users, merchants have adopted different promotional methods, include "21 days to cultivate a good habit", "friend circle card full 80 days to return tuition fees" and so on. Because of persisting in learning, the free course, and the passion impact of people around, it has instantly set off a wave of national learning within the circle of friends. Service providers use this novel social marketing method to charge content and provide more high quality learning content, which is intended to cultivate more paying users. This is also one of the key profit methods being tried by more online education platforms at this stage.

Mobile learning platforms or social groups are different from previous online learning platforms such as MOOCs or open classes, which are more interactive. The merchant will set up a special learning group for users who have the same learning interests, and will assign tutors to provide users with guidance and services in learning, such as course preparation,

course summary, homework reviews, unit tests, etc. At the same time, the tutor will encourage users to share their gains on social media platforms, recommend other related courses to users in a timely manner, and motivate users to persist in learning through learning gold coins, learning medals, coupons and other methods. On the one hand, users are also more interactive. They will learn and share on social media platforms or groups to get the praise and encouragement of people around them. In addition, they will also get the attention and comments from users who have the same learning interests. Everyone will communicate with each other, and no longer study alone.

Existing literature conduct empirical research on factors that affect users' online learning situations or the continuance use of online learning platforms, mostly with the background of MOOCs, online learning systems in colleges and universities, and online open courses. Few studies are in the context of mobile learning. Then, this article takes mobile learning apps as an object and conducts empirical research on the factors that affect users' continuance intention, in order to help merchants analyze mobile education of user behavior and develop commercial operation strategies.

2. Related Literature Review

Many literature have studied the factors that influence users' continuance intention in the context of online learning. Daghan et al. [2] combined the technology acceptance model, the information system success model, the cognitive model, and the expectation confirmation model to study the impact on students' continuous use among online learning platforms. The results show that research on the willingness to use online learning platforms can be explained by three variables: information quality, system quality and service quality, and validate the information system success model. Taking the MOOC platform as the background, Khaled et al. [3] constructed an expectation confirmation theoretical model based on information systems. The study found that perceived reputation, perceived openness, perceived usefulness, and user satisfaction significantly affect users' continuance intention. Lori and Stone [4] studied the influencing factors that affect college students' continuous use of e-textbooks. They found that perceived usefulness and satisfaction can drive students' continued willingness to use e-textbooks. Based on the flow experience, Guo et al. [5] studied the factors that affect students' smooth experience in online learning and the impact of flow experience on students' continuous online learning intentions. Chen Meiling et al. [6] studied the influencing factors of users' continuous mobile learning based on expectation confirmation model. They found that user satisfaction, expectation confirmation, and perceived value have significant effects on the willingness to continue learning. Guo Wenqian [7] with the expectation confirmation model, combined with the information system success model and customer relationship marketing theory, constructed a behavior theory model of user's continuance intention for online English curriculum education platform, and found perceived usefulness, satisfaction, trust, and perceived conversion costs significantly impact on users' continuance intention. On this basis, we study the factors that affect users' continued willingness to use, with mobile learning apps as the background. The research results have practical reference value for exploring and improving the online education operation model.

In the context of the Internet Web 3.0, information sharing activities have promoted knowledge dissemination, sharing and innovation in the community, and social media has also become an important knowledge sharing platform. Ho et al. [8] found that information sharing can enhance social identity and help build trust relationships in order to achieve better knowledge sharing within the organization. Chiu et al. [9] explored the motivation behind the knowledge sharing of users in virtual communities based on social cognitive theory and social capital theory. They found that social interactions, trust, reciprocity norms,

identity, common vision and language can affect individual knowledge sharing in virtual communities, with the expectation that they will stimulate knowledge sharing in virtual communities. Chen et al. [10] studied the factors that affect the knowledge sharing and community development of professional virtual community members. The results show that the relationship advantages of reciprocity norms, interpersonal trust, knowledge sharing, self-efficacy and perception have important effects on knowledge sharing behavior, and knowledge contribution and knowledge acquisition behavior have a positive relationship with knowledge utilization. Li et al. [11] based on the theory of planned behavior, found that altruism, relationship trust, personal outcome expectations, and self-efficacy have a significant positive impact on community members' willingness to share knowledge. This research takes the mobile learning platform as an object, users rely on social media for learning and sharing, which is highly interactive. Therefore, we introduce information sharing willingness and social identity as research variables to further study the factors that affect the continuance use intention of mobile learning app users. .

Based on the lack of scientific basis in the research of information systems in the 1980s, DeLone and McLean first proposed the *information system success model* (IS success model) and defined six factors that affect the success of information systems, namely information quality, system quality, system use, user satisfaction, personal impact, and organizational impact. Subsequently, DeLone and McLean revised the IS model and added service quality. The revised model includes six variables: information quality, system quality, service quality, user satisfaction, willingness to use, and net benefits. Among them, information quality, system quality and service quality have an impact on user satisfaction and willingness to use, while user satisfaction and willingness to use affect the net benefit of the entire information system [12]. On this basis, scholars tested the revised IS success model in different situations. Given the IS success model, Xu and Du [13] studied the factors affecting user satisfaction and loyalty of Chinese university digital libraries. The results show that compared with information quality, system quality and service quality have a significant impact on perceived ease of use, which in turn affects user satisfaction and loyalty. Wang Xiwei [12] found in the research on the influence factors of social media user migration behavior, social media system quality, information quality, service quality, and immersive experience have a positive impact on user satisfaction. Wu Haidong [14] conducted a research on 160 interviewed readers based on the information system success model. The results show that system quality, service quality, and content quality all have a positive impact on user satisfaction. In summary, considering the similarities between mobile learning apps and information systems in terms of system design, content and services, we introduce the IS success model and will start from the three aspects of system quality, information quality, and service quality to study the continuance intention of mobile education apps users.

3. Research Hypotheses and Research Model

Existing studies have shown that satisfaction is an important indicator of online learners' continuance intention. The research results of Oliver [15], Bhattacherjee [16], and Fornell [17] show that satisfaction is a vital factor that determines users' continuance intention. The higher the user's evaluation of the experience and experience of the online education platform they use, the stronger their willingness to continue using the platform. In this research, *satisfaction* refers to the comprehensive cognitive evaluation of the user's use effect based on his / her own learning experience after using app to learn; *continuance intention* refers to the user's willingness to persist in using app for learning. Using the above discussion as basis, we assume the following hypotheses:

H1. Mobile learning app user satisfaction has a significant positive impact on their continuance intention.

Erdelez and Rioux [18] believed that information sharing plays a vital role between the use of information and the transmission of information. Ducoffe [19] pointed out that information sharing is a dimension of information use, and is transmitting rich and useful information to other users. In this research, the *information sharing intention* refers to the possibility that users will be willing to share course information, relevant learning experience or comments to the circle of friends after learning the course using the app.

Matti, Heikki, and Hannu [20] found that customer satisfaction not only stimulates their loyalty, but also prompts customers to share their purchase and preference information with friends, which helps the company to continuously develop new products and provide new services. Similarly, we also believe that the more satisfied users are with the mobile learning app they use, the more willing they are to share this information with others. In addition, when users share this information, they will inevitably receive a lot of attention and approval from their friends. At this time, they may stimulate the inherent motivation of users to continue learning and strengthen their willingness to continue using the app. Therefore, we assume the following two hypotheses:

H2. Mobile learning app user satisfaction has a significant positive impact on their information sharing intention.

H3. The willingness of mobile app users to share information has a significant positive impact on their continuance intention.

Ye Zhongkai [21] constructed a theoretical model of the factors affecting the willingness to forward messages in WeChat circle of friends from the four dimensions of information characteristics, source characteristics, engine rotation and perceived risk. The research found that the social belonging motivation in the transfer engine has a significant positive impact on the willingness to forward. In other words, WeChat users expect to get the attention of their friends through the forwarded information, in order to get the recognition and support of others, and improve their social status. Hu Lei et al. [22] also found that social media has amplified the user's right to speak, and many users want to display things related to them by forwarding or commenting, hoping to gain recognition from others and improve their social status.

In this research, *social identity* refers to the degree to mobile learning app users perceive their social status to be enhanced and gain recognition from others. We believe that mobile app users can share their learning footprints and experience as a growth diary by sharing in the circle of friends. More importantly, they can get the attention and supervision of friends to help them continue on the learning path. In particular, when their learning behaviors and effects get likes and comments from friends, users will also get incentives from their hearts to increase their satisfaction with the app. Using the above discussion as basis, we assume the following two hypotheses:

H4. The social identity of mobile learning app users has a significant positive impact on their sharing intention.

H5. The social identity of mobile learning app users has a significant positive impact on their satisfaction.

DeLone and McLean [23] proposed an information system success model, and pointed out that the quality of information systems includes system quality, information quality, and service quality, which have different effects on user satisfaction and willingness to use. Among them, *information quality* refers to the accuracy, relevance and completeness of the information generated by the website; *system quality* refers to the characteristics and features that users expect to have when using the system, including the ease of use, flexibility,

expandability, reliability, response time, etc.; *service quality* refers to the degree of difference between users' normative expectations of services and perceived service performance. The impact of information system quality on user satisfaction has been widely confirmed by many scholars in different fields such as information management and e-commerce. Based on the IS success model, Halawi et al. [24] studied the success factors of knowledge management systems. They found that the quality of knowledge in the system is a key factor in the success of the knowledge management system and has a significant impact on user satisfaction. Taking the health service system as the object, Sebetci [25] claimed that the quality of information and system have a significant impact on user satisfaction. Li Haojun and Ran Jinting [26] evaluated the service system of the university mobile library, and concluded that the information quality and system quality of the mobile library service system have a direct positive impact on user system usage and satisfaction. Schauppa [27] found that not only e-commerce sites, but also system quality has a significant impact on user satisfaction in other types of sites. Taking the student management information system as an object, Martins and Branco et al. [28] pointed out that service quality is an important factor affecting student satisfaction and continuous use of the system.

Drawing on the successful model of the information system, we consider that the quality of the information system affects the satisfaction of app users. The quality of the information system includes information quality, system quality, and service quality. Information quality refers to the user's evaluation of the type, quantity and quality of courses on the app. Generally speaking, the quality of information is higher, that is, the more courses there are, the higher the quality of the courses, and the richer the content. Users will feel that learning through the app is more helpful to improve their academic performance, learning ability or cultural accomplishment, and then they are very satisfied with the app. System quality refers to the user's evaluation of the response speed, interface design, system stability, and ease of operation of the app system. Service quality refers to the user's evaluation of AI services or artificial services provided on the app. For example, customer service personnel can respond to user messages in a timely manner, accurately answer user questions, quickly solve user questions, actively organize users to communicate and discuss in learning. These can improve the user's learning experience and satisfaction with the app. Therefore, we assume the following hypotheses:

H6. The quality of the information system of the mobile learning app has a significant positive impact on user satisfaction.

H6a. Information quality has a significant positive impact on user satisfaction.

H6b. System quality has a significant positive impact on user satisfaction.

H6c. Service quality has a significant positive impact on user satisfaction.

In summary, we conduct a theoretical model of the influencing factors of mobile learning users' continuance intention, as shown in Figure 1. Variable definitions and assumptions between variables have been explained in detail above.
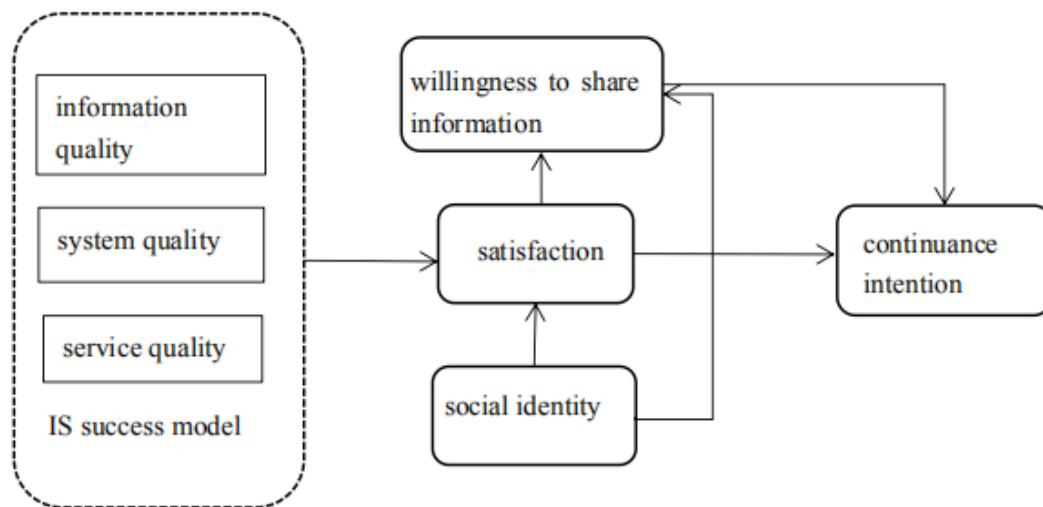
Figure 1: Research model

4. Questionnaire Design and Measure

In this study, structural equation modelling (SEM) will be used to verify a series of hypothetical relationships between potential variables in the theoretical model. In order to ensure that each potential variable can be effectively measured, we have adopted relevant maturity measurement Tables and made contextual adjustments to some measurement items in conjunction with the research background of this article. The corresponding relationship between each latent variable and the measurement item is shown in the Table 1.

The initial survey questionnaire about the factors that influence the continuance intention of mobile learning app users includes two parts: (1) Basic information of surveyors include gender, age, education, use of online education platforms, monthly disposable income, etc. (2)There are all 7 potential variables, 21 of which refer to the title item. We used a 5-point Likert scale to measure each indicator. To ensure the validity of the final data, we conducted a preliminary survey before the formal survey. The pre-investigation was conducted offline. A total of 86 questionnaires were distributed, and all questionnaires were collected. Subsequently, we used SPSS 20.0 to conduct exploratory factor analysis and reliability tests on the pre-survey data to ensure the reliability and validity of the final survey questionnaire. The analysis results show that the cronbach's α coefficient of the reliability test of each construct is greater than 0.8, which has good reliability; 21 measurement items are extracted from 5 common factors, and KMO = 0.799> 0.7, reaching a significant level. Therefore, the pre-survey data has good validity.

Table 1: Summary of t of Questionnaire Measurement Items

Variable	Index Coding	Test Items	References or Source
Information Quality	INQ1	Course content on the app is easy to understand.	DeLone and McLean(2003) Xu, Fang et. al(2018)
	INQ2	The course content on the app is easy to grasp.	
	INQ3	The courses on the app can improve my learning efficiency.	
	INQ4	The courses on the app can meet my learning needs.	
System Quality	SYQ1	The app is easy to operate.	DeLone and McLean(2003) Guo Wenqian(2017)
	SYQ2	The app learning interface layout is reasonable.	
	SYQ3	The app system responds quickly.	
Service Quality	SEQ1	The app customer service staff can solve system problems in a timely manner.	DeLone and McLean(2003) Contextualized adaptation
	SEQ2	The app tutors can accurately solve learning problems.	
	SEQ3	The learning group leader can actively organize members communicate and discuss in the group.	
Sharing Intention	SH1	I'm willing to share my learning content on social media.	Ducoffe(1996) Contextualized adaptation
	SH2	I'm willing to share my learning footprint on social media.	
	SH3	I'm willing to share my learning insights on social media.	
Social Identity	SI4	I hope the people around me have a good opinion of me.	Ye Zhongkai(2016)
	SI5	I hope I can make a good impression on those around me.	
	SI6	I hope to be recognized by people around me.	
Satisfaction	SA1	I'm satisfied with the learning effect after using the app.	Oliver(1980) Bhattacherjee(2008)
	SA2	The learning experience of using the app is enjoyable.	
	SA3	I'm generally satisfied with the app.	
Continuance Intention	CI1	I'm willing to continue to use the app to learn.	Ming-Chi Lee(2010)
	CI2	I will choose more courses to study on this app.	
	CI3	When I have learning needs, I will choose this app.	

5. Data Analysis

5.1. Sample Sources and Descriptive Statistics

Formal surveys are conducted through online social media forwarding and offline paper questionnaire distribution. The distribution targets are mainly college students, and a small number of social workers. The questionnaire survey lasted for one week. From March 23, 2019 to March 30, 2019, a total of 335 valid answers were received, of which 260 questionnaires were recovered online; 80 paper questionnaires were distributed offline and recovered 75 servings. Through manual investigation, 10 questionnaires and 16 questionnaires with no difference in answers have not been used. The final valid questionnaires were 309, and the effective questionnaire recovery rate was 92.24%. Table 2 gives descriptive statistics of the sample data.

Table 2: Descriptive statistics of sample data

Statistical item	Category	Frequency	Percentage%
Gender	male	151	48.9
	female	158	51.1
Age	under 18	4	1.29
	18~25	267	86.41
	26~40	36	11.65
	Over 40	2	0.65
Occupation	school students	257	83.17
	employees in government agencies, state-owned enterprises, institutions, private enterprises and other practitioners	39	12.62
	personnel engaged in foreign investment and joint ventures	13	4.21
Education	high school and below	5	1.62
	college or undergraduate	129	41.75
	master's degree	170	55.01
	PhD and above	5	1.62
Income	1000 and below	134	43.37
	1001~5000	155	50.17
	5001 and above	20	6.45

5.2. Reliability and Validity Analysis

To test the reliability of the questionnaire, we use SPSS 20.0 to test the internal consistency of the questionnaire data. The results are shown in Table 3, and show that the overall Cronbach's α coefficient value of the model is 0.939, which is much larger than the critical value of 0.7. So the questionnaire data has a relatively good level of reliability. The Cronbach's α values of the 7 latent variables are all greater than 0.7, indicating that the measurement reliability of each latent variable is better. The combined validity of each latent variable is above 0.8, which is greater than the critical value of 0.7, explaining that the overall reliability of the questionnaire scale is higher and the reliability is higher.

Table 3: Latent variable reliability analysis Table

Latent Variable	Item Coding	Cronbach's α	Combined Reliability	AVE
Information Quality	INQ1 INQ2 INQ3 INQ4	0.871	0.912	0.722
System Quality	SYQ1 SYQ2 SYQ3	0.837	0.902	0.755
Service Quality	SEQ1 SEQ2 SEQ3	0.864	0.917	0.787
Sharing Intention	SH1 SH2 SH3	0.937	0.960	0.888
Social Identity	SI1 SI2 SI3	0.942	0.963	0.897
Satisfaction	SA1 SA2 SA3	0.892	0.892	0.735
Continuance Intention	CI1 CI2 CI3	0.882	0.927	0.810
Overall Reliability Measure		0.939		

Table 4 shows the KMO and Bartlett spherical test results of this model. The KMO value is 0.903, which is greater than 0.7; the approximate chi-square value of the Bartlett sphericity test is 5026.283, the degree of freedom (df) is 231, and the degree of significance (Sig.) = 0.000 (very significant), indicating that the assumption of independent variables is not supported. The data concentration measured by the questionnaire is good, which is suitable for factor analysis.

Table 4: Tests of questionnaires KMO and Bartlett

Kaiser-Meyer-Olkin Metrics of Sampling Adequacy	.903
Bartlett's sphericity test Approximate chi-square	5026.283
df	231
Sig.	.000

As can be seen from Table 3, the average variance extraction value (AVE) of each latent variable is greater than 0.7 and is far greater than the critical value of 0.5, which indicates that the correlation between measurement items in the same construct is high and the model aggregation validity high. For the discriminant validity, as shown in Table 5, the absolute value of the correlation coefficient of each latent variable is significantly smaller than the AVE square root value of the latent variable, explaining that the measurement model has good discriminant validity, that is, the characteristics of each latent variable are significantly different from other latent variables.

Table 5: Square root of the average variance extraction value of each latent variable.

Variable	CI	INQ	SA	SEQ	SH	SI	SYQ
CI	0.900						
INQ	0.643	0.850					
SA	0.775	0.660	0.918				
SEQ	0.505	0.548	0.582	0.887			
SH	0.379	0.373	0.325	0.433	0.942		
SI	0.365	0.337	0.412	0.281	0.428	0.947	
SYQ	0.602	0.699	0.669	0.577	0.298	0.255	0.869

5.3. Path Analysis

We use Smart PLS 3.0 software to perform path coefficient estimation and significance test. The resulting path diagram is shown in Figure 2. After testing, the model's internal potential variable satisfaction R^2 is 0.630, and the R^2 of continuance intention is 0.724, indicating that the model has a high degree of interpretation. Each factor load of external latent variables is above 0.7, which meets the standard load requirement of 0.6. So the model has a good confirmatory factor analysis result. It shows that the eight hypotheses proposed in this research meet the significance requirement at a significance level of 0.05. Table 6 summarizes the test results of the research hypotheses.
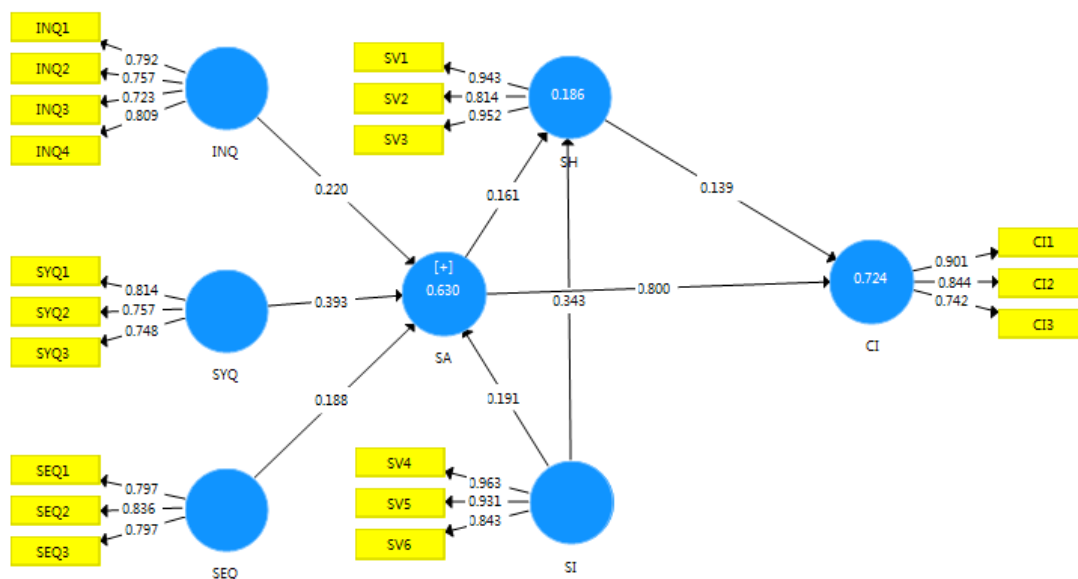

Figure 2: Path map

Table 6: Research hypothesis test results.

Hypothesis	Hypothesized path	Path factor	T value	P value	Status
H1	SA ⟶ CI	0.704	16.209	0.000	Accepted
H2	SA ⟶ SH	0.153	2.484	0.013	Accepted
H3	SH ⟶ CI	0.149	3.538	0.000	Accepted
H4	SI ⟶ SH	0.326	5.891	0.000	Accepted
H5	SI ⟶ SA	0.183	4.219	0.000	Accepted
H6a	INQ ⟶ SA	0.252	4.568	0.000	Accepted
H6b	SYQ ⟶ SA	0.313	4.601	0.000	Accepted
H6c	SEQ ⟶ SA	0.204	3.251	0.001	Accepted

6. Conclusion

We study the factors that influence users' continuance intention with mobile learning apps as the object. The results show that both user satisfaction and users' sharing intention have a significant impact on users' continuance intention. This shows that when users are satisfied with the course products after learning, the comprehensive evaluation of the platform will also be improved. When having new course learning needs, they will tend to continue to use the current course platform; otherwise, if users have a poor learning experience on the courses they are studying, they tend to be dissatisfied with the products and services of the courses. When having a new course learning requirement, they will give priority to the platform and choose to use other platforms to learn. Among the factors that affect user satisfaction, system quality has the greatest impact on user satisfaction. In other words, the app system has fast response speed, friendly interface design, stable system and strong operability, which is very important to users. The impact of information quality on user satisfaction is second, that is, users also value the quality, quantity, and update frequency of courses provided on the app, which will affect users' overall evaluation and satisfaction of the app. In addition, service quality has a greater impact on user satisfaction. This shows that when users use mobile learning apps, they need a special tutor to answer questions and even organize members to communicate in learning.

Moreover, users' sharing intention also has a significant impact on their continuance intention. Social media-based learning methods are appearing more and more frequently in the public view, which achieves the perfect combination of socialization and online learning. In order to achieve self-promotion and friend supervision, users often take the initiative to share their learning footprints with their friends, and on the basis of "cultivating a good habit in 21 days", they have a strong willingness to continue using the mobile learning app they use. Additionally, social identity will make users have strong intention to share information to gain or improve their own social identity.

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