Utilisation Status and User Satisfaction of Online Education Platforms

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Abstract—In the information age, the proliferation of online education platforms is accompanied by various problems. This paper aims to solve the problems of online education platforms, making them more useful and adaptable. Targeting at two key online education platforms (Chinese Mooc and Super star) in China, the authors conducted a questionnaire survey among users on their utilisation and perception of online education platforms. Based on the survey data, the current status of the platforms was summarised, followed by an analysis of the degree of impact from each factor on the selection among platforms. Next, platform development and user satisfaction were discussed in the light of platform security and credit rating and user experience. Finally, several suggestions were put forward to improve online education platforms. The research results are of great importance to the development of online education in China.

Keywords—Online education platforms, Utilisation status, User satisfaction, Platform improvement.

1   Introduction

With the continuous development of information technology, the online education industry has ushered in a new development period [1]. Online education has set off a new wave of education innovation. The rapid popularisation of the "Internet+" concept has brought new vitality and technical support to online education. However, some shortcomings have been exposed to the process of online education platform construction.

First, in terms of educational function, there are resource waste and content duplication problems with current online education platforms, their functions are too exten-

sive rather than specialised, resulting in that the platforms lack their own educational characteristics.

Second, on existing online education platforms, the learning assessment methods are not appropriate enough. In the learning process, the flexible exchanges and open tests should be the focus of the assessment.

Third, the interactive function is imperfect. On existing online education platforms, the interactive function is insufficient, which is related to the development of technology and the initiative of the platforms. Proper treatment of this bottleneck is another important way for effective learning [2].

In such context, this research investigated the platform users about their use and feelings for two existing online education platforms and the current status of the platforms by analysing the influence of different factors of the users' selection between different online education platforms. It found out the aspects that the users are most concerned about. Moreover, from the aspects of platform security and credibility and user experience, this paper analysed the development status and user satisfaction of the platforms. Hence, this paper provided reasonable suggestions for online education platforms for providing greater convenience and better resources to users, thereby promoting the development of education in China.

The survey took online education platform users as respondents, pedestrians on city streets were stopped and asked to fill in a questionnaire about "Chinese Mooc" and "Super Star", two well-known online education platforms in China. A total of 1500 questionnaires were sent out, and 1162 valid questionnaires were returned, the valid rate was 77.5%. The survey adopted PPS sampling, structural equations, association rules and other methods comprehensively, combining with the macro social background and the microdata analysis. It started from the current situation of the low satisfaction with online education platforms to analyse the advantages and disadvantages of existing platforms, in the hopes of promoting online education to enter a new development stage [3].

2 Overview of Literature Concerning Online Education Platform Usage and Satisfaction

Existing literature at home and abroad mainly researched online education platforms from three perspectives: the first is the evaluations based on information systems, the second is the analyses based on platform operation, and the third is the analyses based on macro industry development.

In terms of related research concerning the topic of online education, developed countries are taking the leading positions. Aspects such as education application modes, online education psychology, and teaching resource sharing are the main directions of theoretical research, while there are few research papers concerning the incentive mechanism of online education platforms. Muirhead [4] believes that strengthening teacher-student interaction through topic discussions, virtual roles, positive affirmation, and other strategies can raise the enthusiasm of online learners. Wills [5] proposed that the transfer of knowledge and experience can attract learners

to visit the online learning platforms, conduct online interaction through role-playing, and strengthen their learning effects by combining online study with offline communication. Due to the differences in national conditions and culture of various countries, we should not copy the online education modes of other countries but can refer to their positive ideas. Xie et al. [6] believed that incentive measures are important influencing factors that could stimulate learners' learning motivation, and the incentive measures should take cognitive objectives as the orientation to trigger the learners' learning motivation. Moreno-Ger et al. [7] proposed that introducing game mode into online education can produce positive incentive effects. However, from a more rational perspective view, some scholars have proposed introducing game mode into a study can hardly achieve the ultimate purpose in the long run and the starting point is not solid.

The degree of satisfaction has an important impact on the companies' marketing strategies, and it plays a key role in measuring a company's performance in modern corporate management [8]. In the 1960s, American scholar Cardozo [9] first introduced the concept of customer satisfaction to marketing, and the research on customer satisfaction was initiated from that era. The effect of satisfaction on purchasing behaviour was first studied, and then a large number of scholars joined the research field and broadened the study. With the continuous development of the Internet and the popularisation of computers and smartphones, more studies started to concern online satisfaction evaluation.

Spurred by the abundant research methods and tools, introducing econometric models into the analysis and calculation of customer satisfaction has been accepted by academia. In 1989, American scholar Anderson and Fornell [10] introduced various factors, such as customer expectations before purchase, customer perceptions after purchase, judgments of value and price into the research of customer satisfaction, and established an econometric model of customer satisfaction. E. Gide and M.X. Wu proposed a corporate satisfaction model based on the theory of customer satisfaction, and pointed out ten factors that can affect corporate satisfaction, including human resources, technology, website, security, culture, law and ethics, management, relationship, finance and marketing. These factors together constituted the corporate satisfaction model. In China, the research on satisfaction index started in the mid-1990s. At that time, the market competition had intensified as Chinese economic market opening up is promoted, and hence, the competition of customer development had become increasingly fierce. Souitaris and Balabanis [11] believed that in the e-commerce environment, the four aspects of comprehensive performance, product information, quality assurance, and customer relationship would affect customer satisfaction. Nisar and Prabhakar [12] adopted fuzzy analysis and AHP methods to study the satisfaction with the platforms. They believed that the platforms should continuously improve their service functions and business models, and transform from the traditional role of information provider to the modern role of transaction servicer.

Based on the analysis above, it is not difficult to conclude that domestic and foreign researches on online education platforms are mostly focused on two perspectives: service quality and user satisfaction. The development status of the

platforms was measured through the analysis of the objective situation, subjective cognition and related theories. Scholars' research perspectives are mostly the general status of the platforms or their respective expertise fields. However, there are not abundant specialised discussions of the online education business models, and the research angles are extensive enough to connect platform vendors with users. Therefore, based on theoretical analysis, this study adopted the questionnaire survey method to directly come into contact with the users and investigate their behaviours and satisfaction with online education. Face-to-face interviews were also carried out to investigate the operators of "Chinese Mooc" and "Super Star" about their feelings for the development of these platforms.

2.1 Respondents

The respondents are online education users in Guiyang City, Guizhou Province, China. Guiyang is a key and leading city of big data, so the data is relatively reliable.

2.2 Sampling method

PPS sampling is a probability sampling method that takes samples proportionally to the size of the scale. With the sampling area as an independent control variable, the samples were classified according to the commercial districts. Afterwards, based on the ratio of the business areas of major shopping centres in each commercial district, the number of questionnaires for each shopping centre was determined, and the samples were selected randomly within the allocated numbers.

2.3 Survey accuracy

The sample size of this survey was determined according to the formula $n = \frac{(Z_{\frac{\alpha}{2}})^2 \sigma^2}{\Delta^2}$ (n is the sample size, Za/2 is the statistic value of Z when the confidence level is 1-α, Δ is the limit error, σ is the standard deviation). In the survey results, the variances of all questions were less than 2.9. 1500 samples were expected to be surveyed, and the limit error was less than 0.743% at a 95% confidence level.

The obtained sample size was 1162. According to this method, the limit error was calculated to be 0.862%. In the actual survey, 1500 questionnaires were issued, and 1162 valid questionnaires were recovered, the effective rate was 77.5%.

2.4 Distribution of sample size

The survey was conducted in 6 major commercial districts in Guiyang City, and 4 commercial districts and 10 shopping centres had been selected according to the PPS sampling method.

Table 1. Distribution of sample size

Item	Personal Information	Person-time	Percentage
Gender	Male	429	36.92%
	Female	733	63.08%
Age	0-17 years old	45	3.87%
	18-30 years old	895	77.02%
	31-40 years old	120	10.33%
	41-50 years old	90	7.75%
	Over 51 years old	18	1.55%
Monthly income	Less than 2,000 CNY	690	59.38%
	2001-4000 CNY	215	18.50%
	4001-7000 CNY	170	14.63%
	7001-10000 CNY	52	4.48%
	10001-15000 CNY	16	1.38%
	15001-20000 CNY	16	1.38%
	More than 20,001 CNY	3	0.26%
Occupation	Student	689	59.29%
	Civil servant	42	3.61%
	Employee of public institution	124	10.67%
	Company employee	169	14.54%
	Worker	30	2.58%
	Farmer	8	0.69%
	Self-employed or private business owners	42	3.61%
	Unemployed	45	3.87%
	Retired	3	0.25%
	Others	14	0.92%
Education	Junior high and below	34	2.93%
	Senior high / technical secondary school	120	10.33%
	Junior college	139	11.96%
	Bachelor	807	69.45%
	Master or above	62	5.33%

3 Theoretical Analysis and Research Hypotheses

3.1 Setting of latent variables and measurable variables

The influencing factors of satisfaction and the previous online education platform usage experience, platform security and credibility, user experience and overall satisfaction were taken into consideration. Wherein the platform security and credibility and user experience were exogenous latent variables, and the overall satisfaction was the endogenous latent variable.

The measurable variable settings and corresponding questions are shown in the table below:

Table 2. Variable settings and corresponding questions

Latent variable	Measurable variable	Corresponding question number
Platform security and credibility	Personal information security Y1	B1
	Payment security Y2	B2
	Credit evaluation system Y3	B3
User experience	Cost performance Y4	B4
	Helpfulness Y5	B5
	Customer service efficiency Y6	B6
	Operation convenience Y7	B7
	Product maintenance and improvement Y8	B8
Satisfaction	Score of satisfaction degree X1	B9

3.2 Research hypotheses

According to the influence amongst the three latent variables, the following hypotheses can be established:

H1: Platform security and credibility has a positive influence on satisfaction;

H2: User experience has a positive influence on satisfaction;

On the basis of the above analysis and the rules of symbols in the structural equation model path diagram, AMOS 21.0 software was used to draw a path diagram for the causal relationships of the model, and one of the measurement indexes corresponding to each latent variable in the model was specified as 1, which was equivalent to stipulating that the unit of measurement of the latent variable was the same as the unit of the corresponding measurement index[13]. Moreover, the measurement error coefficient of the measurable variables of the exogenous and endogenous latent variables was specified as 1, and the causal relationship path diagram was drawn.

After some variables of the initial model were fitted, negative values appeared, and some of the relationships cannot obtain the determined values. The analysis showed that the reason was the defects in the design of the structural equation model. Although the model structure was theoretically feasible, it is not executable after data verification. Therefore, adjustments were made to obtain a new model and its path diagram.

3.3 Model fitting

Based on the analysis above and the rules of symbols in the structural equation model path diagram, AMOS 21.0 software was used to draw a path diagram for the causal relationships of the model. One of the measurement indexes corresponding to each latent variable in the model was specified as 1, which was equivalent to stipulating that the unit of measurement of the latent variable was the same as the unit of the corresponding measurement index. Moreover, the measurement error coefficient of the measurable variables of the exogenous and endogenous latent variables was specified as 1, and the causal relationship path diagram was drawn. The

maximum likelihood estimation method was adopted for estimation, the goodness of fit was tested by the likelihood ratio chi-square, RMR, GFI, and RMSEA, so as to examine the goodness of fit of the model [14].

3.4 Model realisation

The model was drawn in AMOS 21.0, and data were put in to test the model. The results of the goodness of fit are shown in the table below.

Table 3. Results of model testing and the goodness of fit

Fitting index	CMIN/DF	GFI	AGFI	IFI	CFI	RMSEA	P
Suggested value	<2	>0.9	>0.8	>0.9	>0.9	<0.1	>0.05
Result data	1.879	0.910	0.847	0.929	0.913	0.062	0.068

It can be seen from the table that the P value was 0.068, the significance level was greater than 0.05, and the P value corresponding to the chi-square was statistically significant and passed the significance test with a significance level of 95%. The ratio of chi-square to the degree of freedom was 1.879, which was less than 2. At the same time, *RMR* was close to 0, *GFI* was close to 1, and *RMSEA* was less than 0.08. The above indexes all met the requirements of model testing and goodness of fit, and the standardised regression coefficients of all observed indexes were above 0.6, indicating the fitting effect of the model was good.

The program was run, and the standardised structural equation model was obtained.
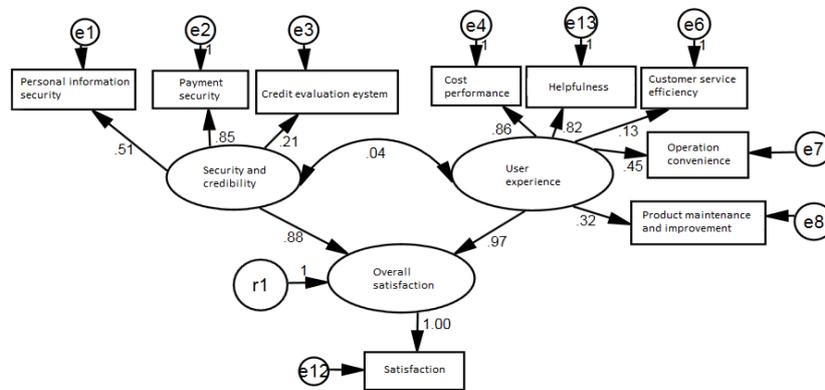
Fig. 1. Structural equation of user satisfaction with the online education platforms

3.5 Parameter estimation results of structural equation model

Table 4. Standardised path coefficients of structural equation

			Estimate
Overall satisfaction	<---	Security and credibility	0.884
Overall satisfaction	<---	User experience	0.971
Personal information security	<---	Security and credibility	0.512
Payment security	<---	Security and credibility	0.853
Credit evaluation system	<---	Security and credibility	0.213
Cost performance	<---	User experience	0.864
Helpfulness	<---	User experience	0.823
Customer service efficiency	<---	User experience	0.133
Operation convenience	<---	User experience	0.454
Product maintenance and improvement	<---	User experience	0.322

3.6 Analysis and discussion of model results

After the paths had been subject to repeated corrections, a model with a better fitting degree was obtained. The coefficients of each path had their respective meanings. Based on the previous hypotheses about the one-way influence relationships among the latent variables, the following conclusions had been drawn:

Relationships among latent variables: The coefficient between latent variables indicates the degree of changes in another variable caused by a certain variable. For example, in Figure 1, the regression coefficient of user experience and satisfaction factors in the survey sample was 0.97, which means that a 1% increase in the user experience factor will directly increase the overall satisfaction factor by 0.97%. The regression coefficient of security and credibility and satisfaction factors was 0.88, which means that a 1% increase in the security and credibility factor will directly increase the overall satisfaction factor by 0.88%. It shows that, at present, the security issue is non-negligible; it has become a focus of attention and has an important impact on the overall satisfaction.

The regression coefficient of security and credibility and user experience factors was 0.04, which was relatively small, indicating that the correlation coefficient between the two exogenous latent variables selected was not large, which means that the two factors were relatively independent of each other. The influence between the two was relatively small.

Relationships among latent variables and measurable variables: Through the analysis of the relationships among latent variables and observed variables, the observed variables that had significant relationships with the latent variables could be discovered, and comparisons among observed variables of each factor could be carried out.

1. Relationships between security and credibility factor and measurable variables:

In the security and credibility factor, the coefficient of the payment security variable was the largest (0.85), followed by the coefficient of personal information

security (0.51), the coefficient of credit evaluation system was smaller than the former two (0.21). This indicates that, in terms of the security assurance of online education platforms, users would pay more attention to payment security, which is consistent with the real-life experience. Platform operators can prevent user information leakage through technical improvement, and information supervision means to improve user satisfaction with the products. Although the coefficient of credit evaluation system (0.21) was relatively small, it does not mean that this factor can be ignored. If we want to develop a powerful online education platform, the configuration must be optimised as much as possible to improve user satisfaction. Platform operators should also take into account the credit evaluation system and make possible efforts to improve user satisfaction.

2. Relationships between user experience factor and measurable variables:

In the user experience factor, the coefficients of cost performance (0.86) and helpfulness (0.823) were greater, followed by the coefficient of operation convenience (0.45) and the coefficient of product maintenance and improvement (0.32), the coefficient of customer service efficiency was relatively small (0.13). It indicates that, in terms of the quality evaluation of online education products, users are more concerned about the helpfulness and cost performance of the products. Therefore, in future development, online education platforms should make efforts to develop their own advantages and attract more users with rich course content and high-quality teaching.

The coefficient of operation convenience was 0.45, which indicates that operation convenience has a vital influence on the satisfaction of online education platforms [15]. If the operation of an online education platform was not convenient, it might have a significant negative impact on the overall satisfaction of the platform. Therefore, in order to improve the overall satisfaction of the platform, it is necessary to reduce the complicated operation procedures and make the operation more feasible. The design of online education platforms must not be too complex, and they should be fit for as many groups as possible.

3.7   Conclusions and suggestions of the model

Conclusions: based on the questionnaire survey, it is proved through structural equation model that the overall satisfaction of current online education platforms is directly or indirectly affected by two factors: security and credibility, and user experience. The relationships among above-mentioned latent variables, and among latent variables and measurable variables had been explained. Therefore, the platform operators and users should start from their actual conditions and adopt different strategies to make full use of the characteristics of the direct and indirect influence of the two factors on the overall satisfaction of the online education platforms to meet their own needs. These activities would also be significant positive contributes to promoting the comprehensive and healthy development of online education platforms.

Suggestions: to improve the overall satisfaction of online education platforms, the key points would include ensuring user information security and improving user experience and satisfaction [16].

Improving the overall satisfaction of users is a necessary move for the development of the online education industry; however, many factors would affect satisfaction to varying degrees [17]. Through the analysis of the structural equation about the influencing factors on online education platform satisfaction, it is found that the cost performance (regression coefficient was 0.864), helpfulness (regression coefficient was 0.823), payment security (regression coefficient was 0.853) and personal information security (regression coefficient was 0.512) had a greater impact on overall satisfaction. Therefore, operators are suggested to consider elements focusing on the four aspects mentioned above for platform development.

4 Descriptive Analysis of the Usage of Online Education Platforms

4.1 Empirical analysis of the influencing factors of online education platform satisfaction

The selection of parent factor and child factors: In order to analyse the influencing factors of users' satisfaction with the online education platforms, this section selected 1 parent factor and 7 child factors to conduct advantage analysis on the grey system. The specific variable selection results are shown in the table below [18].

Table 5. Selection of parent factor and child factors

Factor category	Variable selected	Number of corresponding questions
Parent factor	Overall satisfaction	A30
Child factors	Brand awareness	A16
	Recommendation	A16
	Cost performance	A16
	Teacher resource	A16
	Course diversity	A16
	Interaction	A16
	Safety	A16

Under each parent factor, after comparison, the child factor with the greatest correlation was marked as the potential dominant child factor, which had the best explanatory ability.

Output results: After initial data transformation, MATLAB was adopted for analysis, and the output result matrix is as follows: $R = \begin{bmatrix} 0.7734 \\ 0.6977 \\ 0.8291 \\ 0.8430 \\ 0.8021 \\ 0.7129 \\ 0.8301 \end{bmatrix}$.

The results of advantage analysis of the grey system with selection preference structure: The results were sorted out in the form of the data table, as shown below:

Table 6. Output results of advantage analysis

i j	Overall satisfaction
Brand awareness	0.7734
Recommendation	0.6977
Cost performance	0.8291
Teacher resource	0.8430
Course diversity	0.7021
Interaction	0.7129
Safety	0.8301

Influencing factors of respondents' online education platform satisfaction, Combining with the incidence matrix R, it can be seen that: For the parent factor of the satisfaction with the current status of the online education platforms, cost-performance, teacher resource, and safety were dominant child factors, and their correlations were 0.8291, 0.8430, and 0.8301, respectively, that is, they had a significant impact on satisfaction.

It can be clearly seen that users who pay more attention to the cost-performance and teacher resource were more satisfied with the current status of the online education platforms, indicating that the platforms were cost-effective and could provide high-quality services for users who pursue high-quality and cost-effective online education services. In addition, to contend for the online education market, the major online education platforms often compete for reputed teachers. Compared with offline education, online platforms have more opportunities to hire famous teachers as part-timers, thereby winning praise from users who pay more attention to the teacher resource factor. The less optimistic thing is that users who were more concerned about safety were less satisfied with the current status of online education platforms, which indicates that since the online education platforms had not done a good job so far. Therefore, the room for improvement is huge with personal information, safety protection and payment security assurance.

5 Analysis of Satisfaction-Related Factors Based on the Association Rule Algorithm

In the analysis of factors related to satisfaction, the minimum support and confidence of the association rule algorithm were set to 60% and 80%, respectively [19].

5.1 Results of association rules of first-level satisfaction

In the analysis of first-level satisfaction, a total of 38 rules had been mined. The specific estimation results of the model are shown in Table 7.

Table 7. Results of association rules of first-level satisfaction

No.	Rule	Support	Confidence	Improvement
R1	H2=>A1	60.33	93.45	1.001
R2	F2=>A1	80.71	97.46	1.044
R3	L1=>A1	83.62	97.55	1.045
R4	C1=>A1	85.43	92.31	0.989
R5	E2=>A1	89.95	95.61	1.024
R6	D1=>A1	96.62	93.15	0.998
R7	F2∧L1=>A1	76.29	97.32	1.042
R8	F2∧C1=>A1	66.29	96.98	1.039
R9	F2∧E2=>A1	80.61	97.46	1.044
R10	F2∧D1=>A1	82.71	96.26	1.044
R11	L1∧D1=>A1	80.71	97.46	1.040
R12	L1∧E2=>A1	83.62	97.55	1.045

Users with lower consumption willingness had a lower degree of satisfaction: From the expression $F_2 \wedge E_2 => A_1$, it can be seen that for users who chose to pay by per course and had a consumption willingness lower than 100 CNY, the support and confidence were 80.71% and 97.46%, respectively. Such users were not satisfied with the user experience of the current online education platforms, and they lost their confidence in this education form [20]. In response to such situation, platform operators should start with the attractiveness and education quality of the platforms to firmly seize the users' heart, to increase the usage and expand the business scope of the platforms.

School promotion is unpopular: From the expression $L_1 \wedge D_1 => A_1$, it can be seen that, for users with a bachelor's degree who received online education through school promotion, the support and confidence were 83.62% and 97.55%, respectively. On the one hand, the quality of the platforms promoted by the schools was uneven; on the other hand, students had no interest in school promotion. Therefore, platform operators should take targeted measures for teachers and students, such as, classifying the courses and formulating reasonable lecturing methods to cooperate with the offline classroom teaching. In addition, concentrated marketing and promotion are inadvisable.

5.2 Results of association rules of second-level satisfaction

In the analysis of second-level satisfaction, a total of 23 rules had been mined. The specific estimation results of the model are shown in Table 8.

Table 8. Results of association rules of second-level satisfaction

No.	Rule	Support	Confidence	Improvement
R_8	$C_1 \wedge D_1 => A_2$	83.96	94.83	0.992
R_9	$E_1 \wedge C_1 => A_2$	80.25	97.16	1.016
R_{10}	$F_1 \wedge G_5 => A_2$	81.10	97.19	1.017
R_{11}	$F_1 \wedge E_2 => A_2$	84.81	97.32	1.018
R_{12}	$F_1 \wedge L_4 => A_2$	84.81	97.32	1.018
R_{13}	$F_1 \wedge D_1 => A_2$	89.73	97.46	1.019
R_{14}	$J_3 \wedge G_5 => A_2$	81.90	94.64	0.990
R_{15}	$J_3 \wedge G_6 => A_2$	83.48	97.27	1.017
R_{16}	$J_3 \wedge L_4 => A_2$	85.60	94.87	0.992
R_{17}	$J_3 \wedge D_2 => A_2$	90.52	95.15	0.995
R_{18}	$G_2 \wedge E_2 => A_2$	84.33	97.30	1.018

"Partly free-of-charge" is more welcomed by female users: From the expression $E_1 \wedge C_1 => A_2$, it can be seen that female users who chose partly free-of-charge courses had a moderate degree of satisfaction, the support and confidence were 80.25% and 97.16%, respectively. Female users are the main users of online consumption. "Partly free-of-charge" exactly fits with female users' wishes, since it not only evokes their interests but also greatly improves their satisfaction with the price. Therefore, appropriately setting partly free-of-charge courses for female users could enlarge the market shares.

"Pay by per course" is accepted by common users more easily: From the expression $G_2 \wedge E_2 => A_2$, it can be seen that, among users aged between 18 and 30, the satisfaction of respondents who chose to pay by per course had a moderate degree satisfaction, the support and confidence were 84.33% and 97.30%, respectively. Users of different ages have different learning requirements, but "pay by per course" could meet their rational consumption demands. "Buy what you want to learn" has inadvertently improved the satisfaction of platform users. Therefore, charging by courses could be taken as the main charging method of online education platforms.

5.3 Results of association rules of third-level satisfaction

In the analysis of third-level satisfaction, a total of 11 rules had been mined, and the specific estimation results of the model are shown in Table 9

Table 9. Results of association rules of third-level satisfaction

No.	Rule	Support	Confidence	Improvement
R1	$G4 => A3$	96.88	95.28	1.032
R2	$K4 => A3$	96.88	95.28	1.032
R3	$F2 \wedge K4 => A3$	91.70	95.02	1.029
R4	$I4 \wedge K4 => A3$	91.70	95.02	1.029
R5	$D2 \wedge G4 => A3$	92.87	95.08	1.030
R6	$L1 \wedge D4 \wedge C1 => A3$	92.87	95.08	1.030

"TV promotion" has a certain effect on female users: From the expression $L_1 \land D_4 \land C_1 => A_3$, it can be seen that female users with a bachelor degree who chose online education courses through TV promotion had a high degree satisfaction, the support and confidence were 91.70% and 95.02%, respectively. Women like to watch TV more than men, and the popularisation of TV shopping in recent years had witnessed this trend. Therefore, once the platform operators master this feature, they could attract more female users through TV promotion [21].

Do a good job in the competition of "open courses for postgraduate entrance examinations": From the expression $F_2 \land K_4 => A_3$, it can be seen that users whose consumption willingness was less than 100 CNY and had chosen the courses of postgraduate entrance examinations had a high degree satisfaction, the support and confidence were 92.87% and 95.08%, respectively. The users' consumption willingness was relatively low, which means that there might be a blank field in the online education for postgraduate entrance examinations. Furthermore, the high satisfaction degree for the users who had chosen courses for postgraduate entrance examinations indicates that the development prospect of this field is excellent. Therefore, platform operators can vigorously launch open courses for postgraduate entrance examinations to attract the attention of users, and then give some discounts to form a good reputation effect.

6   Conclusions and Suggestions

6.1   Main conclusions

Construction of online education platforms:

1. Take the advantages of the online platforms

In terms of the channels to spread the brands of online education platforms, application websites including Weibo, WeChat, and TV are the three main channels accounting for 39%, 38% and 37% market share, respectively. Therefore, it could be seen that the network and television media have influential publicity effects.

2. Develop platform products related to hobbies and interests

For the learning requirement types, nearly 60% of the users was hobby and interest-based, which was far more than other learning types. Therefore, it could be seen that there might be a broad market for platform products related to hobbies and interests.

3. Compared with traditional education, online education is more flexible

Comparing online teaching with offline teaching, 83.99% of the users believed that the main advantage of online education was that they could arrange learning time at will, and 76.59% of the users thought that geographic elements did not restrict online education. Meanwhile, 48.88% of the users believed that the shortcoming of

traditional education is the fixed time [22]. When selecting education methods, most learners wish they could have greater freedom by getting away from the constraints of time and space. It is not difficult to see that this is the driving force for the vigorous development of online education platforms in recent years.

6.2   User satisfaction needs to be improved

Users have low trust in network security and low satisfaction in with payment and information security: Nearly half of the users believed that the payment of online education platforms was not secure enough, and 80% of the users thought that their personal information was insecure. In the context of a large number of information leaks on the Internet, users are generally worried about the safety of the information they filled in during registrations. If the platforms were not strictly supervised, the users might lose their confidence.

The overall cost performance of the platforms is high and the user experience is good: Approximately 90% of online education platform users believed that the platform resource and service level were of good value for money, and the overall cost-performance was high. Good user experience is an important condition for improving the user satisfaction of the platform.

The helpfulness of the platforms is high and the educational significance is demonstrated: Users generally felt that the overall online education platform quality had been improved and nearly 85% of the users believed that online education products were quite helpful. This phenomenon had proved the practicality of the online education platforms, demonstrated their educational significance and improved user satisfaction.

7   Acknowledgment

The contributions of the three authors are equal in this paper.

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