

A Study on the Influencing Factors of Social Presence on Online Learners' Learning Effect

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Abstract: In the context of the still severe epidemic, online teaching will still be the first choice for education and teaching. However, there is a big gap between the learning effect of online teaching and the learning effect of traditional offline teaching. At the same time, students' sense of learning experience through online learning has relatively weak self-awareness. Therefore, this study uses the questionnaire survey method to conduct a survey on 166 online students, and uses the data analysis method to conduct reliability and validity test, correlation analysis and regression analysis on the sample data to verify whether the null hypothesis is established. The results show that H1: Conscious social presence has a positive effect on learning, H2: Emotional social presence has a positive effect on learning, and H3: Cognitive social presence has a positive effect on learning. All three hypotheses are valid, the social presence of online learners has a positive impact on their learning effect. At the same time, social presence has a direct impact on the learning effect of online learners, and its regression equation is: $Y=0.229*a+0.543*c$. In the online classroom, online students can be improved by turning on the camera, frequent communication and interaction, more clearly formulating teaching tasks and explaining knowledge points, etc.

Keywords: Social Presence, Online Learners, Learning Effectiveness

1. Introduction

Since the outbreak of the Coronavirus disease (COVID-19) in 2019, the country and the people have been hit hard. The outbreak of the Coronavirus disease once seriously damaged the offline teaching mode of primary, secondary schools and universities in many countries. Faced with sudden challenges, all countries are actively seeking new teaching methods. At this time, online classrooms have become the mainstream of the epidemic era. After the widespread application of the online teaching mode, a series of problems have also appeared, such as students' low enthusiasm for online classes, weak concentration, and relatively poor learning effects. Many teachers and scholars are actively exploring the influencing factors of online learners' learning effect, among which online learners' social presence is an important influencing factor. The impact of social presence on the learning effect of online learners has become a topic of concern to many teachers and scholars.

1.1. Social Presence

Social presence, is also known as social presence. Short, Williams and Christie proposed that social presence refers to the degree to which a person is regarded as a "real person" and the perceived degree of connection with others in the process of using media to communicate [1, 2]. Lv Hongbing Social presence is the immediate feeling of others, and it is the result of cognitive inspiration from others' cognitive, emotional and behavioral characteristics [3].

1.2. Online Learner Social Presence

After the emergence of online education and online education, Gunawardena proposed that social presence is closely related to online education. Tu concluded that social presence is the degree to which learners feel, feel and

experience in online learning. Hu Yong found that social presence is students' sense of identification with online learning, and the degree of experience compared with traditional classroom learning [4]. Guo pointed out that social presence is the true degree of mutual presence between learners and other learners and teachers in the process of online learning [5]. Therefore, the learning effect and learning state of online learners are closely related to the social presence of online learners [6].

1.3. Related Theories of Online Learners' Social Presence

1.3.1. Social Presence Hypothesis Model Based on VC

Yoon pilhoun and others believe that in the group learning of virtual environment and virtual conference (VC), when the social presence of the group increases, the cohesion of the group tends to increase [7]. The stronger the learners' social presence, the greater the impact of the interaction between social presence and group cohesion on group efficacy and academic performance. The resulting group cohesion and group efficacy will improve the academic performance and learning effect of online learners (Figure 1).

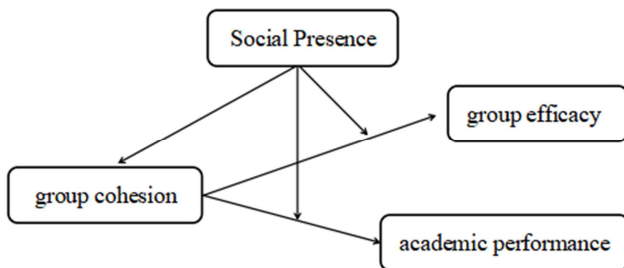


Figure 1. Social Presence Hypothesis Model Based on VC.

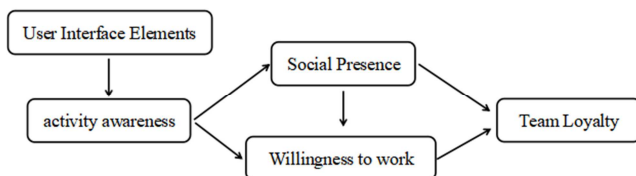


Figure 2. Research Model of Social Presence Based on CMC.

1.3.2. Research Model of Social Presence Based on CMC

Haines Russell's research model is to study activity awareness, social presence and motivation in distributed virtual teams (Figure 2). The research model is based on the problems in computer media communication (CMC), and takes the distributed virtual team as the research object [8]. It is mainly composed of user element interface, activity awareness, social presence, work willingness and team loyalty. Its research model points out that providing activity awareness information of other team members through user interface elements is conducive to increasing the activity awareness of members. The activity awareness of team members has a positive impact on the social presence and work intention of team members. Higher social presence will increase members' work intention and

team loyalty, and work intention also has a positive impact on team loyalty.

2. Research Hypotheses and Research Proposals

2.1. Research Hypotheses

Through the further research of social telepresence related theories and social telepresence related research models, it is concluded that online learners' social telepresence has a positive impact on students' learning effect, assuming the model (Figure 3).

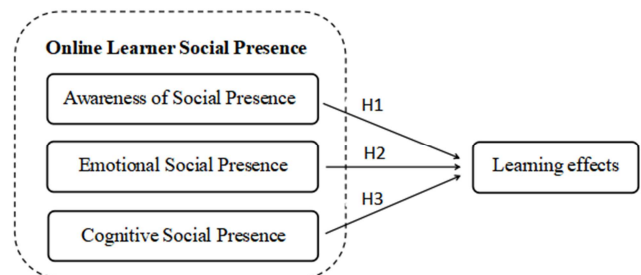


Figure 3. Research Hypotheses.

Based on the online community scenario, Ning and Kathy (2008) proposed that social presence includes three dimensions, namely perception, emotion and cognition, in which online learners' social presence feels the influence of students' awareness, emotion and cognition. The learning effect (LE) includes the enthusiasm, concentration, mastery of knowledge points and practical application ability of students in online learning [9-13].

Social presence has a positive impact on online learners' learning outcomes. Accordingly, the following assumptions are made:

H1: Awareness of social presence has a positive impact on learning outcomes.

H2: Emotional social presence has a positive impact on learning outcomes.

H3: Cognitive social presence has a positive impact on learning outcomes.

2.2. Research Program

According to the research hypothesis put forward above, combined with the measurement scale of social telepresence summarized by Lv Hongbing [14]. This multi-dimensional measurement of online learners' social presence mainly includes three types: online learners' awareness of social presence (ASPOL), online learners' emotional social presence (ESPOL) and online learners' cognitive social presence (CSPOL). The learning effect of online learners includes four aspects: enthusiasm (LE1), concentration (LE2), knowledge point mastery (LE3) and practical application ability (LE4). The measurement items of each dimension are shown in Table 1.

Table 1. Online Learner Social Presence Measurement Metrics.

Variables	Numbering	Measurement indicators
ASPOL	ASPOL1	I can perceive the presence of teachers in the online classroom
	ASPOL2	I can perceive the presence of other learners in the online classroom
	ASPOL3	I feel that the teachers are aware of my existence in the online classroom
	ASPOL4	I feel that other learners in the online classroom are aware of my presence
	ASPOL5	I will pay close attention to teachers and other learners in the online classroom
	ASPOL6	Teachers and other learners in the online classroom will pay close attention to me
ESPOL	ESPOL1	Emotions generated by my interactions in online classes affect others
	ESPOL2	I am emotionally affected by other people's interactions in online classes
	ESPOL3	The emotions of others in the online classroom do not affect my emotional state
	ESPOL4	My emotions in the online class will not affect the emotional state of others
	ESPOL5	Emotions between me and others interact with each other during online classroom learning
	ESPOL6	There will be a sense of closeness between me and other people during the online classroom learning process
CSPOL	CSPOL1	I understand the role of the online classroom and my intention to study online
	CSPOL2	The teachers and students of the online classroom and the participants understand each other
	CSPOL3	I can understand other people's viewpoints and propositions during the online classroom learning process
	CSPOL4	Others can understand my views and claims during the online classroom learning process
	CSPOL5	Teachers and other learners in the online classroom are very clear about what I think
	CSPOL6	During the online classroom learning process, I am very aware of the thoughts of the teacher and other learners
LE	LE1	Every time I study online, I can pay full attention to the lecture
	LE2	I can actively interact with teachers and other learners every time I study online
	LE3	I can master comprehensive knowledge after online class
	LE4	I can better apply and practice after the online class

3. Research Methods

3.1. Participants

The sampling method used in this survey is simple random sampling. The survey objects select students who have participated in online courses. They can fill out the questionnaires for the students and conduct sampling verification to verify the validity and authenticity of the questionnaires. Among the participants in this survey, undergraduate students accounted for a large proportion, accounting for 73.69% of the entire sample size. Among them, boys accounted for 33.94% and girls accounted for 65.06%. The students who participated in the survey were mainly concentrated between 21-30 years old. The classes as research objects are mainly vocational and technical education students and e-commerce students from Beijing Union University (Table 2).

Table 2. Basic situation of sample respondents.

Describe the item	Options	Percentage (%)
Gender	Male	33.94
	Female	65.06
Age stage	Under 20	5.42
	21-30 years old	83.13
	Over 31 years old	11.45
Education	Specialist	6.63
	Undergraduate	71.69
	Postgraduate	21.69

3.2. Data Collection

Due to the epidemic, this survey was distributed online,

mainly through the questionnaire star, and 166 questionnaires were returned, and 13 invalid questionnaires were excluded (the invalid questionnaires mainly included the questionnaires filled out by non-online students and the continuous questionnaire scales). Fill out the questionnaires with the same value multiple times), and retain 153 valid questionnaires, with an effective rate of 92.17% (Table 3).

Table 3. Questionnaire recovery statistics.

Item	Total
Questionnaire recycling	166
Valid questionnaires	153
Efficient	92.17%

3.3. Data Processing

166 students from Beijing Union University were invited to participate in this study in the form of online questionnaire. For 153 valid questionnaires collected, spss26 was used for data analysis, including descriptive analysis of media tools used by participants in online learning, reliability and validity analysis of the overall questionnaire, correlation analysis and regression analysis between online students' social presence and online learners' learning effect.

4. Result

4.1. Descriptive Analysis

Through the descriptive analysis of the samples, it is concluded that the media tools most used by online learners in online courses are mobile phones, followed by computers, accounting for 86% and 84% respectively. A small proportion

of online learners use tablets or other tools to participate in online learning (Figure 4).

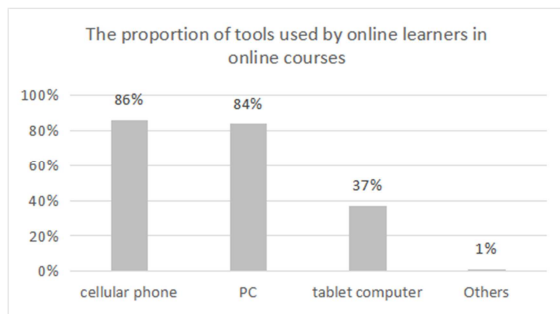


Figure 4. The proportion of tools used by online learners in online courses.

4.2. Reliability and Validation Analysis

Reliability analysis was performed on all scale items of the entire questionnaire using SPSS software (Table 4). The overall reliability coefficient of the questionnaire was 0.965. The overall reliability of the questionnaire is greater than 0.7, the reliability is relatively good, and the next step of validity analysis can be carried out. The overall reliability test of the questionnaire also verifies that the data obtained by the questionnaire is reliable, and the reliability is relatively high.

Table 4. Reliable Analysis.

Cronbach Alpha	Cronbach's alpha of the normalized term	number of items
0.965	0.955	30

All variables are tested. Its KMO value is 0.933, and the test result is relatively significant, indicating that the correlation between each variable is relatively good, and the next step can be analyzed (Table 5).

Table 5. Validity Analysis.

KMO Sampling Suitability Quantity	0.933
Approximate Chi-square	3079.839
Bartlett's sphericity test Degree of freedom	213
Sig	.000

4.3. Factor Analysis

Then, factor analysis was performed on the components of the independent variables. The final result showed that three factors were mainly extracted, and the cumulative variance rate of these three factors finally reached 74.809%, which indicates that the structural validity of the influencing factor scale in the study is people were relatively satisfied (Table 6).

Table 6. Exploratory Factor Analysis Interpretation of Variance.

Element	Initial eigenvalue			Extract the load sum of squares			Rotational load sum of squares		
	Total	variance%	accumulation %	Total	variance%	accumulation %	Total	variance%	accumulation %
1	11.044	61.353	61.353	11.044	61.353	61.353	4.891	27.174	27.174
2	1.295	7.193	68.547	1.295	7.193	68.547	4.733	26.296	53.470
3	1.127	6.262	74.809	1.127	6.262	74.809	3.841	21.338	74.809
...	-	-	-	-	-	-
18	.083	.461	100.000	-	-	-	-	-	-

Extraction method: principal component analysis.

The maximum variance method is used for each independent variable factor, and each independent variable factor is rotated. The results show that each factor loading of all independent variable questions exceeds 0.5, and the results are relatively satisfactory, indicating that the proposed three common factors are correlated with the online learning outcomes of the learners (Table 7). The three factors are: Conscious Social Presence (ASPOL), Online Learner Emotional Social Presence (ESPOL), and Online Learner Cognitive Social Presence (CSPOL).

Table 7. Exploratory factor analysis matrix results after second rotation.

Item	1	2	3
ASPOL1	.227	-.034	.774
ASPOL2	.275	.329	.754
ASPOL3	.201	.498	.713
ASPOL4	.198	.586	.663
ASPOL5	.324	.482	.576
ASPOL6	.311	.456	.552
ESPOL1	.354	.783	.240
ESPOL2	.381	.739	.151
ESPOL3	.426	.529	.114
ESPOL4	.446	.563	.145
ESPOL5	.347	.814	.134

Item	1	2	3
ESPOL6	.385	.753	.244
CSPOL1	.564	.123	.538
CSPOL2	.680	.397	.374
CSPOL3	.772	.334	.343
CSPOL4	.700	.448	.336
CSPOL5	.684	.450	.359
CSPOL6	.725	.416	.329

4.4. Correlation Analysis

Through SPSS software, three influencing factors of online learning awareness social presence (ASPOL), online learner emotional social presence (ESPOL) and online learner cognitive social presence (CSPOL) were correlated with the learning effect of dependent variables., and the learning effect includes students' enthusiasm for online learning (LE1), concentration (LE2), knowledge point mastery (LE3) and practical application ability (LE4). The results show that online learners' conscious social presence, emotional social presence, and cognitive social presence are all positively correlated with online learners' learning outcomes (Table 8). Among them, the correlation coefficient of ASPOL is 0.685, and the correlation coefficient of CSPOL is 0.787, which are positively correlated

with the learning effect of online learners, indicating that the H1, H2, and H3 assumptions are established. The correlation coefficient of ESPOL is 0.560, which is highly positively correlated with the learning effect of online learners. The

correlation coefficients between ASPOL and CSPOL and online learners' enthusiasm, concentration, knowledge point mastery and practical application ability are all greater than 0.6, which has a strong positive correlation.

Table 8. Correlation analysis.

	ASPOL	ESPOL	CSPOL	LE1	LE2	LE3	LE4	LE
ASPOL	1							
ESPOL	.654**	1						
CSPOL	.700**	.628**	1					
LE1	.613**	.480**	.725**	1				
LE2	.639**	.562**	.715**	.817**	1			
LE3	.701**	.529**	.735**	.785**	.688**	1		
LE4	.635**	.533**	.766**	.745**	.739**	.830**	1	
LE	.685**	.560**	.787**	.924**	.897**	.904**	.909**	1

** . The correlation is significant at the 0.01 level (two-tailed).

4.5. Regression Analysis

Regression analysis was performed on all independent variables to test the collinearity and fit of each variable, and the results of the overall regression analysis (Table 9).

Table 9. Regression analysis.

Model	Unstandardized coefficients		standardized coefficient	t	Sig	Collinearity Statistics	
	B	Standard Error	Beta			Tolerance	VIF
1	(const)	5.193	3.807		1.364	.175	
	ASPOL	.233	.071	.229	3.278	.001	.465
	ESPOL	.119	.076	.115	1.577	.117	.429
	CSPOL	.551	.078	.543	7.030	.000	.382

a. Dependent Variable: LE

The VTF values of SPOL, CSPOL and ESPOL are not more than 10, and the tolerance is greater than 0.1. So, there is no collinearity problem. The t-value significance level of the constant term and ESPOL variables was greater than 0.05, and the significance test was not passed. Therefore, in the regression equation, the constant term and ESPOL variables should be eliminated. The t values of ASPOL and CSPOL are: 3.278 and 7.030, respectively, and their significance levels are less than 0.05. They have passed the significance test and have a linear relationship with the learning effect of online learners. Let ASPOL be a, CSPOLc, the regression equation that affects the learning effect of online learners is: $Y=0.229*a+0.543*c$.

5. Conclusion

In this study, the questionnaire survey method was used to investigate the online students, and the data analysis method was used to test the reliability and validity of the sample data, correlation analysis and regression analysis to verify whether the null hypothesis was established. The results show that H1: Conscious social presence has a positive effect on learning, H2: Emotional social presence has a positive effect on learning, and H3: Cognitive social presence has a positive effect on learning. All three hypotheses are valid., the social presence of online learners has a positive impact on their learning effect.

In the research, it is found that the awareness and

cognition of online learners have an important influence on the level of social presence they generate. Through the mutual perception of teachers or other learners, online students affect the online students' experience in online courses, which in turn affects the online students' sense of social presence; The cognitive understanding of learning tasks and learning intentions will affect the cognitive social presence of online students. The stronger the online students' perception of teachers and other learners, the more familiar they are, the stronger the online students' experience in the online classroom, the stronger the sense of social presence, the better the students' attention and enthusiasm, thus improving the online classroom. Learner's learning effect. The emotional social presence of online learners will be affected by the emotions of teachers, other learners and themselves in online classrooms, which has a positive impact on the learning effect of online learners, but the impact is not strong.

Online learners' conscious social presence and cognitive presence have a positive linear relationship with online learners' learning effects, and have a direct impact on online learners' learning effects. The regression equation is: $Y=0.229*a+0.543*c$. In the online classroom, students can be attracted by turning on the camera, frequently communicating and interacting, formulating teaching tasks more clearly, explaining knowledge points, etc., so as to enhance students' awareness and cognition in the virtual learning environment, and enhance the online learners'

awareness. Social presence, and then improve the learning effect of students' online learning.

6. Limitations and Deficiencies

Due to the limited time and the impact of the Coronavirus disease, this study still has some shortcomings, which are summarized in the following two aspects. In terms of questionnaire survey, due to the impact of the epidemic, this survey adopted the online distribution mode of questionnaires, and no offline questionnaires were distributed. In terms of influencing factors, this research studies the influence of social presence on online learners' learning effect, and does not make a detailed research on those factors that affect online learners' social presence.

For the above two problems. In the future research process, more attention should be paid to the above two aspects. First, the distribution of questionnaires should be carried out in a combination of online and offline methods to expand the sample size. Second, it is necessary to focus on the research on the influencing factors of online learners' social presence, and link them with the learning effect of online learners, so as to provide more suggestions and solutions for online teaching.

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