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Original Article

Presenting a Causal Model for Predicting Social Presence Based on Cognitive Presence (Mediated by Online Search) Students of Payam Noor University's Online Courses: Application of Path Analysis

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Abstract

The concept of social presence is defined as the ability of learners to identify the learning community, have a sense of belonging to the community and communicate purposefully in a learning community. The reason for emphasizing the social presence of online learning is that online and virtual learning experts believe that social constructivism is an important factor in promoting interpersonal communication and the quality of learning. Given the importance of social presence as an influential variable in the process of virtual education, it is necessary to pay more attention to this issue and its predictors. In this regard, the present study aimed to provide a causal model for predicting social presence based on cognitive presence mediated by the online learning atmosphere. Participants included 265 students of online courses of Payame Noor universities in North Khorasan province in the academic year of 2009-2010 who were selected by cluster random sampling method. In order to measure the research variables, questionnaires of cognitive presence, social presence and online learning atmosphere were used. Amos software and path analysis method were used to evaluate the proposed model. The results showed that, 1-According to the above findings, the proposed model in the RMSEA index (root mean square of estimation errors) does not fit well, so the model was modified by correlating latent variable errors and The results showed that the final model has a good fit; 2-Cognitive presence has a direct, positive and significant relationship with social presence ($P\leq0.05$ and $\beta=0.62$); There is a direct, positive and significant relationship between cognitive presence and online learning ($P\leq0.05$ and $\beta= 0.14$) and also a direct relationship between online learning atmosphere and social presence is positive and significant ($P\leq0.05$ and $\beta=0.32$); 3-In the indirect way, with the presence of mediator variables, the relationship between cognitive presence and social presence was still significant and the online learning atmosphere absorbs part of the effect of cognitive presence on social presence and mediates this relationship in part .

Keywords

Social presence, cognitive presence, online learning atmosphere, online courses.

Introduction

In the past, education was considered an end and goal in itself, but with the change of views towards the education system and changes in its goals and philosophy, today education is not an end, but a means to achieve lofty and superior goals. In the educational environment, the skills that provide all-round growth of a person are emphasized, and these skills are used in daily life (Mousavi et al., 2020, p28). Reading and studying, writing skills, language skills, problem solving, critical thinking, questioning, metacognitive skills and computer skills are among these skills. E-learning environments, with their capabilities, have made it possible to

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pay more attention to the development and cultivation of basic skills. In the following, this topic is elaborated (Yan,Wu,Iliyasu, Kawamoto& Hirota., 2022,p3).

The emergence of e-learning and its sustainable results have shown that deep and meaningful learning is not limited to the classroom experience. E-learning has revolutionized the way we think about educational experiences in terms of sustainable communication and collaboration (Brijens et al., 2022,p 5). New communication technologies can create and maintain communication between learners and provide instant and quick access to information for learners, which has significantly changed our understanding and acceptance of electronic learning. The history of distance education goes back to correspondence education. Education that learners were taught without attending the classroom, through pamphlets, books, videos and software that were sent to them (Behl et al., 2022,p46). However, with the advent of the computer and the use of its capacities in education, the platform for this type of education was made through the network, so that in 1982, the International Association of Correspondence Education (ICCE) became the International Association of Education from (ICDE) round was renamed. Distance education in its general sense is an umbrella that covers many new ways of education (Ung , Labadin & mohamad., 2022,p459). Web-based education, distributed learning, virtual education, lifelong learning are terms whose common feature is that the learners, the instructor, the educational organization, and the support are far from each other in terms of time and place.

E-learning is a metaphor for teaching and learning environments, focusing on the learners in order to realize learning. E-learning uses the technology of the global wide network, but is not limited to it in any way (Zhao, Cao, Li and Li, 2022,p.256). In the definition of electronic education, new methods of education based on electronic education technology have been read with different titles such as alternative methods, new and multimedia media, knowledge media, the best educational solution, etc., but it seems that the best term Which is a comprehensive and complete definition of all the mentioned names, it is virtual education (Rahayu, Ferdiana and Kasumawardani, 2022,p.547). Although e-learning uses the technology of the World Wide Web, it is by no means limited to it. In the field of electronic education, in addition to web-based education, non-attendance education, distance education, distance education, retraining, self-education and computer-based education can also be proposed. Online education is a definition for educational and learning facilities, focusing on placing scholars to realize situational learning, experiential and problem-oriented learning (as the heart of virtual education) through the combination of new technologies, in this system an electronic classroom is proposed. which is considered the intelligent core of the system, and also a network, which is the virtual presence of scholars and a satellite that connects them through short waves or cable, has been presented (Paniaburee, komalawarana and Ingkavara, 2022.p.4). The development of advanced and modern interactive communication technologies such as computer conferences, e-mail chats, virtual live classes has provided the possibility of simultaneous and asynchronous interactions for people on a large scale. As Alan Tait stated in 1999, "the secret garden of open learning and distance education" has become public, and many universities and educational institutions around the world have moved out of the traditional mode and into the process of virtual education and electronic learning alongside traditional education. (Pham, Kim, Walker, Deardin & Li, 2022,. p.559). Benefits such as reduced time, travel costs, learning based on the learner's ability, learning at the learner's chosen location, etc. made distance learning continue to grow and develop with increasing popularity, and there are no signs of slowing down (Rahayu, Ferdiana & kusumawardani, 2022,.p.540). The significant increase in the registration rate in online courses shows the strengths and outstanding features of this type of education compared to traditional education. Also, with the onset of the Corona disease in 2020, traditional and face-to-face trainings were

closed, and in all levels of primary, secondary, higher education, as well as in-service training, virtual training was introduced (Jin, Fan, and Kadir, 2022,p.215).

However, at the same speed of growth and development of electronic and online education, attention should be paid to the quality of this education and the satisfaction of learners, instructors and educational workers (Behl et al., 2022,p.127; Panjaburi, Komalawrahana &Ingkavrai. 2022,p.4). The trend of online learning shows that the rate of decline This area is 10-20% more than traditional rounds. In the virtual learning environment, several factors reduce participation among learners. Factors such as feeling lonely and isolated, introducing the computer as a social factor to the class and education (Dalsunto, pena- Jimenes, Saiani & Battistelli., 2022,.p.98), increasing the time required to feel a sense of belonging to other learners and the teacher (Kabir et al., 2022), the inability to exist Bringing various interactions and not having a favorable environment for social participation. The lack of face-to-face communication with instructors and other learners causes a feeling of isolation in online classes, which causes the learner to feel concerned about the quality of the entire learning environment. These concerns have prompted researchers to research the concept of attending online learning. pay (Yusuf and Ahmed, 2020; Kalman, Macias & Weston., 2020.p.3354; Ferri, Grifoni and Guzzo, 2020.p.86; Priyadarshinp., 2020.p246). Garrison et al. (2004, cited in Lee, 2014,p.46) developed a community of inquiry framework based on the presence factor to help identify the elements of features that contribute to creating and enhancing a successful online learning experience. Theoretically, the foundation of the framework of the inquiry community is based on the work of John Dewey, the representative philosopher of the school of pragmatism. The main core of Dewey's philosophy is participation, free interaction, sharing efforts and bringing people's participation in activities, which are considered the nature and essence of a learning community (Lee, 2014,p.47). In an online course, the simplest definition of presence refers to the sense of inclusiveness and belonging to a course and the ability to interact with other learners and the instructor even though physical contact is not available (Cabb, 2009,p.216; Kilis and Yildirim, 2019.p 56; Wang, 2022,p.98). ; Dempsey and Zhang, 2019). Cognitive presence refers to the degree to which learners in a particular composition in a inquiry community are able to construct meaning through ongoing communication(p.67). This element is closely related to the process and consequences of critical thinking and may be considered as the most challenging element to facilitate and measure learning in an online learning environment (Guo, Saab, Wu & Admireal., 2021, p 1483). The reason for emphasizing the social presence of online learning is that online and virtual learning experts believe that social constructivism is an important factor for improving interpersonal communication and learning quality. Social presence is influenced by various factors that learners gain from their learning experiences and can have an impact on learners' motivation, teacher and instructor satisfaction, and real learning and perceived learning results (Andel et al., 2020,p.137; Liu, Bao and Zheng, 2019; Gurjar, 2019,p. 2734). Cognitive presence in the framework of the inquiry community is rooted in the concept of critical thinking and presents a hierarchical plan to examine the thinking processes of learners and their abilities to achieve rich levels of learning. Cognitive presence provides a way to conceptualize, examine, and differentiate between changing levels of learners' critical thinking (Liu, Bao & zheng., 2022). For this purpose, creating high-level learning and a more colorful social presence in an online interactive environment should require the cognitive participation of learners in order to combine, combine, and evaluate ideas. In order to achieve this goal, strategies should be used that allow learners to create a inquiry community through which they can participate in a meaningful critical discourse, and this requires cognitive presence (Rehmat, Sukimin, Taib, Amir& Abidin., 2022). In addition to the three presences, the inquiry community has new domains such as emotional presence, which is affected by

self-efficacy variables in the use of technology and students' perception of online learning atmosphere.

Online courses have their own atmosphere. Kaufman, Sellnow, and Frisby (2016) define online classroom space as a perceived relationship between instructor and student interaction in an online classroom (p.309). The concern is often about the isolation online that many students may experience when they are unable to interact with other students in class. Combating students' feelings of isolation in online environments may begin with the behavior of instructors. Previous research shows that the way instructors can facilitate discussion in the class is related to student interest, interaction and understanding of the lesson material, and creating social and cognitive presence to create an overall positive perception of the learning atmosphere (Finn and Schradt., 2016, p. 459). Additionally, "affirming behaviors," such as answering students' questions, may be related to positive student emotions and learning outcomes. Since confirmation behaviors include timely and accurate feedback to students' questions and comments, showing students' interest in learning and validating students' feedback by adapting the course based on the student's needs, which is the cognitive presence of learners in online courses. Online students' communication with online instructors is related to online course satisfaction (Cole et al., 2016, p. 635). Students' positive perception of instructors is related to the positive perception of the online learning environment (Kaufman et al., 2016, p.311).

Some studies directly or indirectly examine the relationship between cognitive presence and social presence (Garrison and Cleveland-Lance, 2005; Akiol and Garrison, 2011; Li, 2014; Chen, Li and Zheng, 2019; Xiao, Hrink and Bonk, 2019) and the relationship between online learning atmosphere and social presence or other variables (Alice and Seidel and Grachner, 2019; Viranton, Kristiavan and Fitriani, 2021) have discussed. But so far, no study has been found by researchers in internal and external studies that has investigated the role of online learning atmosphere in the relationship between cognitive presence and social presence in online students, and therefore there is a gap in previous studies. The current study seems important and necessary. Therefore, according to the stated content, the main goal of the present study is to present a causal model of predicting social presence based on cognitive presence with the mediation of the online learning atmosphere of students of online courses. The conceptual model between the research variables in the current study is presented in Figure 1.

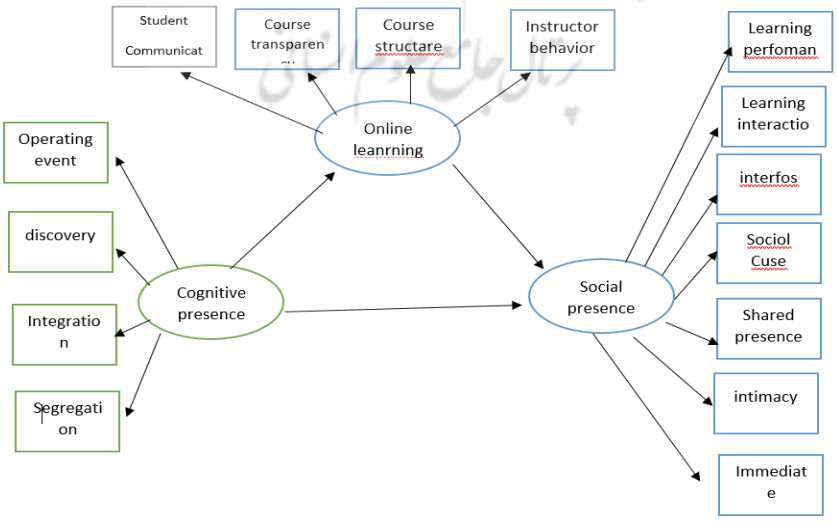

Figure 1. The conceptual model of research.

Research hypotheses

First hypothesis: cognitive presence has a direct and meaningful causal effect on social presence.

Second hypothesis: cognitive presence has a direct and significant causal effect on online learning.

The third hypothesis: cognitive presence with the mediation of online learning atmosphere has an indirect and significant causal effect on social presence.

Method

The current research plan is practical in terms of purpose and in terms of data collection, including correlation studies (cross-sectional-descriptive), known as structural equation modeling, in which causal relationships between exogenous, mediating, and endogenous variables are tested in a theoretical model. The statistical population included all students of Payam Noor universities in North Khorasan province who had online courses in the academic year 2019-2019. The number of students according to the level of education, regardless of gender and level of education, is 3340, of which 3200 were undergraduate students and 140 were master's students. The intended (or target) population in this study were male and female students of Payam Noor universities in North Khorasan province who had online courses in the academic year of 2019-2019. For model-based studies, a rule of thumb for sample selection is suggested: the minimum sample size for each parameter is calculated as ۵ times. On the other hand, a ratio of ۱۰ to ۱ is considered more appropriate and a ratio of ۱۵ to ۱ is considered desirable (Klein, ۲۰۱۱). Since there are ۱۹ observed parameters in the current research, according to the number of parameters, a ratio of ۱۵ to ۱ was used, and the number of ۲۸۵ people, taking into account the possibility of subject dropout, distorted questionnaire and outlier data) Stepwise cluster random sampling was chosen. In the first stage, 5 universities (centers/units) were randomly selected from Payam Noor universities in North Khorasan province as the first cluster. In the second stage, the universities of the selected centers/units were referred to, and then the number of classes and students by field of study was provided to the researcher. Then, three classes were randomly selected from each university (center/unit) as a cluster. The second was chosen. In the analysis phase, by reviewing the questionnaires, out of 258 questionnaires, 20 questionnaires were distorted and had outlier data, such as a large number of questions were unanswered, or all questions were selected as the average option, and the number of 265 questionnaires analyzed was removed it placed.

Data Collection tools:

Demographic sample sheet: This researcher-made sample sheet included questions that measured the following items: age, sex, level of education, marital status, field of study.

Cognitive presence questionnaire: To measure cognitive presence, Garrison et al.'s (2000) questionnaire, which was implemented by Arbaugh et al. Garrison et al.'s cognitive presence questionnaire (2000) has four sub-components of operation event, discovery, integration and segregation. In Garrison et al.'s (2000) study, the face and content validity of the presence-cognitive questionnaire was reported using the opinion of 7 experts in cognitive psychology. Also, reliability is reported by internal consistency method by calculating Cronbach's alpha coefficient of 0.81. In order to check the validity of the construct as well as to analyze the factor structures of the test, the method of factor analysis has been repeated using principal components analysis and in rotation using the direct slope method. The obtained results show that the scale is saturated with four factors. In the current research, the content validity of the presence-cognitive questionnaire qualitative method, using the opinion of 7 experts in the field of educational psychology of Payam Noor University, North Khorasan Center, was reported as favorable. Also, in the present study, the reliability coefficients, using Cronbach's alpha method for the presence-cognitive questionnaire, which was implemented on 265 students of Payam Noor University,

Faruj branch, Garmeh branch, Jajarm branch, and Payam Noor University, Raz branch, were 0.88. was obtained, which indicates the acceptable reliability of the questionnaire used in this research.

perception of online learning atmosphere: In this research, Kaufman et al.'s (2016) online learning climate questionnaire was used to measure the perception of the online learning environment. The purpose of this questionnaire is to measure the learners' perception of the online and virtual learning environment. Kaufman et al.'s online learning atmosphere questionnaire (2016) has 15 questions and four sub-components of instructor behavior, course structure, course transporency, and student communication. In the study of Kaufman et al. (2016), the face and content validity of the online learning environment was reported using the opinion of 5 experts in the field of information technology. Also, reliability is reported by internal consistency method by calculating Cronbach's alpha coefficient of 0.84. In order to check the validity of the construct as well as to analyze the factor structures of the test, the method of factor analysis has been repeated using principal components analysis and in rotation using the direct slope method. The obtained results show that the scale is saturated with four factors. In the current research, the content validity of the online learning atmosphere questionnaire was reported qualitatively, using the opinions of 6 experts in the field of information technology, Payam Noor University, North Khorasan Center. Also, in the present study, the reliability coefficients, using Cronbach's alpha method for the online learning atmosphere questionnaire, which was implemented on 265 students of Payam Noor University, Faruj Branch, Garmeh Branch, Jajarm Branch, and Payam Noor University, Raz Branch, were 0.89. was obtained, which indicates the acceptable reliability of the questionnaire used in this research.

Social Presence in Online Classrooms(SPIOC): In this research, in order to measure the social presence of learners in online rounds, from the social presence questionnaire of Wei, Chen and Kishong (2019) has 28 questions and 7 sub-components is of the user interface, social case, shared presence, intimacy, immediate, Learning interaction and learning performance. In his study, Chen and Kishong (2019), the face and content validity of the social presence questionnaire was reported using the opinion of 4 experts in the field of social psychology. Also, reliability is reported by internal consistency method by calculating Cronbach's alpha coefficient of 0.90. In order to check the validity of the construct as well as to analyze the factor structures of the test, the method of factor analysis has been repeated using principal components analysis and in rotation using the direct slope method. The obtained results show that the scale is saturated with four 7 factors. In the current research, content validity was reported using the qualitative method of "Social Presence Questionnaire", using the opinions of 6 experts in the field of social psychology, Payam Noor University, North Khorasan Center. Also, in the present study, the reliability coefficients, using Cronbach's alpha method for the "Social Presence Questionnaire", which was implemented on 265 students of Payam Noor University, Faruj Branch, Garmeh Branch, Jajarm Branch, and Payam Noor University, Raz Branch, were 0.88. was obtained, which indicates the acceptable reliability of the questionnaire used in this research.

Research implementation process: To carry out the research, first the necessary permits were obtained from security, educational management and student affairs of North Khorasan Payam Noor University, and then the questionnaires were randomly distributed among the students. The sampling method was such that in the first stage, among Payam Noor University in Bojnord Center, Payam Noor University of Esfrain Branch, Payam Noor University of Shirvan Branch, Payam Noor University of Ashkhane Branch, Payam Noor University of Faruj Branch, Payam Noor University of Garmeh Branch, Payam Noor University, Jajarm Branch and Payam Noor University, Raz Branch, 4 Payam Noor University, Bojnord Center, Payam Noor University, Esfrain Branch, Payam Noor University, Shirvan Branch, and Payam Noor University, Faroj Branch, were randomly selected as the first cluster. In the second stage, the centers of the selected

universities were referred to and a list of the number of classes and students by grade and field of study was provided to the researchers. Then the researchers randomly selected three classes from each university as the second cluster. The list of students of the selected classes (name, surname, student number, field and degree level) was provided to the researchers by the Vice-Chancellor of Education Centers of Payam Noor University, Faruj branch, Garmeh branch, Jajarm branch and Payam Noor University, Raz branch. Due to the spread of the Covid-19 disease and the virtual nature of universities, after obtaining the necessary permits and coordination, students answered the questionnaires virtually and online through email and the WhatsApp social network. After removing incomplete and distorted questionnaires, as well as removing single-variable and multivariable outliers, the remaining 265 questionnaires were analyzed using SPSS version 23 and Imus version 23 software.

data analysis method: Descriptive statistical methods (mean and standard deviation), Pearson correlation and structural equation analysis were used to analyze the data of the research modeling section. Because in the analysis of structural equations, there are many indicators to measure the fit of the model in this research, from the maximum likelihood method to estimate the model and from four absolute indices, namely chi-square (X2), chi-square index on degree of freedom (X2/DF), goodness-of-fit index (GFI) and root mean square error of approximation (RMSEA). Three relative indices, i.e. comparative fit index (CFI, Tucker-Lewis index (TLI), Bentler-Bunt normalized fit (NFI) and a brief index i.e. PNFI index were used. GFI, CFI, TLI and NFI criteria are indicators that are wide between 0 and 1, and the closer they are to one, the better, and it is desirable to be greater than 0.90. The X2 criterion is non-significant, but due to the high sensitivity to the sample size, its significance can be expected, and in case of significance, it is better to refer to the X2/DF index. It is desirable that this index be below 5. PNFI criterion is also higher than 0.50. The RMSEA criterion, which is considered the most important index of fit, is considered at three levels: 0.08 to 0.10 is acceptable, 0.06 to 0.08 is desirable, and below 0.06 is considered excellent (Bashlideh, 2014; Gamset et al. et al., 2006; Klein, 2011). These data were analyzed by AMOS software.

Findings

Table 1. Sample frequency distribution based on field, marital status, age and gender

Demographic variable		Frequency	Percent
Field of Study	Psychology	56	21/13
	agriculture	10	3/77
	Law	43	16/22
	electrical engineering	12	4/52
	architecture	8	3/01
	Physical Education	47	17/73
	Computer	29	10/94
	Educational Science	38	14/33
	Management	22	8/30
marital status	Single	202	76/22
	married	61	23/01
	no answer	2	0/007
Age	Between 18 and 25 years	225	84/9
	Between 25 and 35 years	40	15/09
gender	Girl	194	73/20
	Boy	71	26/79

Table 1 shows the frequency distribution of the sample with an average age of 21.41±5 based on the field of study and marital status. The findings related to age, gender, major and marital status are reported in the above table.

Table 2. Descriptive indicators in cognitive presence variable (its small components), online learning atmosphere (its small components) and social presence (its small components)

Variable	Subscales	minimum	maximum	mean	standard deviation
Cognitive presence	operation event	3	12	9/55	3/25
	Discovery	3	12	8/32	3/10
	Integration	3	12	10/87	4/36
	Segregation	3	12	9/30	3/71
	cognitive presence variable (total score)	12	48	38/15	14/42
Online learning atmosphere	Instructor behavior	6	24	20/32	4/63
	Course structure	3	12	11/47	3/19
	Course transparency	3	12	10/84	3/30
	Student communication	3	12	10/71	3/64
	online learning atmosphere (overall score)	15	60	51/34	16/21
social presence	Interface	4	16	11/30	3/21
	Social cues	4	16	12/48	4/14
	Shared presence	4	16	12/50	3/84
	Intimacy	4	16	13/32	3/52
social presence	Immediacy	4	16	12/14	3/69
	Learner interaction	4	16	11/45	3/47
	learner performance	4	16	13/75	4/22
	social presence variable (total score)	16	108	86/96	26/09

As Table 2 shows, the mean and standard deviation for sub-variables of the factor event are 9.55 and 3.25, discovery 8.32 and 3.10, integration 10.87 and 4.36, separation 9.30. and 71/3; And for cognitive presence variable, the mean and standard deviation are 38.15 and 14.42, respectively. The mean and standard deviation for the sub-variables of the ability to use the Internet 25.04 and 6.17, the ability to communicate simultaneously 13.57 and 3.38, the ability to use email 22.28 and 7.22, the ability to interact asynchronously 58 20/5 and 65/5; And for the computer self-efficacy variable, the mean and standard deviation are 87.41 and 22.42, respectively. The mean and standard deviation for the sub-variables of teacher behavior 20.32 and 4.63, course structure 11.47 and 3.19, course clarification 10.84 and 3.30, student communication 10.71 and 3.64 ; And for the online learning climate variable, the overall mean and standard deviation are 51.34 and 16.21, respectively. Also, according to Table 2, the mean and standard deviation for user interface sub-variables are 11.30 and 3.21, social signs 12.48 and 4.14, joint presence 12.50 and 3.84, intimacy 13.32 and 3.52, directness 12.14 and 3.69, learning interaction 11.45 and 3.47, learning performance 13.75 and 4.22; And for the social presence variable, the overall mean and standard deviation are 86.96 and 26.09, respectively.

Table 3. Correlation matrix between research variables

Variables	1	2	3
Cognitive presence	-		
Online learning atmosphere	0/45**	-	
social presence	0/69**	0/39**	-

<۰/۰۱P<۰/۰۵ ،**P *

As Table 3 shows, the correlation between cognitive presence and online learning atmosphere is 0.45; The difference between cognitive presence and social presence is 0.69, which is significant at the significance level of P<0.01. Also, the correlation coefficient between online learning atmosphere and social presence is 0.39 at the significance level of P<0.01. In order to analyze the

structural equation model, the presuppositions were examined separately. Multivariate normality: One of the common criteria in examining the assumption of normality is the calculation of skewness and skewness statistics. According to Klein (2011), the absolute value of the skewness coefficient is less than 3 and the skewness coefficient is less than 10. Table 4 shows the results of the normality test of the variables.

Table 4. Descriptive indices of skewness and kurtosis to check the normality of the distribution of the scores of the research variables

Variables	crookedness		Elongation	
	Indicator	The standard error	Indicator	The standard error
operation event	1/88	0/13	2/88	0/26
Discovery	1/09	0/13	2/09	0/26
Integration	2/89	0/13	9/71	0/26
Segregation	0/91	0/13	0/56	0/26
Instructor behavior	1/52	0/13	1/61	0/26
Course structure	1/40	0/13	1/89	0/26
Course transparency	1/17	0/13	0/88	0/26
Student communication	0/92	0/13	0/57	0/26
Interface	0/98	0/13	0/59	0/26
Social cues	0/59	0/13	0/17	0/26
Shared presence	0/92	0/13	0/57	0/26
Intimacy	0/99	0/13	0/56	0/26
Immediacy	0/58	0/13	0/52	0/26
Learner interaction	0/90	0/13	0/57	0/26
learner performance	0/99	0/13	0/59	0/26

As Table 4 shows, the assumption of normality has been observed in all variables. Multiple non-collinearity: In order to check multiple collinearity, the correlation matrix and two tolerance and variance inflation factors (VIF) were used. The tolerance statistic is a ratio of variance that is not explained by other variables, and tolerance values less than 0.10 indicate multiple collinearity. Another problem of multiple collinearity is that the high correlation between predictor variables increases the standard error of their coefficients, this phenomenon is known as variance inflation factor and values greater than 10 indicate multiple collinearity. Examining the correlation matrix in Table 5 does not show coefficients above 0.80, so the assumption of multiple non-collinearity has been met. Table 5 also shows tolerance factor and variance inflation factor.

Table 5. tolerance factor and variance inflation factor for exogenous predictor and mediator variables

Variables	Multiple Collinearity Index	
	tolerance factor	Variance inflation factor
operation event	0/43	2/32
Discovery	0/74	1/86
Integration	0/67	1/13
Segregation	0/43	2/23
Instructor behavior	0/71	1/63
Course structure	0/47	2/26
Course transparency	0/73	1/62
Student communication	0/66	1/10
Interface	0/46	2/29
Social cues	0/71	1/01

Shared presence	0/62	1/40
Intimacy	0/49	2/39
Immediacy	0/78	1/65
Learner interaction	0/73	1/60
learner performance	0/59	1/11

As Table 5 shows, the tolerance values of none of the variables are not less than 0.10, and the variance inflation values of none of the variables are not higher than 10, so the assumption of multiple non-collinearity has been met. Outlier data: Another assumption of the structural equation is the absence of extreme data. There are two types of outlier data: univariate outlier data and multivariate outlier data. A box plot was used to check univariate outlier data and extreme data were observed (18 people). Mahalanobis distance was also used for predictor variables to check multivariate outlier data. If the maximum Mahalanobis distance is greater than the critical value of X2 with certain degrees of freedom (number of predictor variables) at the α=0.001 level, there is a problem of outlier data (Tabachnik and Fidel, 2007). The minimum and maximum Mahalanobis distance in this research was equal to 1.74 and 69.15. According to this critical X2 with 12 degrees of freedom (number of predictor variables) at α=0.001 level is equal to 29.81, there was a problem of multivariate outlier data. Therefore, at this stage, 4 people were removed from the analysis process and the number of samples was reduced to 261 people. Linearity: In the structural equation modeling method, it is assumed that there is a linear relationship between predictor variables. Since there is no simple score to test this hypothesis, the method of drawing scatter diagrams was used. In this study, by using the method of scatter diagrams, the assumption of linearity was confirmed. Figure 2 shows the standard coefficients of the route in the final pattern for the entire sample.

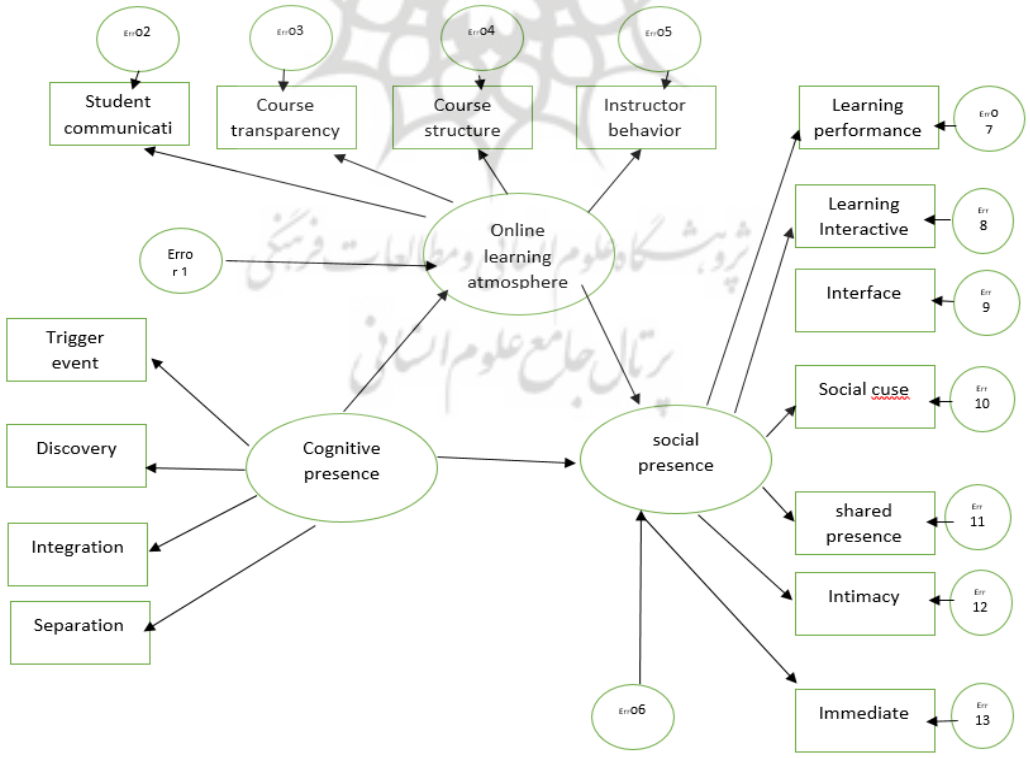

Figure 2. Standard coefficients of the route in the final pattern for the entire sample.

The fit of the final model is based on the indices of "Goodness of Fit Index (GFI), "Adjusted Goodness of Fit Index (AGFI), "Comparative Fit Index (CFI), "Normalized Bentler-Bonnet Fit Index (NNFI)" Tucker-Lewis fit index (TLI), incremental fit index (IFI), and relative fit index (RFI) and the value of "root mean square error of estimation" (RMSEA) were performed. The fit of the final model tested based on the fit indices showed that the indices of the initial model were χ^2=26.88, 8df=, IFI=0.095 (incremental fit index), TLI=0.91 (Tucker-Lewis fit index) respectively. , CFI=0.95, NFI=0.93 (Bentler-Bonnet's normalized fit index), RMSEA=0.11 (root mean square error of estimation) and PCLOSE=0.01 and the indices of the final model, respectively, χ^2=17.18, 7df = 0.97, IFI (incremental fit index), 0.94 TLI = (Tucker-Lewis fit index), 0.97 CFI = (comparative fit index), 0.95 NFI = (Bentler-Bonnet's normalized fit index), 08 RMSEA = 0.0 (root mean square of estimation errors) and PCLOSE = 0.06 (probability of closeness of fit). According to the above findings, it can be seen that the proposed model does not have a good fit in the RMSEA (Root Mean Square Errors of Estimation) index, so the model was modified by correlating the variables errors and the results showed that the final model has a good fit.

Table 6. Standard path coefficient related to the direct effects of variables in the final model

path	B	p
Cognitive presence → social presence	0/62	0/001
Online learning atmosphere → social presence	0/32	0/003
Cognitive presence → Online learning atmosphere	0/14	0/008

Based on the standard parameter coefficients and the corresponding significance level presented in the table. All paths in the final model are significant. In this way, there is a direct, positive and significant relationship between cognitive presence and social presence ($p \leq 0.05$ and $\beta = 0.62$); There is a direct, positive and significant relationship between cognitive presence and online learning ($p \leq 0.05$ and $\beta = 0.14$) and also the direct relationship between online learning atmosphere and social presence is also positive and significant (0.5). $p \leq 0$ and $\beta = 0.32$). In this research, to determine the significance of the indirect relationship between the variables and to investigate the mediating role of online learning, Sadaki's bootstrap test and Sodari's corrected bootstrap were used. For this purpose, first, the overall effect of the predictor variable was determined without the presence of a mediator, and the results showed that there is a significant relationship between cognitive presence and social presence without the presence of a mediator.

Table 7. Mediation test using the bootstrap method

path	overall effect	Indirect effect	direct impact	Result
Cognitive presence to social presence through online learning environment	B=0/61	B=0/19	B=0/14	partial mediator
	P=0/001	P=0/01	P=0/03	

When the mediator variable enters the model, if the direct relationship between the predictor variable and the criterion becomes non-significant, in this case the desired variable is a complete mediator. But if this relationship remains significant in the presence of the mediator variable, the role of the mediator variable will be partial. It was shown according to Table 7 in the indirect route. that with the presence of the mediator variable, the relationship between cognitive presence and social presence was still significant. This means that the atmosphere of online learning absorbs part of the effect of cognitive presence on social presence and partially mediates this relationship.

Discussion and conclusion:

The aim of the current research was to present a causal model of predicting social presence based on cognitive presence with the mediation of online learning. In the current research, cognitive presence was considered as an exogenous variable, online learning climate variable as a mediating variable, and social presence as an endogenous variable. The obtained data were analyzed based on appropriate statistical methods and valuable findings were obtained.

Statistical findings showed that the path of cognitive presence to social presence ($P<0.001$, $\beta=0.62$) is significant. This finding confirms the first hypothesis. This result is consistent with the findings of (Youssef and Ahmed, 2020; Kalman et al., 2020; Frei, Grifoni and Gajo, 2020; Pari Yadarshino et al., 2020). In these studies, the emphasis on the person's cognitive presence causes the feeling of ability and responsibility to increase in the person, and the level of social presence increases accordingly. Among the other reasons for the agreement, we can mention the type of sample that both genders were used in the mentioned studies and in the present study. Garrison et al. (2004) believe that the higher level of people's cognitive presence in online courses has a positive relationship with the increase in the probability of their social presence in online environments. People who have a high cognitive presence consider themselves to have more control over their online academic life and feel more responsible in the direction of their academic life, which makes the ground for their social presence provide more (Ashby, Kottman, & Darper, 2002). Another explanation that can be given for the first finding of this study is that high-level learning and the promotion of cognitive presence in adults can create social platforms (where there is a possibility of conflicting opinions and thoughts) such as social presence. The learner attributed (Shai, 2013, p. 202) that it facilitates communication and interaction and a positive and appropriate understanding of online classes.

Statistical findings showed that the path of cognitive presence to online learning environment is significant ($P<0.008$, $\beta=0.14$). Therefore, the second research hypothesis is confirmed. This result is consistent with the findings of (Garrison and Cleveland-Lance, 2005; Akiol and Garrison, 2011; Li, 2014; Chen, Li and Zheng, 2019; Xiu, Hrink and Bonk, 2019). One of the reasons that can be mentioned to explain this finding is that the cognitive and positive presence of learners in the online space can create a positive perception towards online learning in them, and in other words, lay the groundwork for understanding a The atmosphere of online learning should be optimal and favorable. Therefore, in explaining this finding and in agreement with the results of studies by Garrison and Cleveland-Lance (2005), Akiol and Garrison (2011), Li (2014), Chen, Li and Zheng (2019) and Xiu, Hrink and Bonk (2019) It can be said that when positive perceptual fields are created in the knowledge of the learners, this becomes a factor to create a favorable feeling towards the online learning atmosphere in them, and therefore, in general, it can be said that cognitive presence The main positive for Ardak is the optimal and favorable online learning environment. Research has shown that learners who felt a positive connection with other learners, the instructor, the learning environment, and other support factors were both more likely to succeed and completed the course more than those who did not feel this way. Ende have continued (Li and Zheng, 2019; Xiu, Herink and Bonk, 2019). Designing an online learning space in which people can interact with each other more and with better quality is something that can provide the basis for improving the presence-cognitive level of learners. Therefore, when the online learning environment is interactive, positive and attractive, the result is the improvement of the presence-cognitive level in the students of online courses (Akiol and Garrison, 2011).

The findings showed that with the presence of the mediating variable of online learning atmosphere, the relationship between cognitive presence and social presence was still significant. This means that the atmosphere of online learning absorbs part of the effect of cognitive presence on social presence and partially mediates this relationship. This result is consistent with the findings of (Alice, Seidel, and Grachner, 2019; Viranton, Kristiavan, and Faitriani, 2021). Alice, Seidel, and Grachner (2019) in their research entitled "Creating a positive online learning

atmosphere and conversational culture in the framework of a teacher learning community based on virtual space" concluded that in an online learning environment, what is of particular importance is the atmosphere. It is positive and desirable so that learners can welcome to attend this space. Among the other findings of the study of Alice, Seidel and Grachner (2019) was that when online learning is positive and favorable, the social presence of learners is proportionally more. And therefore, in the explanation of the present study and in alignment with the results of the study of Alice, Seidel and Grachner (2019), it can be said that for this reason, the online learning climate variable mediates the relationship between the cognitive-presence and the social presence of learners in online courses. It seems that online learning, when it is positive, has a positive effect on the mentality and thinking of the learners and in this way increases their social presence in online courses. In the study of Viranton, Kristiyavan and Faitriani (2021) titled the process of online learning atmosphere during the corona pandemic period, they showed that important variables such as self-efficacy, emotional presence, cognitive presence, lifestyle, facilities and social presence affect the level of interest. People are interested in participating in virtual and online courses. One of the most important findings of the study by Viranton, Kristiavan and Faitriani (2021) was that the online learning atmosphere and the perception that learners have of the online space can have different effects on their social and cognitive presence, in such a way that A positive perception of the online learning environment causes positive social presence and a negative and unfavorable perception of the online learning environment causes low social and cognitive presence of learners in online courses during the outbreak of the Corona pandemic. Among the other reasons to explain this finding and in line with the study of Virantun, Kristiavan and Faitriani (2021), it can be said that what has a significant effect on the social presence of learners is their perception of the learning atmosphere, and therefore it can be said that because the perception of The atmosphere of online learning has a direct role on the thinking and ability of learners and consequently has a positive effect on the level of social presence of learners in online courses, so for these reasons this variable has been able to show the relationship and correlation between cognitive presence and social presence. to mediate, albeit partially. Among the other reasons that can be stated to explain this finding and in general agreement with previous studies is that; First, in the past studies and the present study, the sample used was educated people (students). Also, in the past studies and the present study, both sexes have been used for the studied sample. In addition, in similar studies, as in the above study, the variable of online learning atmosphere was used as a mediating variable. Finally, in all the mentioned studies, the overall score of social presence and cognitive presence was used.

In general, the findings of the present study showed that the proposed model does not have a good fit in the root mean square of estimation errors. Therefore, the model was modified by correlating the errors of the current variable and the results showed that the final model has a good fit. The findings of the present study showed that cognitive presence has a direct, positive and meaningful relationship with social presence; Cognitive presence and online learning atmosphere have a direct, positive and meaningful relationship Also, the direct relationship between the atmosphere of online learning and social presence is also positive and meaningful. The findings also showed that in the indirect path, with the presence of the mediator variable, the relationship between cognitive presence and social presence was still significant and the online learning atmosphere absorbed part of the effect of cognitive presence on social presence and this relationship partially mediates.

Since every research conducted in the field of human issues is not free of limitations, the current research is not an exception to this rule and has limitations such as: Due to the fact that the participants of this study were online students of Payam Noor University in North Khorasan province, the results of this study cannot be generalized to other groups. Also, this study was conducted on students of online courses at Payam Noor University, the center of North Khorasan province, and as a result, generalization to other educational levels, other universities and

provinces should be done with caution. And finally, the current research, like many other researches, due to the use of self-reporting tools, instead of studying real behavior, it is possible that the participants use methods based on gaining social approval and avoiding the stigma related to inadequacy. Someone has encouraged.

According to the results of the present study, it is suggested that this study be conducted in different age groups to increase its generalizability. It is suggested to carry out this study in other academic courses and other universities and in different provinces. Since the present study was conducted only on students of online courses, it is better for future studies to use students of online and virtual courses as well and compare the fit of the model and the paths leading to social presence in two groups. This study used self-report tools, to reduce the errors caused by them, it is better to use other data collection methods in future studies. Also, from a practical point of view, it is suggested to emphasize the importance of cognitive presence in the formation of online learning atmosphere in improving the level of social presence of virtual course students.

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