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How to Promote Knowledge Sharing among EVC Members? — Based on Interactive Perspective of Modified TAM Model

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ABSTRACT

Compared with traditional learning methods, Educational virtual community has the incomparable advantage of knowledge diffusion with high efficiency and wide range. It is conducive to the knowledge acquisition and innovation of learners, and it provides a platform for learners to change their roles from the passive recipient of information to the main participant of knowledge acquisition. Based on the interactions between users' personal, technical and organizational characteristics, a modified technology acceptance model was presented in this paper to explain the willingness and behavior of knowledge sharing in EVC in order to propose and validate the effects of perceived usefulness, perceived ease of use, and psychological ownership on the willingness and behavior of knowledge sharing. In this research, the methods of interviewing and questionnaires with 40 questions included have adopted and 334 members from 32 educational virtual communities were surveyed. Based on the 326 valid samples, the hypothesis of research be tested with software SPSS 22.0 by structural equation model. Empirical research found that: Perceived usefulness and perceived ease of use has remarkable positive impact on knowledge sharing willingness, and perceived usefulness with greater function can significantly promote perceived ease of use; psychological ownership can affect not only the knowledge sharing behavior through the knowledge sharing willingness, but also the behavior directly; the knowledge sharing willingness plays a fully mediating role between perceived usefulness and knowledge sharing behavior, while there exist the significant mediating effects between perceived ease of use and knowledge sharing behavior, and between psychological ownership and knowledge sharing behavior. Based on the conclusion of this research, the interactions between different factors should be taken into account in order to advance the willingness and behavior of knowledge sharing among EVC members and the perceived usefulness, perceived ease of use and psychological ownership level of community members should be proactively promoted.

Keywords: educational virtual community (EVC), knowledge sharing, psychological ownership, perceived usefulness; perceived ease of use

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State of the literature

- As a comprehensive, multi-functional teaching and learning environment based on E-learning, EVC is of great significance in the enhancement of learners' interest and the promotion of knowledge exchange and innovation, which is the important direction of educational development in the future.
- The high-quality knowledge information actively shared by community members is the key to the existence of EVC; but in reality, the circumstances of insufficient contribution by members and the shortage of knowledge supply affect the development of EVC.
- There are a lot of factors affecting knowledge sharing of EVC members, so in order to promote the willingness and behavior of knowledge sharing of EVC members, not only should the functions of various factors be improved, but also the interactions between community users, community systems, and organizational relationships should also be considered.

Contribution of this paper to the literature

- Based on the interactions between users' personal characteristics, technical characteristics and organizational characteristics, a modified technology acceptance model was proposed in this paper to provide a new perspective for the explanation of the willingness and behavior of EVC members' knowledge sharing.
- Perceived usefulness and perceived ease of use can positively affect knowledge sharing willingness, and perceived usefulness with greater function can significantly promote perceived ease of use; psychological ownership can affect not only the knowledge sharing behavior through knowledge sharing willingness, but can also affect the behavior directly.
- Based on the constructed theoretical model and empirical conclusions, the suggestions to improve knowledge sharing in EVC were offered from the enhancement of EVC members' perceived usefulness, perceived ease of use, psychological ownership level, etc.

INTRODUCTION

Jerome Bruner pointed out: "the acquisition of knowledge is an active process, so learners should be the active participant in the process of knowledge acquisition rather than the passive recipients of information". With the advent of knowledge economy and the Internet era, the emergence of education virtual community (EVC) provides a platform for learners to change their roles from passive recipients of information to the main participant of knowledge acquisition, resulting in the profound transformation of the content and form of "knowledge". Unlike general learning community, the educational virtual community is a comprehensive, multi-functional teaching and learning environment based on E-learning. In educational virtual community, the network technology across time and space provides a free and open teaching environment for learners, and for the common education goal, the community members (mainly including teachers and students) compose the various types of learning communities to obtain knowledge through special subject research and study, interactive collaboration and resource sharing so as to complete the task of learning together and form an interactive relationship in the process.

As a virtual community of interest, EVC is incomparable to traditional learning methods, and has the advantages of knowledge diffusion with high efficiency and wide range. Under the guidance of common education goal, common learning concept and common learning needs, learners communicate with each other, establish a trust relationship with each other, and actively carry out the collaborative sharing of knowledge to achieve the continuous improvement of self-cognitive ability and practical ability. Efficient knowledge sharing is the foundation of the survival and development of educational virtual communities. On the one hand, all the resources within EVC come from the knowledge shared by users, so the personal abilities of learners are improved through effective knowledge sharing, thus promoting the development of organization; on the other hand, the main purpose of learners to carry out community communication is to obtain various learning resources, and realize the transformation, absorption and integration of knowledge through cooperative and autonomous learning to improve knowledge and skills. Therefore, enhancing the willingness and behavior of learners to share knowledge,

Table 1. Basic Theory of EVC Knowledge Sharing

Theoretical perspective	Main points	Representative literature
Social cognitive theory	Knowledge sharing behavior is affected by personal motivation and self-efficiency. The better the expectations of the results are, the more the user's knowledge sharing willingness can be stimulated; the higher the self-efficiency of user is, the better the knowledge sharing behavior is.	Hsu et al. (2007); Chou et al. (2009); Chen & Hung (2010); Tseng & Kuo (2014); Shang (2012)
Social capital theory	EVC is a network of social relationship, and the main purpose of users to share knowledge is to obtain the relational, structural and cognitive capitals from the community. Knowledge sharing is affected by the intensity of social relationship, reciprocity and identification between members.	Nahapiet & Ghoshal (1998); Wasko & Faraj (2005); Chang & Chuang (2011); Zhao et al. (2012); Tseng & Kuo (2014)
Social exchange theory	Knowledge sharing is a social exchange behavior for benefit or repay, which can be promoted by reciprocity and equity.	Paxton (1999); Seers (2014); Blaud (2004); Kankanhalli (2005); Li (2013)
Social behavior theory	Knowledge sharing is an altruistic behavior, and psychological capital, trust, organizational commitment, etc., are the main factors affecting sharing willingness.	Chou & Chang (2008); Chao et al. (2010); Yu (2014)
Knowledge governance theory	Knowledge characteristics, organizational structure, formal and informal knowledge governance arrangements can affect the willingness and effect of knowledge sharing in the organization.	Nonaka (1994); Zander & Kogut (1995); Grandori (2001); Foss (2008, 2012)
Planned behavior theory	The generation of behavior directly depends on the intention of a person to perform a particular action. Subjective norms and perceived behavioral control are positively related to users' willingness to share knowledge.	Ajzen (1988, 1991); Chou & Chang (2008); Chao et al. (2010); Xia (2015)
Technology acceptance model	The characteristics of the network system will influence user's cognition and behavior. Perceived usefulness and perceived ease of use of virtual communities are the key factors for users to accept this new type of tool for information exchange.	Davis (1989, 1993); Adams (1993); Zhang (2003); Yang (2011); Chiu (2011)

promoting the dissemination and transformation of knowledge within the community, and ultimately creating new knowledge are the foundation of sustainable development of EVC.

However, the actual research shows that most contribution of EVC users exist within the "90-9-1" phenomenon; that is to say, 90% of the users basically do not contribute, 9% of the users contribute occasionally, and only 1% of the users contribute often. The low contribution rate and the decline of participation willingness have become the key to restrict the development of EVC, so webmasters and educational organizers need to figure out the factors that affect users' knowledge sharing behavior so as to take effective measures to enhance users' participation and knowledge sharing willingness, thus ultimately enhancing the community value and realizing the goal of education. Unlike the existing researches that focus on the interaction between user and characteristics of knowledge, a modified technology acceptance model was proposed in this paper based on the interactions between users' personal characteristics, technical characteristics and organizational characteristics, and the model was carried out with empirical test to explain the factors that affect the willingness and behavior of EVC knowledge sharing, and some suggestions to enhance the level of knowledge sharing in EVC were also offered.

THEORETICAL BASIS AND MODEL CONSTRUCTION

Knowledge sharing is a process of knowledge exchange, which includes four factors; namely, knowledge, medium, recipient of knowledge, and knowledge-owner. In this process, the owner of knowledge expresses tacit and explicit knowledge in some form, which were shared to the recipients through medium, in order to realize the dissemination and transformation of knowledge between different subjects, and then ultimately create new knowledge and improve the knowledge level of the organization. Based on the existing researches, the theories related to knowledge sharing of EVC user and influencing factors mainly involve social cognitive theory, social capital theory, planned behavior theory, knowledge governance theory, etc., as shown in [Table 1](#).

According to the above literatures, it is found that there are four main factors affecting user knowledge sharing: knowledge characteristics, organizational characteristics, individual characteristics, and technical

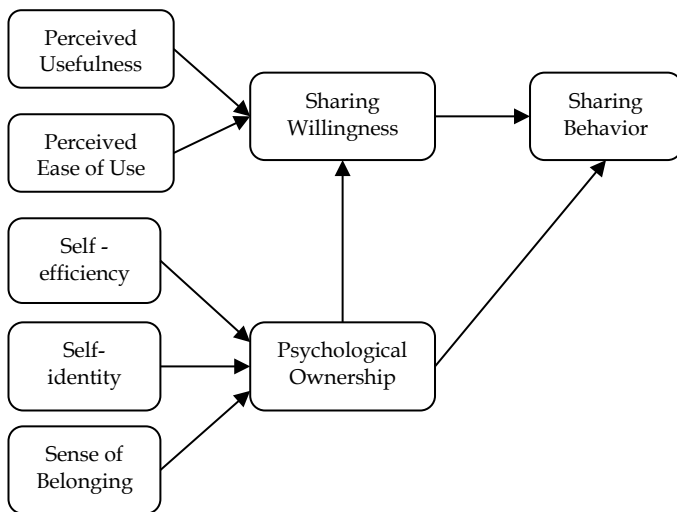


Figure 1. Modified TAM and Influencing Factors of EVC Knowledge Sharing

characteristics. Among them, the knowledge characteristics reflect the influence of complexity, fuzziness, embedability, codability, viscosity and distribution of knowledge on sharing; organizational characteristics discuss the influence of organizational structure, organizational culture, organizational climate, organizational system, trust relationship, leadership style on sharing willingness; individual characteristics reflect the influence of individual competence, individual motivation, self-efficiency and interactive relationship of knowledge transmitters and recipients of knowledge in EVC; technical characteristics as the physical basis of community and the transmission medium of knowledge reflect the space and means of knowledge sharing, which determine the convenience of knowledge diffusion, and the availability as well as usefulness of knowledge acquisition in community.

Unlike general virtual learning community, EVC with teachers and students as main users has definite learning purpose and cultural commonality, and the codability of shared knowledge is also relatively strong. Knowledge sharing behavior in EVC is a process in which two or more users in the community involve knowledge supply and reception, while in this process, users need to exchange information and knowledge with other users by means of electronic equipment, and perceived usefulness and perceived ease of use of the network technology have an important impact on their willingness to participate. Therefore, the influences of knowledge characteristics, individual characteristics, organizational characteristics and technical characteristics on knowledge sharing behavior in EVC are not at the same level. The success of knowledge sharing depends on the quantity and quality of interaction between users, and the willingness and ability of users to apply knowledge. Among them, the user's psychology, attitude and ability play a direct role, and the influences of knowledge characteristics and organizational characteristics are not critical, which are reacted by affecting user's personal characteristics. Attention is fixed on the interactions of users' individual characteristics, technical characteristics and organizational characteristics due to this characteristic of EVC knowledge sharing, thus a modified technology acceptance model was proposed in this study to explain the influencing factors of EVC knowledge sharing (as referred to in **Figure 1**).

In the above model, the knowledge sharing behavior of EVC user firstly depends on his intention of knowledge sharing; that is to say, knowledge can be communicated and transformed in EVC only when the user is willing to share his knowledge. The knowledge sharing willingness of user is mainly affected by the technical characteristics of EVC system, user's personal characteristics and organizational characteristics. Based on the classic technology acceptance model (TAM), the interaction between personal characteristics of user and technical characteristics of system can be described in two aspects including the perceived usefulness that reflects the extent to which the user considers the use of EVC to improve his effectiveness of knowledge exchange and the perceived ease of use that refers to the extent to which users think it is easy to share knowledge by using EVC. The interaction

between user's personal characteristics and organizational characteristics mainly reflects the social interaction characteristics of EVC knowledge sharing and acquisition, which can be explained by the theory of psychological ownership. In the process of EVC knowledge sharing, the users complete the acquisition, absorption and construction of knowledge through the communication and cooperation with each other, which not only helps to improve learner's cognitive level and self-efficacy, but also effectively improves user's willingness to participate and sharing motivation with the improvement of personal cognitive level and the enhancement of social presence, and then the community has become a place for members to engage in emotional communication and collaborative learning, thus resulting in the friendly and cooperative atmosphere with good senses of belonging and identity. Self-efficacy, sense of belonging and self-identity as the important factors affecting users' knowledge sharing are the concentrated reflection of psychological ownership in EVC knowledge sharing. Self-efficacy refers to user's degree of confidence in being able to engage in knowledge sharing behavior; sense of belonging refers to the emotional attachment of users to EVC, namely, the psychological state that put yourself in the virtual community of EVC; self-identity means that the user can psychologically identify with community value that will be connected with self-identity so as to find their own position in EVC and set up personal label.

RESEARCH HYPOTHESIS

Influence of Perceived Usefulness and Perceived Ease of Use on EVC Users' Willingness of Knowledge Sharing

Perceived usefulness is the degree to which users consider academic virtual communities to improve their learning performance, and perceived ease of use is the ease of users using academic virtual communities. The technical characteristics of EVC affecting user's perception of community usefulness and ease of use, can determine user's willingness to share knowledge, thus indirectly affecting user's knowledge sharing behavior. The success of knowledge sharing with user as main body is affected by the technical operation level of knowledge contributor (Wask & Faraj, 2005), and the ease of use and the ease of learning of technology should be paid attention to because of the difference in information capacities of virtual community members (Cheung, 2004). Ease of use can increase the speed of knowledge exchange among members and save time for knowledge exchange, so users' willingness of knowledge sharing could be greatly improved when they think EVC is easy to use; and the usefulness of this system perceived by user will have an impact on the intention of continued use through the satisfaction with information technology. Perceived usefulness and ease of use are the important reasons for promoting the generation of users' willingness (Zhao, 2010), and the knowledge sharing of actual users and potential users is affected by perceived usefulness and ease of use. At the same time, the TAM model proposed by Davis (1989), the TAM2 model proposed by Venkatesh (2000) and the UTAUT model have verified that perceived ease of use has a positive effect on perceived usefulness. The proposed research hypotheses H1, H2 and H3 are as follows:

- H1:** Perceived ease of use has a positive effect on perceived usefulness;
- H2:** Perceived usefulness has a positive effect on knowledge sharing willingness;
- H3:** Perceived ease of use has a positive effect on knowledge sharing willingness.

Influence of Psychological Ownership on EVC Users' Willingness of Knowledge Sharing

The concept of psychological ownership proposed by Pierce et al. (2004) originates from the study of organizational behavior about employee stock ownership plan, which is defined as an experience of possession; namely, "the state that an individual feels the object (of psychological ownership) seems to be owned by him or her". Furby (1991) pointed out that this psychological level of ownership is an experiential sense of possession, which enables people to regard possession as an extension of self, and then affects attitudes, motivations, and behaviors of people. Wilpert et al. (1991) found that employee's psychological ownership of an organization arouses the altruism spirit of the employee, and the employee may initiatively help others, care for the organization, share knowledge to benefit the organization. Furby (1978) pointed out in the research that psychological ownership

would make individuals generate the willingness and behavior to improve organizational performance, such as knowledge sharing, by stimulating the individual's sense of responsibility towards the organization. Han (2010) and others believed that the individual will be more willing to invest time and effort to participate in the virtual community to share knowledge and make contribution under the influence of psychological ownership that can directly or indirectly affect the individual's knowledge sharing behavior. The proposed research hypotheses H4 and H5 are as follows:

H4: Psychological ownership has a positive effect on EVC user's willingness of knowledge sharing;

H5: Psychological ownership has a positive effect on user's behavior of knowledge sharing.

Knowledge Sharing Willingness Determines Sharing Behavior

The willingness to share knowledge is a behavioral intention of EVC users to share knowledge, which does not necessarily lead to knowledge sharing. Willingness and behavior are likely to deviate from each other under different external conditions. Based on the TAM model and the extended TAM2 model proposed by Venkalesh & Davis (2000), it can still be assumed that the knowledge sharing behavior of EVC users is determined by their sharing willingness, and the following hypothesis H6 can be obtained:

H6: EVC user's willingness of knowledge sharing has a positive effect on knowledge sharing behavior.

RESEARCH METHODS AND VARIABLE MEASUREMENTS

The method of questionnaire investigation was adopted in this study and all the variables adopted validated scales to ensure the reliability and validity of the questionnaire. Among them, the scales including 8 items of perceived usefulness and perceived ease of use referred to the scales of Davis (1989) and Dabholkar & Bagozzi (2002); the scale including 5 items of sharing intention referred to the scales designed by Cho (2010); the scale including 6 items of sharing behavior referred to the scale designed by Shi (2010), Liu (2010) and others. Psychological ownership was measured mainly from three dimensions including self-efficacy, self-identity and sense of belonging, among which, the scale including 5 items of self-efficacy referred to the scale designed by Kankanhalli et al. (2005); the scale including 4 items of self-identity referred to the scale designed by Han (2010); the sense of belonging including 4 items referred to the scale designed by Avey et al. (2009). All scales were measured by using five-point numerical value of Likert, 1-5, respectively, "very disagree", "relatively disagree", "general", "relatively agree", and "quite agree"; that is to say, the higher the score is, the more the description of this item is agreed.

The respondents were registered users who were and are using EVC, including students, teachers and parents. A total of 334 questionnaires were recovered and 326 valid questionnaires were obtained with the effective recovery rate of 97.6% after eliminating the unqualified questionnaires with obvious tendency. The statistical information about respondents is shown in **Table 2**.

As shown in **Table 2**, the proportion of men and women who participated in the survey was relatively average with the concentrated age of under 25 years old, accounting for 83.74%; in terms of registered identity, the students in high school and university as the main part of registered users accounted for 88.83%, and there were also some teachers and parents; 82.39% of the respondents visited EVC 1-3 times a week, indicating the user's frequency of use is lower with low activity.

Table 2. Basic Information about Respondents

Demographic variables		Number of people	Percentage (%)
Gender	Male	154	46.31
	Female	172	53.69
Age	< 18 years old	216	66.26
	18-25 years old	57	17.48
	26-35 years old	24	7.36
	36-45 years old	18	5.52
	> 45 years old	11	3.37
Registered identity	Middle school student	8	2.45
	High school student	205	62.88
	College students and above	52	15.95
	Teachers	37	11.35
	Parents and others	24	7.36
Number of weekly access	≤1 times	52	15.95
	2-3 times	184	56.44
	4-6 times	48	14.72
	7-9 times	25	7.67
	≥10 times	17	5.21
Time to join the community	less than 1 month	95	29.14
	1-6 months	59	18.10
	6-12 months	51	15.64
	1-3 years	89	27.30
	over 3 years	32	9.82

ANALYSIS OF RESEARCH RESULT

Reliability and Validity Test

The reliability of each scale was tested by using SPSS 22.0 software, while the internal consistency reliabilities of perceived usefulness, perceived ease of use, self-efficacy, self-identity, sense of belonging, sharing willingness and sharing behavior are all greater than 0.7, and the Cronbach's α values of sub variables and overall scale were between 0.777-0.955, indicating that the internal consistency of the scale is higher with better reliability, which is suitable for the next step of research. The validity was measured from two aspects including factor load value (loading), which was between 0.625-0.867, and average extraction variance (AVE), which was between 0.533-0.678, and both of them were greater than 0.5 with better convergent validity. The discriminant validity was tested by comparing the square root of AVE and the correlation coefficient between variables. If the square root of AVE of a variable is greater than all the correlation coefficients associated with the variable, the discriminant validity of the variable is proved to be good. The correlation coefficients between variables are shown in [Table 3](#). The square roots of AVE of all variables are greater than the correlation coefficients between related variables, and the discriminant validity of the model is better.

Table 3. Mean Value, Standard Deviation and Correlation Coefficient of Variable

Mean Value	M	SD	1	2	3	4	5	6	7
Perceived usefulness	3.801	0.644	0.801						
Perceived ease of use	3.873	0.629	0.408**	0.736					
Self-efficiency	3.532	0.611	0.548**	0.587**	0.804				
Self-identity	3.351	0.691	0.408**	0.411**	0.589**	0.778			
Sense of belonging	3.361	0.679	0.496**	0.413**	0.378**	0.423**	0.755		
Sharing willingness	3.911	0.611	0.538**	0.362**	0.361**	0.407**	0.410**	0.782	
Sharing behavior	3.490	0.627	0.545**	0.553**	0.384**	0.344**	0.567**	0.329**	0.730

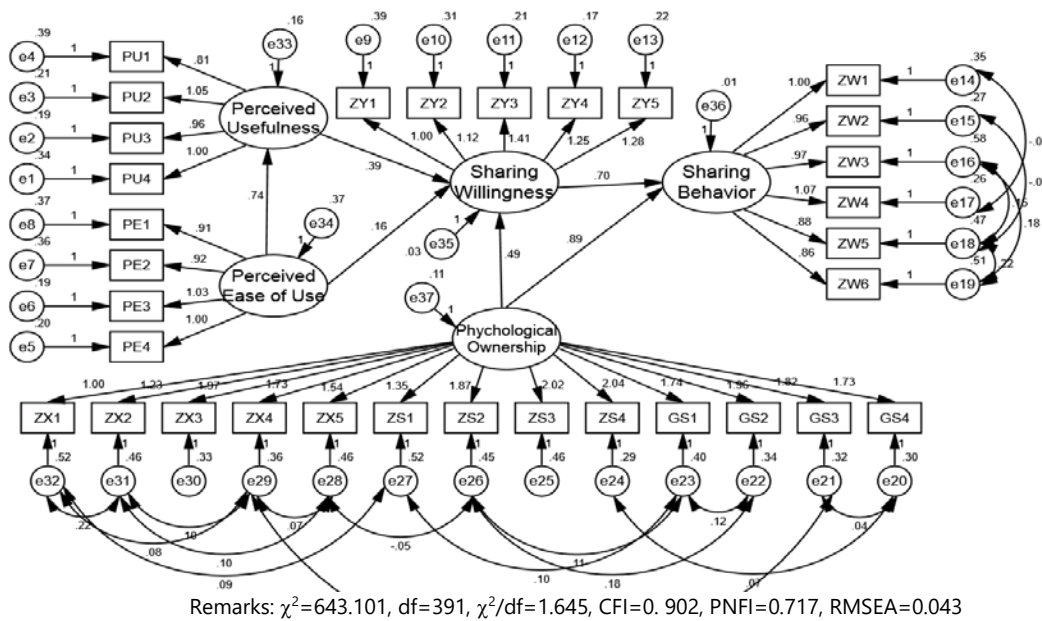


Figure 2. Modified Model Diagram

Multiple linear problems may exist due to the higher correlation coefficient between individual variables, so it is necessary to test whether there is a serious interdependence between the model variables. SPSS 22.0 was used to test the variables, and the results showed that VIF (variance inflation factor) is between 1.845-3.356 and less than 10; the tolerance is between 0.256-0.573 and more than 0.1 without multiple linear relationships. According to the test by the Harman single factor, it was found that the first principal component obtained without rotation was within the acceptable limits, and there was no common variance problem.

Descriptive Statistical Analysis and Correlation Analysis

The mean values, standard deviations, and Pearson correlation coefficients between variables are shown in Table 3, and it can be concluded from Table 3 that there are the significant correlations between the variables in this study, so the hypotheses can be preliminarily supported.

Structural Equation Modeling

Based on the reliability and validity tests with the technology acceptance factor constructed between them, the relationship model between psychological ownership and sharing behavior, and the research hypotheses, AMOS 20.0 was used to establish and modify the initial model. The ideal fitting effect of the model is achieved after modification, as shown in Figure 2 and Table 4.

Table 4. Estimation Results of Path Coefficient and Factor Loading in Modified Model

	Estimate	S.E.	C.R.	P	Corresponding hypothesis	Test result
Perceived usefulness ← Perceived ease of use	0.725	0.070	10.301	***	H1	Getting support
Sharing willingness ← Perceived usefulness	0.392	0.067	5.878	***	H2	Getting support
Sharing willingness ← Perceived ease of use	0.162	0.050	3.248	***	H3	Getting support
Sharing willingness ← Psychological ownership	0.480	0.099	4.876	***	H4	Getting support
Sharing behavior ← Psychological ownership	0.701	0.095	7.410	***	H5	Getting support
Sharing willingness ← Sharing behavior	0.882	0.155	5.694	***	H6	Getting support

Table 5. Result of Mediating Effect Test

Path	$Y = cX + e_1$	$M = aX + e_2$	$Y = c'X + bM + e_3$	
	c	a	c'	b
Perceived usefulness → sharing willingness → sharing behavior	0.536***	0.630***	0.135	0.636***
Perceived ease of use → sharing willingness → sharing behavior	0.641***	0.754***	0.225***	0.552***
Psychological ownership → sharing willingness → sharing behavior	0.837***	0.685***	0.647***	0.278***

Mediating Effect Test

The SPSS 22.0 was adopted to test the mediating effect of knowledge sharing willingness with reference to the testing idea of Wen et al. (2014), as shown in **Table 5**. It can be seen that knowledge sharing willingness plays a complete mediating role between perceived usefulness and knowledge sharing behavior, and plays a significant mediating role between perceived ease of use and knowledge sharing behavior, and between psychological ownership and knowledge sharing behavior.

DISCUSSION

As a comprehensive, multi-functional teaching and learning environment based on E-learning, EVC is of great significance in the enhancement of learners’ interest and the promotion of knowledge exchange and innovation, which is the important direction of educational development in the future. There are a lot of factors affecting knowledge sharing of EVC members, so in order to promote the willingness and behavior of knowledge sharing of EVC members, not only should the functions of various factors be improved, but also the interactions between community users, community systems, and organizational relationships should be considered. Based on the interactions between users’ personal characteristics, technical characteristics and organizational characteristics, a modified technology acceptance model was proposed in this paper to explain the willingness and behavior of knowledge sharing in EVC, in order to propose and validate the effects of perceived usefulness, perceived ease of use, and psychological ownership on the willingness and behavior of knowledge sharing.

In order to increase the willingness and behavior of knowledge sharing of EVC members, and promote the sustainable healthy development of EVC, the following measures can be taken: The first is to enhance the ease of use of EVC websites. The user’s willingness to share knowledge is affected by the friendliness of the EVC operating interface and the convenience of the conditions for sharing. Managers should be user centric, improve the ease of operation and the friendliness of interface, and regularly maintain community websites to enhance user

access and knowledge sharing experience. The second is to strengthen the user's perception of usefulness. The usefulness of EVC embodies in the quality and the level of provided knowledge, and the learners are more willing to share knowledge when they feel that the educational virtual community can effectively meet the content requirements of their learning. EVC administrators can increase the attraction and improve the level and quality of knowledge by inviting well-known educational scholars, outstanding students and others to enter the site; regularly conduct the activities of thematic exchange, learning and discussion or knowledge contest to enhance user's interest of participation and attract more learners to join; strengthen the classification management of knowledge in EVC, improve the capability and search ability of knowledge through the electronic whiteboard, mind map and other software, and enhance the perceived usefulness of EVC knowledge. Finally, improve the psychological ownership of EVC users. The empirical test of the three dimensions of psychological ownership shows that users are more willing to share knowledge with more confidence in their abilities, stronger emotional attachment to EVC and more sense of personal existence. EVC managers can enhance learners' willingness and behavior by improving their sense of community belonging, sense of community attachment, identification of community identity and self-efficacy, for example, optimize community hierarchy and provide higher privilege level for the members who can share the knowledge with high quality so as to strengthen their self-identity; set up reward points and evaluation system, and the member who is willing to help others and actively share knowledge is rewarded with points; strengthen emotional connection and trust relationship of community, create a good learning atmosphere and fair mechanism and enhance the member's psychological sense of "ownership".

CONCLUSION

Based on the interactions between users' personal characteristics, technical characteristics and organizational characteristics, according to the educational community characteristics of EVC, a modified technology acceptance model was proposed in this study to explain the influencing factors of EVC knowledge sharing, which has validated the positive effect of the interactions between individual characteristics and technical characteristics, and between individual characteristics and organizational knowledge sharing behavior, as well as the mediating role of knowledge sharing willingness in technology acceptance factor and psychological ownership. Empirical research found that: Perceived usefulness and perceived ease of use can positively affect knowledge sharing willingness, and perceived usefulness with greater function can significantly promote perceived ease of use; psychological ownership can affect not only the knowledge sharing behavior through the knowledge sharing willingness, but also affect the behavior directly; the knowledge sharing willingness plays a fully mediating role between perceived usefulness and the knowledge sharing behavior, while there exists significant mediating effects between perceived ease of use and knowledge sharing behavior, and between psychological ownership and knowledge sharing behavior. In order to promote the willingness and behavior of knowledge sharing among EVC members, the interactions between different factors should be taken into account, and the perceived usefulness, perceived ease of use and psychological ownership level of community members should be positively promoted.

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REFERENCES

- Avey, J. B., Avolio, B. J., Crossley, C. D., & Luthans, F. (2010). Psychological ownership: theoretical extensions, measurement and relation to work outcomes. *Journal of Organizational Behavior*, 30(2), 173-191. doi:10.1002/job.583
- Bhattacharjee, A. (2001). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision Support Systems*, 32(2), 201-214.

- Chen, C. J., & Hung, S. W. (2010). To give or to receive? Factors influencing members' knowledge sharing and community promotion in professional virtual communities. *Information & Management*, 47(4), 226-236. doi:10.1016/j.im.2010.03.001
- Chen, M. H. (2015). Research on the Willingness of Students' Sustainable Knowledge Sharing in Academic Virtual Community. *Information and Documentation Services*, 36(1), 41-47.
- Cheung, C. M. Y., Shek, S. P. W., & Sia, C. L. (2004). Virtual Community of Consumers: Why People Are Willing to Contribute. *Proceedings of the 8th Pacific Asia Conference on Information Systems*, 2100-2107.
- Chou, C. H., Wang, Y. S., & Tang, T. I. (2015). Exploring the determinants of knowledge adoption in virtual communities: a social influence perspective. *International Journal of Information Management*, 35(3), 364-376. doi:10.1016/j.ijinfomgt.2015.02.001
- Davis, Fred D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Society for Information Management and the Management Information Systems Research Center*. doi:10.2307/249008
- Furby, L. (1978). Possession in humans: exploratory study of its meaning and motivation. *Social Behavior & Personality an International Journal*, 6(1), 49-65. doi:10.2224/sbp.1978.6.1.49
- Gang, K. W., & Ravichandran, T. (2015). Exploring the determinants of knowledge exchange in virtual communities. *IEEE Transactions on Engineering Management*, 62(1), 89-99. doi:10.1109/TEM.2014.2376521
- Huang, W., & Zhang, P. (2016). Research on the influencing factors of knowledge sharing behavior of virtual community users. *Information Science*, 34(4), 68-73.
- Jin, H. (2015). Research on the mechanism of knowledge sharing of college teacher education blog based on DTPB - an empirical study from real users and potential users. *Journal of Intelligence* (10), 175-182.
- Nielsen, J. (2006a). Participation inequality: encouraging more users to contribute. *Quaderns De Filologia Estudis Literaris*, 2688(3), 11-25.
- Nielsen, J. (2006b). The 90-9-1 Rule for Participation Inequality in Social Media and Online Communities. Retrieved from <http://www.nngroup.com/articles/participation-inequality>.
- Pierce, J. L., Kostova, T., & Dirks, K. T. (2001). Toward a theory of psychological ownership in organizations. *Academy of Management Review*, 26(2), 298. doi:10.5465/AMR.2001.4378028
- Han, T. S., Chiang, H. H., & Chang, A. (2010). Employee participation in decision making, psychological ownership and knowledge sharing: mediating role of organizational commitment in Taiwanese high-tech organizations. *International Journal of Human Resource Management*, 21(12), 2218-2233. doi:10.1080/09585192.2010.509625
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46(2), 186-204. doi:10.1287/mnsc.46.2.186.11926
- Wasko, M. L., & Faraj, S. (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly*, 29(1), 35-57.
- Yang, S. C., & Farn, C. K. (2009). Social capital, behavioral control, and tacit knowledge sharing – a multi-informant design. *International Journal of Information Management*, 29(3), 210-218. doi:10.1016/j.ijinfomgt.2008.09.002
- Yao, C. Y., & Fang, Y. C. (2015). Understanding social capital, team learning, members' e-loyalty and knowledge sharing in virtual communities. *Total Quality Management & Business Excellence*, 26(5-6), 619-631. doi:10.1080/14783363.2013.865918
- Yilmaz, R. (2016). Knowledge sharing behaviors in e-learning community: exploring the role of academic self-efficacy and sense of community. *Computers in Human Behavior*, 63, 373-382. doi:10.1016/j.chb.2016.05.055
- Zhang, Y., Fang, Y., Wei, K. K., & Chen, H. (2010). Exploring the role of psychological safety in promoting the intention to continue sharing knowledge in virtual communities. *International Journal of Information Management*, 30(5), 425-436. doi:10.1016/j.ijinfomgt.2010.02.003