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Exploring the Factors of Undergraduate Learners' Engagement and Knowledge Sharing for Sustainable hMOOC Learning

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ABSTRACT

In the post-pandemic era, the application of MOOC is essential to improve the quality and flexibility of higher education. This study aims to explore how factors from personal, environmental, and social level influence learners' engagement and knowledge sharing in the context of hybrid MOOC (hMOOC) learning. Through random sampling, this study adopted a self-administered questionnaire to survey undergraduate students in China based on structural equation modeling (SEM). The results revealed motivation belief, system and relational quality had positive effects on learner engagement while content, instructor and relational quality also exerted positive effects on knowledge sharing. Meanwhile, learner engagement positively influenced knowledge sharing in hMOOC learning. However, system quality significantly affected knowledge sharing and instructor quality significantly affected learner engagement. Furthermore, content quality indirectly affected learner engagement via motivation belief. And learner engagement mediated the relationship between motivation belief and knowledge sharing behavior. These findings suggested that instructors, MOOC technician and administrator should take into consideration personal, environmental, and social factors to redesign an active engaging and sharing learning environment for achieving hybrid learning success.

1. INTRODUCTION

Nowadays, with the rapid development of information technology and Internet, great importance has been attached to improving the accessibility and adaptability of education, bringing down the educational costs, and even transforming traditional methods to promote lifelong learning and education quality [1]. Thus, e-learning such as online or blended learning has become prevalent towards the learners in higher education. Massive Open Online Course (MOOC) providers entered another stage of fast development in 2020 through absorbing large audience for the free online courses offered by top universities due to pandemic, which made 2020 named as "the Second Year of the MOOC" [2]. MOOC can be subdivided into cMOOC (first generation based on connectivism), xMOOC (second generation based on cognitive behaviorism), hMOOC (third generation based on social constructivism) and etc. [3]. In the era of post pandemic, the sustainability of MOOC is under a hot discussion. hMOOC is developed by integrating MOOC into on-campus learning and taken as MOOC 3.0 [4]. Thus, hMOOC belongs to a kind of blended learning, aiming to enhance more interaction, engagement, and knowledge sharing.

In the previous literature, focuses are on discussing many advantages of hMOOC over cMOOC and xMOOC, including increased flexibility and personalization due to diversified learning pathways, rich MOOC resources as digital textbooks, a balanced mixture of high-quality instructional materials and social learning experiences [3]. Some scholars make a comparison between hMOOC learning and traditional learning [5] or explore the design of hMOOC and discuss its effectiveness [4]. Anders [3] summarized 3 types of hMOOCs: content-based hybrids, community and task-based hybrids, and network-based hybrids. Perez-Sanagustin et al. [6] proposed 4 types of models from the perspective of institution support based on the curriculum, where MOOC is considered as service, replacement, driver or added value. Nevertheless, most of these literatures pay more attention to theoretical discussion of hMOOC design instead of empirical research of hMOOC success.

Meanwhile, learner engagement is regarded as one of important determinants affecting the success of MOOC learning, which has gained increasing attention in recent years. However, there are few studies exploring the learner engagement of hMOOC [7]. Admittedly, there exist some surveys inquiring into internal factors affecting learner engagement, such as motivation belief and engagement [8], or external factors such as system or technical factors [9], the majority of which is for traditional classroom learning or online learning rather than blended learning. Thus, more research is needed to understand learner engagement in hybrid contexts, particularly in hMOOC learning. Furthermore, knowledge sharing is often explored in commercial and public fields for donating and collecting knowledge within a group or organization. Relatively few studies are concentrated on the impact of knowledge sharing in the education sector. However, MOOC and hMOOC learning provides more opportunities for learners to exchange their experience and information through

MOOC platform, which is essential to ensure the quality of MOOC and hMOOC learning. Therefore, it is significant to discuss knowledge sharing in the education field, reflecting learners' active online learning process.

To address the above gap, this paper aims to explore undergraduate learners' actual perceptions towards hMOOC learning through quantitative research and to incorporate personal, environmental, and social perspectives to determine their effect on learner engagement and knowledge sharing. The results of the study will not only make theoretical contribution through establishing a functioning mechanism but also provide practical implications for administrators and practitioners to enhance hMOOC success.

2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 Learner engagement

The past literature has demonstrated different indicators of learner engagement for online learning. Fredricks et al. [10] suggested that engagement was composed of three indicators: cognitive engagement, emotional engagement, and behavioral engagement. Cognitive engagement entailed some strategy uses such as plan, application, and reflection or investment in grasping complicated concepts and mastering difficult techniques; emotional engagement referred to affective reaction in learning such as positive attitude, self-confidence or strong interests; behavioral engagement involved participatory behaviors and positive conducts [10]. However, the term "behavioral" is not adopted consistently, which is sometimes regarded as attendance or completion of homework, or other times defined as effort and persistence overlapping with the concept of cognitive engagement [11]. Therefore, following the suggestion of Manwaring et al. [11], our study defines the concept of learner engagement from the psychological perspective highlighting learners' affective investment and response, including cognitive engagement (mental energy like effort and energy in hMOOC learning) and emotional engagement (positive affective response like enjoyment and fulfilling in hMOOC learning).

2.2 Knowledge sharing

As one of fundamental elements of knowledge management, knowledge sharing is regarded as a sustained process of exchanging information for groups to settle problems and contribute ideas [12]. It consists of both donating knowledge (sharing knowledge with others) and collecting knowledge (consulting, accepting and downloading new knowledge from others) [13]. Individual knowledge sharing, as a kind of behavior, occurs via written documents, virtual community and face-to-face communications in synchronous or asynchronous systems [14]. As MOOC provides various open resources for higher education, all the video and documents through MOOC platform are counted as formal knowledge. And the informal knowledge occurs through interaction and communication on MOOC discussion forums. As for hMOOC, informal knowledge is also found through social media such as QQ or WeChat in China, through learning-aided apps like Rain Classroom (a popular app in China), or even in the classroom group activity. Therefore, hMOOC will provide more chances to share knowledge than xMOOC and cMOOC.

Knowledge sharing and learner engagement are both involved in the process of hMOOC learning. The former indicates the sharing behavior in the academic community whereas the latter highlights learners' cognitive and emotional investment in hMOOC learning. Kim and Park [15] indicated that work engagement enhanced the knowledge sharing of employees in organization. Even though such statement is for the organization, this view is also applicable in the e-learning of higher education. Under the hMOOC learning context, if learners have strong emotional and cognitive engagement in hMOOC learning, they will take an active part in the interactive activities, leading to learners' sharing their learning experience or standpoints online and offline. Hence, the following hypothesis is proposed:

H1: Learner engagement will positively affect knowledge sharing in hMOOC learning.

2.3 The expectancy-value theory

The Expectancy-Value Theory (EVT) was established by Atkinson (1957) and developed by Eccles et al. (1983), which has been applied to investigate learners' motivation and how it links task choice directly to expectancy and value belief in educational psychology. The model of EVT is composed of some social cognitive variables such as perception of competence and difficulty of tasks, which will affect expectancy and values. Under this model, motivation belief constitutes two constructs including expectation of success and subjective task value. Expectation of success refers to the individuals' beliefs about how well they will perform the task at present or in the future while the subjective task value indicates learners' understanding of the importance, interest and practical value of the target learning [16]. They are one of the most important prerequisites for influencing learners' engagement and final outcomes in the learning process. Only by having a strong motivational belief and maintaining a good level of motivation can learners be more actively involved in learning activities.

2.3.1 Motivation belief for learner engagement

For years, motivation belief is taken as a personal factor and explored in the field of traditional education or distance education. For example, Johnson and Sinatra [8] surveyed the undergraduate students and the results revealed that different task values positively influenced learning engagement. Manwaring et al. [11] determined that students' perceptions of the importance of the activity produced an active effect on both cognitive and emotional engagement under the blended learning context. Thus, motivation belief, particularly task value, will positively affect learner engagement in hMOOC learning. The following hypothesis is proposed.

H2: Motivation belief will positively affect learner engagement in hMOOC learning.

2.3.2 Motivation belief for knowledge sharing

Motivation belief, particularly achievement-related belief, is found to positively affect knowledge sharing in the past literature. Ismail and Hosseini [17] concluded that motivation belief such as perceived ease of use and perceived usefulness would directly influence the intension to knowledge sharing in e-learning systems. Meanwhile, Arpaci [18] found that the perceived usefulness would actively affect knowledge sharing when adopting clouding computing in education. Under the context of hMOOC learning, there exist many cooperative and

connective activities, which will enable learners to get involved in the learning community and exchange information online and offline. Therefore, the following hypothesis is put forward.

H3: Motivation belief will positively affect knowledge sharing in hMOOC learning.

2.4 IS success model

IS success model is originated to the earliest D & M (DeLone and McLean) model in 1992 and Seddon further modified the D & M model, building IS use and IS success model in 1997. With the development of Internet, DeLone and McLean took an initiative to update IS success model in 2003 and evaluated its usefulness under the context of the e-commerce, including six constructs: (1) information quality (system output), (2) system quality (system performance), (3) service quality (system response and support), (4) use/intention to use, (5) user satisfaction, and (6) net benefits. Information, system, and service quality are thought of as essential variables to assess a system, affecting the intention to use and user satisfaction. However, Delone and Mclean [19] also suggested that this model can be added or deleted some factors so as to meet a particular information context. Thus, some scholars try to improve IS success model in different learning context. For example, Mtebe and Raphael [20] added course and instructor quality to modify the IS success model in the e-learning system. Mohammadi [21] suggested content and information quality as a desired characteristic of IS output in e-learning. Thus, the IS success model has been found to be a robust model for assessing the quality of system and taken as essential factors affecting learning process and outcome of hMOOC learning.

2.4.1 Content quality for learner engagement and knowledge sharing

Information quality is modified into content quality as an environmental factor in this paper. Nearly all the MOOCs in China belong to xMOOCs and are divided into several sessions and each session provides a short video lesson (5-15 minutes) taken as teaching resources and mixed with course materials, online discussion topics, or self-assessment tests etc. These MOOC contents together with the face-to-face lectures are designed to provide additional support for efficient learning in the hMOOC context. Therefore, content quality is defined as richness and update regularity of MOOC resources, authority and relevance of the MOOC content in relation to the classroom knowledge [22]. The past literature indicates the significant effect of content quality on learner engagement and knowledge sharing. If the online content was relevant to syllabus such as being related to face-to-face lectures or being designed to complement the discussions in the class, the students' engagement would be increased [7]. In addition, the MOOCs with the help of social media or IS tools will complement and substitute the physical classroom with qualifying resources and provide a stimulus to knowledge sharing. The high content quality of MOOC will arouse learners' interest to download the information [23]. Accordingly, two hypotheses are proposed as follows.

H4: Content quality will positively affect learner engagement in hMOOC learning.

H5: Content quality will positively affect knowledge sharing in hMOOC learning.

2.4.2 System quality for learner engagement and knowledge sharing

System quality, as another environmental dimension, indicates the response and support from the MOOC provider or other IS system. The better quality that IS system provides, the higher involvement the learner will engage in. Laird and Kuh [24] found a strong positive relationship between use of information technology and learner engagement. Recently, Lee and Xiong [25] indicated that the quality of IS tools like learning apps would have some impacts on learner engagement. Thus, system quality will significantly affect learner engagement in hMOOC learning.

Moreover, system quality also provides convenience for the learners to donate and share information. For instance, Hendriks [9] pointed out that ICT (information and communications technology) perfected knowledge sharing by means of reducing time and space barriers between knowledge workers, and enhancing the acquisition of knowledge. Hung and Wang [26] concluded that Wiki system provided support in enabling employees to exchange knowledge. On the other hand, there is also a risk provided that students dislike using the information system such as MOOC platform, or feel unsafe to make comments in the virtual community which may affect the knowledge sharing negatively [27]. Based on the above review, two hypotheses are suggested.

H6: System quality will positively affect learner engagement in hMOOC learning.

H7: System quality will significantly affect knowledge sharing in hMOOC learning.

2.4.3 Instructor quality for learner engagement and knowledge sharing

Following the work of Thre et al. [28], instructor quality is adopted as a social factor, in that hMOOC learning is inseparable from the influence of instructors including assurance and empathy. Assurance is a guarantee that instructors should obtain enough knowledge and design tasks helpful to enhance learners' efficiency in hMOOC learning while empathy highlights instructors' concern for students, including encouraging, motivating and helping the students to achieve success in the hMOOC learning. The past research shows educators should identify students who were the first time to enroll in online courses and offer necessary technical help to increase their emotional engagement [29]. Compared with online learning, hMOOC learning will also enhance learners' cognitive and emotional engagement through instructor's face-to-face interaction such as timely assistance. However, several studies also demonstrate that if instructors only adopt new technologies but keep their regular teaching style instead of context-based pedagogical strategies in blended learning, they will bring the negative effect to student engagement. For instance, Gebre et al. [30] found that instructors, considering effective teaching as transmitting knowledge, had negative effect on learner engagement. In a word, instructors play significant roles in hMOOC learning. Therefore, a hypothesis is proposed.

H8: Instructor quality will significantly affect learner engagement in hMOOC learning.

Meanwhile, some scholars have explored the relationship between instructor quality and knowledge sharing but obtained controversial findings. Chen et. al. [31] found that teacher attitude was actively related to knowledge sharing behavior while Wangpipatwong [32] concluded that instructor support had no influence on knowledge sharing. These

contradictory results may be due to different learning context and factors. Admittedly, if instructors can provide active support and encouragement for meeting learners' needs online and offline, they will engage in more activities of knowledge sharing [27]. Furthermore, students are encouraged by the instructor to conduct more interaction with peers when they enroll in hMOOC. The more interactions student-student or student-instructor undertakes, the more frequently students will share their knowledge. Thus, the hypothesis is proposed.

H9: Instructor quality will positively affect knowledge sharing in hMOOC learning.

2.5 Social capital

Social capital is the shared value, norm, trust and belonging making social exchange possible, which has been explored by some scholars from economics, sociology, political science and etc. It is comprised of 3 dimensions: structural, relational, and cognitive dimension [33]. Based on this theory, relational quality is taken as a dimension of the social factor, as the quality of relationship between learners plays an important role in a virtual environment of hMOOC learning. This dimension gives prominence to the development and maintenance of successful relationship as well as mutual trust under the process of resources exchange in hMOOC learning [34]. It is often adopted and applied to online community environment to explain knowledge sharing behavior [35].

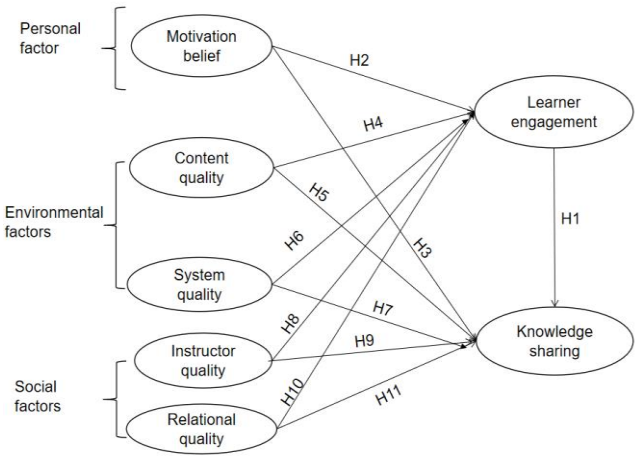


Figure 1. Conceptual model

2.5.1 Relational quality for learner engagement and knowledge sharing

In this research, relational quality comprises trust and commitment. Trust is defined as the positive beliefs and expectations of individuals within a virtual community while commitment represents one has a strong identification and belonging in the community [36]. Under the hMOOC context, online community is an essential platform, providing opportunities for hybrid learners to share ideas, donate knowledge and discuss problems with others. Only if learners hold a strong commitment and trust towards hMOOC learning, can they engage more in the learning activities. Sun et al. [37] concluded that relationship quality positively predicts students' engagement in MOOC learning. And Shao et al. [38] found that trust and belonging have high positive correlation with employees' tacit knowledge sharing. Thus, two hypotheses are proposed.

H10: Relational quality will positively affect learner engagement in hMOOC learning.

H11: Relational quality will positively affect learner knowledge sharing in hMOOC learning.

Based on the above hypothesis, the conceptual model is built as shown in Figure 1.

3. METHODS

3.1 Sample size and data collection

Data was collected in Fujian, China based on random sampling. Fujian province is located on the southeast coast of China, which has gained renown as an education center and pristine nature. There are 39 universities in Fujian, including 2 national top universities, 10 provincial top universities and the other 27 local public and private universities and colleges. The self-administered questionnaire was distributed randomly to undergraduate students based on the different rank of universities in Fujian, China during December 2021 through wenjuanxing (https://www.wjx.cn/), which is quite a popular and widely accepted website in China for data collection.

About 953 students participated in the survey, who majored in soft discipline (law, language, economics, international trade, business English, human resources, accounting, management and etc.) and had once enrolled in hMOOC learning. Finally, 750 questionnaires were selected as valid after deleting some invalid ones such as incomplete information, no varying answers (merely including one or two answers in the questionnaire) or no prior experience of hMOOC learning. Totally there were 250 respondents from two national top universities, 250 from five provincial top universities, and another 250 respondents came from eight local public and private universities.

3.2 Measurement

The survey in this study was composed of 7 scales including motivation belief, content quality, system quality, instructor quality, relational quality, learner engagement and knowledge sharing. The 7 scales were all adapted into the hMOOC learning context based on the past literature. A pilot study was first conducted to 80 college students, based on which a reliability analysis was made and the items with the factor loadings lower than 0.7 were deleted [39]. The modified items for each construct are shown in Table 1 together with the sources of scales.

Table 1. Measurement of 7 scales

Scale	Item	Source
Motivation belief	4	Artino and McCoach [40]
Content quality	5	Theresiawati et al. [28]
System quality	3	Yang et al. [22]
Instructor quality	4	Theresiawati et al. [28]
Relational quality	4	Chang and Chuang [35];Chiu et al. [34]
Learner engagement	5	Manwaring et al. [11]; Sun et al. [41]
Knowledge sharing	3	Vries et al. [13]; Chang and Chuang [35]

All the survey items were measured on a five-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Besides that, some demographic information was

collected including undergraduates' age, gender, and grade as control variables. Additionally, MOOC functions (including service, replacement, added value and driver concerning the support of the higher education institution) and MOOC ranks (including national, provincial, and university level) may exert some impacts on hMOOC learning success [6]. Therefore, both were also collected and taken as control variables.

3.3 Data analysis method

Various statistic techniques were adopted for data analysis on the basis of SPSS and AMOS program. Firstly, descriptive analysis was adopted in this research to describe demographic information of hMOOC learners and their perspective towards MOOC functions and ranks in hMOOC learning. Secondly, reliability was conducted to ensure factor values of Cronbach's α above 0.7 [42] and composite reliability (CR) also above 0.7 [43]. Thirdly, construct validity was examined by testing convergent and discriminant validity based on confirmatory factor analysis (CFA). Convergent validity was first assessed to see how closely the indicators affected each other under the same construct and then discriminant validity was examined to see how far measures of different constructs diverge. For convergent validity, Average Variance Extracted (AVE) and factor loadings of all indicators were examined. For discriminant validity, a new approach was adopted to examine the efficacy of the heterotrait-monotrait ratio of correlations (HTMT) by means of a Monte Carlo simulation [44]. HTMT indicates that the average value of the monotrait-heteromethod correlations (i.e. the correlation of indicators within the same structure) is divided by the average value of the heterotrait-heteromethod correlations (i.e. the correlation of indicators between structures measuring different phenomena). If HTMT value is smaller than 0.85, there exists a perfect discriminant between two constructs [44]. Fourthly, structural equation model (SEM) was adopted to examine structural model fit and make a path analysis based on AMOS 24, so that the hypothesis was tested. Eventually, bootstrapping was adopted for a mediation analysis based on an approach recommended by Preacher and Hayes [45] and to explore whether there existed some mediators between the factors.

4. RESULTS ANALYSIS

Among the 750 participants with the average age of 20.35, male accounted for 21.7% while female was 78.3%, reflecting the real situation of soft discipline learners, most of whom are female. Additionally, the undergraduate respondents were distributed in four grades, among which there were 238 sophomores and 343 juniors. Besides that, most respondents at least took part in one or two hMOOCs indicating the prior experience of hybrid learning. About 26.3% respondents responded that they had joined 3 hybrid courses. Furthermore, 60% of respondents thought MOOC was added value to their curriculum while 25.5% of students considered MOOC as a driver which would enrich their classroom learning. Totally, about 85.5% of respondents agreed that hMOOC learning in China was under the strong support of their universities and served as different functions which were beneficial to their academic learning.

4.1 Measurement model

4.1.1 Reliability and convergent validity analysis

The results of reliability analysis (see Table 2) reveal that the value of Cronbach's alpha (α) in every construct ranged from 0.847 to 0.932, and CR was between 0.848 and 0.931, demonstrating the high internal consistency within the items of every construct. Moreover, convergent validity was examined in accordance with two criteria. Factor loadings should be higher than 0.7 and AVE is no less than 0.5 for effective convergent validity [42]. Accordingly, Table 2 demonstrates the good measurement in convergent validity with factor loadings ranging from 0.741 to 0.907, and AVE values all higher than 0.6.

Table 2. The reliability and convergent validity

Constructs	Items	Loadings	Cronbach's Alpha	AVE	CR
Motivation belief	MB1	0.804	0.896	0.687	0.898
	MB2	0.818			
	MB3	0.826			
	MB4	0.868			
Content quality	CQ1	0.812	0.917	0.691	0.918
	CQ2	0.882			
	CQ3	0.839			
	CQ4	0.849			
	CQ5	0.783			
System quality	SQ1	0.832	0.847	0.652	0.848
	SQ2	0.845			
	SQ3	0.741			
Instructor quality	IQ1	0.862	0.927	0.766	0.929
	IQ2	0.907			
	IQ3	0.896			
	IQ4	0.840			
Relational quality	RQ1	0.840	0.900	0.703	0.904
	RQ2	0.805			
	RQ3	0.851			
	RQ4	0.856			
Learner engagement	LE1	0.839	0.885	0.731	0.931
	LE2	0.883			
	LE3	0.847			
	LE4	0.830			
	LE5	0.874			
Knowledge sharing	KS1	0.847	0.932	0.726	0.888
	KS2	0.861			
	KS3	0.885			

4.1.2 Discriminant validity

As illustrated in Table 3, the estimated correlation values between all construct pairs were lower than the suggested threshold of 0.85 based on HTMT criterion, indicating the distinctness in construct content and the specificity of discriminate validity.

Table 3. The discriminant validity

HTMT	MB	CQ	SQ	IQ	RQ	KS	LE
MB							
CQ	0.810						
SQ	0.774	0.754					
IQ	0.700	0.781	0.818				
RQ	0.763	0.742	0.847	0.806			
KS	0.707	0.708	0.744	0.746	0.834		
LE	0.762	0.682	0.822	0.690	0.844	0.817	

Note: MB-motivation belief; CQ- content quality; SQ- system quality; IQ-instructor quality; RQ-relational quality; KS-knowledge sharing; LE-learner engagement.

Table 4. Structural model fit

Factor Model	x^2	df	x^2/df	NFI	IFI	CFI	TLI	RMSEA
Seven Factors	1868.82	457	4.089	0.907	0.928	0.928	0.916	0.064

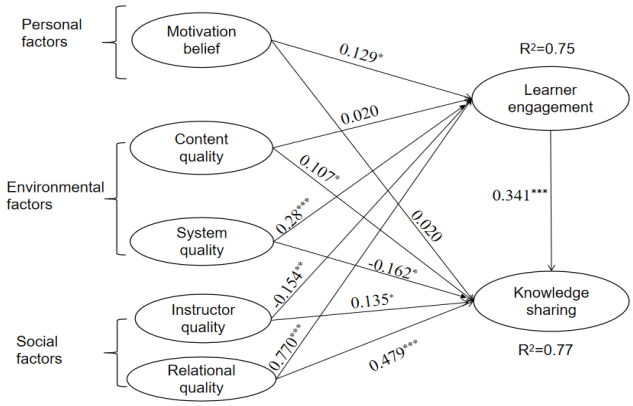
Table 5. Results of mediation analysis

CQ-MB-LE MB-LE-KS		Estimate	SE	Bootstrapping(95%CI) Bias-Corrected Lower	Upper	Mediating effect	%
Total effect	CQ-LE	0.123***	0.036	0.053	0.193		
Indirect effect	MB-LE	0.076***	0.025	0.029	0.128	Yes	100%
Direct effect	CQ-LE	0.047	0.039	-0.029	0.123		0%
Total effect	MB-LE	0.108***	0.037	0.035	0.180		
Indirect effect	LE-KS	0.060***	0.020	0.024	0.099	Yes	100%
Direct effect	MB-LE	0.048	0.035	-0.022	0.117		0%

Note: CQ-content quality, MB-motivation belief, LE-learner engagement, KS-knowledge sharing

4.2 Structural model

Structural model fit was first examined and then path analysis was conducted in Amos 24.0, so that the relationship between the latent constructs was analyzed for examining the hypothesis. Table 4 illustrates the results of absolute fit measures and incremental fit measures for the structural model fit, among which x2/df was 4.089, lower than the cutoff of 5, and RMSEA was 0.064, less than the cutoff of 0.08. In addition, incremental fit indices of NFI, IFI, CFI and TLI were all above 0.9. Accordingly, the structural model fit is nearly satisfactory [42].



Note: *: p<0.05; **: P< 0.01;***: p< 0.001

Figure 2. Results of path analysis for structural model

As shown in Figure 2, learner engagement was positively associated with knowledge sharing in hMOOC learning (β=0.341, P<0.001), so H1 is supported. Motivation belief had a positive association with learner engagement but not with knowledge sharing (β=0.129, P<0.05; β=0.020 P>0.05), thus H2 is supported but H3 not. Meanwhile, instead of exerting a significant effect on learner engagement (β=0.020, P>0.05), content quality affected knowledge sharing positively (β=0.107, P<0.05). Accordingly, H5 is supported but H4 is not. By contrast, system quality positively and significantly influenced learner engagement (β=0.28, P<0.001) but significantly affected knowledge sharing in a negative way (β=-0.162, P<0.05), so H6 and H7 are supported. As for instructor quality, it had a negative relationship with learner engagement but a positive association with knowledge sharing (β=-0.154, P<0.01; β=0.135, P<0.05). Thus, both H8 and H9 are supported. Moreover, relational quality was significantly and positively related to learner engagement and knowledge sharing (β=0.770, P<0.001; β=0.479, P<0.001), so both H10 and H11 are supported. Overall, personal, environmental and social factors can explain approximately 75% of the variance in learner engagement and 77% of the variance in knowledge sharing.

4.3 Mediation analysis

Concerning the unsupported H3 and H4, mediation analysis was further conducted to see whether there existed some indirect effects through mediators by adopting bootstrapping. A mediating effect can be uncovered by testing confidence intervals (CI). If the CI for the indirect effect does not stride across a zero, this will support the existence of mediation effect (and vice versa) [45]. As shown in Table 5, motivation belief is considered as an active mediator, through which content quality affected learner engagement indirectly with indirect effect as 0.076 (P<0.01, CI from 0.029 to 0.128). Furthermore, with the indirect estimate of 0.060 (P<0.01, CI from 0.024 to 0.099), learner engagement is also an effective mediator, where motivation belief indirectly affects knowledge sharing.

5. DISCUSSION AND CONCLUSION

5.1 Discussion

As the results through the above data analysis have demonstrated that most of hypotheses were supported in this study except H3 and H4. For H1, learner engagement is defined as psychological investment and affective enjoyment in this study, which had a positive and significant effect on knowledge sharing behavior. This finding is in agreement with the work by Kim and Park [15], indicating if learners enjoy hMOOC learning, they will invest more energy in sharing and collecting information online and offline. As for H2, motivation belief positively influenced learner engagement in hMOOC learning, which accords with the past literature [8, 11], demonstrating motivation belief is one of the most important prerequisites for influencing learner engagement. However, on the contrary to what Arpaci [18] stated, H3 was not verified which means that motivation belief did not affect knowledge sharing behavior significantly. Further mediation analysis for MB-LE-KS (see Table 5) showed that motivation belief indirectly affected knowledge sharing through learner engagement, which means that if learners have strong belief in hMOOC learning task, they will enjoy such a learning style

psychologically, and then invest more effort in knowledge sharing behavior. As for H4 and H5, content quality significantly and positively affect knowledge sharing instead of learner engagement which is partially in accordance with past research [46]. The mediation analysis for CQ-MB-LE (see Table 5) showed that only if content quality enhanced learners' motivation belief in the value of hMOOC learning, can they invest more effort in learning. For example, if MOOC resources are closely related to face-to-face course and provide a driver or added value to classroom learning, learners' motivation belief will be increased which will lead to high engagement [7]. Concerning H6 and H7, system quality positively affected learner engagement but negatively influenced knowledge sharing, in that there may exist some other constructs affecting the relationship between system quality and knowledge sharing. For example, Ho and Kuo [27] suggested that if learners have no interest in the system, it may bring the negative effect to knowledge sharing. Furthermore, for H8 and H9, instructor quality had a negative effect on learner engagement but positive effect on knowledge sharing. Such results imply that too many tasks assigned by the instructor or keeping traditional teaching styles in the class in hMOOC learning may decrease the enjoyment of learners and reversely affect their psychological engagement [30]. As for H10 and H11, it is found that relational quality has played a significant role in hMOOC learning, affecting both learner engagement and knowledge sharing positively. Accordingly, the two hypotheses are supported and in agreement with Sun et al. [37], demonstrating that the close relationship in the virtual community is essential to hMOOC success.

5.2 Conclusion

This research provided at least two important theoretical contributions to the hMOOC literature. To begin with, an influencing mechanism was established involving personal, environmental, and social factors by integrating the theory of expectancy value, IS success model and social capital theory, which has enriched the connotation of predictors of hMOOC learning. A comprehensive model was proposed by absorbing relational quality as one of significant social factors and exploring the impact mechanism on learner engagement and knowledge sharing. The empirical findings contribute to the extant literature by identifying the critical hMOOC success predeterminants in hMOOC learning. Second, learner engagement in this study was taken as a center of learning process as well as knowledge sharing which was originally applied in the organization sector and seldom discussed in the education sector. In the past literature, few studies took the two constructs into account as indicators of hMOOC success, demonstrating the psychological and behavioral investment. The empirical finding suggests that learners' high psychological engagement can significantly enhance their knowledge sharing behavior online and offline in hMOOC learning.

Meanwhile, the findings also inform some implications for administrators, instructors, technicians, and learners in the field of education. For administrators, strong support should be provided to MOOC and hMOOC construction, as online learning or blended learning is still novel to some undergraduate students at present. For instructors, attention should be paid to the hMOOC design including the functions of MOOC in hMOOC learning, and close connection between MOOC content and classroom learning. Furthermore, task difficulty, task quantity and task type assigned by the instructor should not go beyond the acceptance of learners, otherwise, they will bring high pressure to learners, reversely affecting the engagement in hMOOC learning. For MOOC technicians, focus should be laid on upgrading the system and designing synchronous and decentralized discussion forums, which will enhance the participation and interaction of more learners. For learners, they should improve their technical skills in using MOOC and other IS system as well as enhance the self-directed learning ability. If learners can manage their own learning and understand the actual benefits that hMOOC learning may bring, they will engage more time, focus, energy and strategies in such type of hybrid learning.

There existed some limitations in this paper. First, this research is conducted mainly in Fujian province, China. Participants from different geographical and cultural backgrounds may have diverse experiences with hMOOC learning. As such, the generalization of these research findings should be performed with caution. Further study can be conducted toward the entire country in China or make a cross-country comparison by taking cultural factors into consideration. Second, personal factor is one of the most important dimensions affecting hMOOC learning. However, only one construct (motivation belief) is taken as a personal factor in this study, which is not enough to overall reveal students' characteristics. More personal constructs can be included such as personal ability and personal technical preference in the future study.

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