

Exploring the Factors Affecting MOOCs Continuance Intention: The Role of Design Quality

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Abstract—Massive Open Online Courses (MOOCs) is a rapidly growing paradigm of educational provision. The success of MOOCs depends on learners' continued usage. Drawing upon the expectation confirmation model on information technology (ECM-IT) and combining MOOCs platform design quality, a theoretical model for studying learners' continuance intentions toward participation in MOOCs was developed. Based on survey data from 271 respondents, structural equation modeling was employed to assess the model. The results of this analysis indicate that perceived usefulness, satisfaction, course organization, learning analysis and social interaction were significant antecedents of the continuance intention of individuals, but, learning evaluation was not significant influence on the continuance intention of learners. The results contribute to the extant literatures in the context of MOOCs learning by identifying the critical MOOCs design quality factors, and provide several guidelines to the administrators of MOOCs services regarding to platform design, courses quality, socialized interaction and so on. Theoretical and practical implications are discussed.

Keywords—MOOCs design quality; continuance intention; learning analysis; learning evaluation

I. INTRODUCTION

Massive Open Online Courses (MOOCs) is a rapidly growing paradigm of educational provision, the number of MOOCs has increased in recent years. MOOCs holding the potential to open up access to world class teaching and educational resources beyond geographical and social boundaries. However, despite public enthusiasm for MOOCs, it has been observed that MOOCs suffer from enormous dropout rates (Adams & Williams, 2013; Jia Jiyou et al., 2014; Xing, et al., 2016). Research shows that more than 90% of students attending MOOCs dropout before complete their (Breslow et al., 2013; Hewand Cheung, 2014; Ho et al., 2014). Considering the issue of MOOCs dropout and non-completion rates, a subject of great concern has been centered on issues of learning and teaching. Khaled M. Alraimi et al. (2015) analyzed the impact of the openness and the reputation of top universities on learners' continuance intention. Yang Genfu (2016) integrated the information systems continuance expectation-confirmation model (Bhattacharjee, 2008) and the theory of self-determination (2008), analyzed the intention to using MOOCs. Liqiang Huang (2017) explored how MOOCs' technological factors in in three dimensions (i.e., course vividness, teacher

subject knowledge, and interactivity) influence students' revisiting of MOOCs, and also takes course difficulty into consideration and investigates the interactive effects of course difficulty on the main factors identified above.

Some studies believe that it is necessary to promote the design quality of MOOCs and to put forward the criterion of design quality on MOOCs. For example, Ferncxndez et al. (2015) proposed the MOOCs education quality comprehensive evaluation system. Jiang et al. (2016) designed MOOCs teaching design and evaluation system, including user interface, video content, interactive tools, learning analysis and others quality factors from the two dimensions of teaching and technology. Tang et al. (2017) from the course organization, electronic assessment, peer assessment, user interface, video content, learning analysis and social interaction of MOOCs to evaluate the design quality of MOOCs, in order to improve the quality of MOOCs design.

In addition, MOOCs are classes delivered in an online environment with important differences from traditional education mode. As a new education model, MOOCs rely on technology to transfer information from teachers to students (Lee & Lehto, 2013). In other words, students learning mainly from MOOCs platform through technology (i.e., internet access, watch the video, discuss on forum, interaction with peer or teacher through web or social media). Therefore, the design quality of MOOCs platform plays an extremely important role in attracting and maintaining learners. In summary, this paper based on ECM-IT model, combined with MOOCs design quality factor in five dimensions (i.e., curriculum organization, video quality, learning evaluation, learning analysis, social interaction). This paper will primary discusses two questions:

- 1) The design quality factors how to influence on learners' continuance intention to using MOOCs?
- 2) Perceived usefulness and satisfaction how to affect learners' continuance intention to using MOOCs?

II. RESEARCH MODEL AND HYPOTHESES

Using the theoretical background of the ECM-IT, design quality of MOOCs, we propose a research model that identifies several attributes as predictors of MOOCs continuance intention. The relationships between these constructs are integrated in the conceptual model depicted in figure 1. The basic assumption is that MOOCs continuance intention is jointly determined by perceived usefulness and satisfaction, which are functions of design quality of MOOCs. Curriculum

HangZhou Dianzi University Humanities and Social Science Fund(2017B08). Zhejiang Information and Economic and Social Development Research Center(16XXHJD08).

organization, video quality, learning evaluation, learning analysis and social interaction are design quality of MOOCs is incorporated into the model.

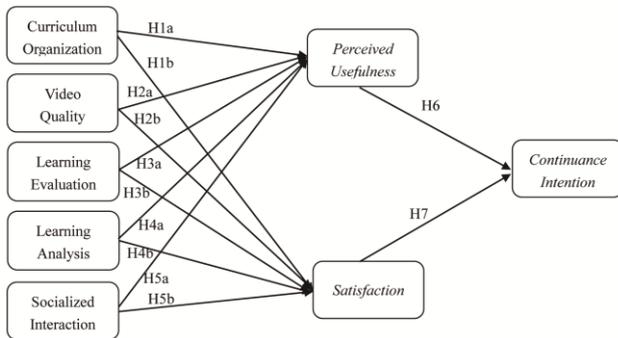


Fig. 1. Research model.

A. Curriculum Organization and Video Quality

Curriculum organization can be defined as the detailed level of the courses' teaching plan, the clarity of learning objectives. Video quality refers to the quality of video of MOOCs content, including the teacher's teaching clarity, the speed of teacher's lecture, the resolution of video. Previous studies showed that curriculum organization and video quality has positive effect on perceived usefulness and satisfaction (Cheng et al., 2014). Thus, we propose the following research hypotheses:

H1a: Curriculum organization has a positive effect on the perceived usefulness of MOOCs.

H1b: Curriculum organization has a positive effect on the satisfaction of MOOCs.

H2a: Video quality has a positive effect on the perceived usefulness of MOOCs.

H2b: Video quality has a positive effect on satisfaction of MOOCs.

B. Learning Evaluation, Learning Analysis and Socialized Interaction

Learning evaluation is closely related to learning objectives and course content, including two dimensions says electronic evaluation (or machine judgment) and peer evaluation. Learning analysis can be defined as a teaching tool that can monitor learning process, identify difficulties, find learning patterns, provide learning feedback, and support learners' self-reflection. Socialized interaction refers to the interaction between MOOCs learners and teachers or peers. Thus, we propose the following research hypotheses:

H3a: Learning evaluation has a positive effect on the perceived usefulness of MOOCs.

H3b: Learning evaluation has a positive effect on the satisfaction of MOOCs.

H4a: Learning analysis has a positive effect on the perceived usefulness of MOOCs.

H4b: Learning analysis has a positive influence on the satisfaction of MOOCs.

H5a: Socialized interaction has a positive effect on the perceived usefulness of MOOCs.

H5b: Socialized interaction has a positive influence on the satisfaction of MOOCs.

C. Perceived usefulness and satisfaction

Previous studies showed that perceived usefulness and satisfaction are key motivators on continuance intention (Bhattacharjee, 2008). Thus, we propose the following research hypotheses:

H6: Perceived usefulness has a positive effect on the continuance intention of MOOCs.

H7: Satisfaction has a positive effect on the continuance intention of MOOCs.

III. RESEARCH METHOD

In this study, a survey is employed to test the hypotheses formulated in the previous sections; questionnaire development and data collection are discussed in the subsequent sections.

A. Questionnaire development

We used a questionnaire survey with two sections to test our theoretical model. The first section includes demographic questions about the participants, whereas the second section features questions measuring the constructs in the research model. Considering the design quality of MOOCs, the research model consisted of eight constructs, which were measured using multiple item perceptual scales. The measurement items of curriculum organization, video quality, learning evaluation, learning analysis and socialized interaction referred to the literature of Yousef et al. (2014) and Keung (2016). Each questionnaire item corresponding to the constructs was measured using a seven-point Likert scale, anchored on "1-strongly disagree" and "7-strongly agree".

B. Data collection

The target participants of this study were those with experience with MOOCs. We sent online surveys by www.Sojump.com to those who were members of a MOOCs platform. We used the paid service of www.Sojump.com. Overall, a total of 497 MOOCs learners were invited to participate in survey, then we remove invalid samples, 271 samples were valid, effective rate was 54.5%. And all the respondents were Chinese from tier cities in China. The demographics of the respondents as following.

The most commonly used MOOCs platforms are: Chinese university MOOC (55.15%), Coursera (27.94%), edx(15.81%), Udacity (13.6%), Tsinghua university online (14.34%), and others (4%). In terms of gender, 37.87% were male and 62.13% were female. In terms of age, the age of 18 to 23 is 26.47%, 51.1% in 24-30 years, 17.28% in 31-40 years old and 4.79% in 40 years old. In terms of career, 55.15% respondents are enterprise staff, 17.65% are students, 24.6% are teachers, and 13.6% are government civil servants, doctors and other professionals.

IV. DATA ANALYSIS

In analyzing the collected data, we followed a two-step procedure (Anderson & Gerbing, 1988). First, we examined the fitness and the construct validity of the proposed measurement model by assessing reliability, convergent validity, and discriminant validity. Then, we examined the structural model to investigate the strength and direction of the relationships among the theoretical constructs. In this study, Partial Least Squares PLS were used to analyze the reliability and validity of the model.

A. Measurement model

Reliability was assessed using Cronbach's alpha. All multi-item constructs should meet the guidelines for a Cronbach's alpha of greater than 0.70. Convergent validity was assessed based on the criterion that the indicator's estimated coefficient was significant on its posited underlying construct factor. Fornell and Larcker(1981) recommend three criteria to evaluate the convergent validity. All these three criteria are: all itemfactor loadings (k) should be significant and exceed than 0.7; composite reliabilities (CR) for each construct should exceed 0.7; and the average variance extracted (AVE) for each construct should be greater than 0.50 .Table I demonstrates that item loading, the AVE, CR and Cronbach's alpha values for all constructs in the measurement model exceeded the recommended threshold values. In sum, the adequacy of the measurement model indicated that all items were reliable indicators of the hypothesized constructs.

TABLE I. CONSTRUCT RELIABILITY AND CONVERGENT VALIDITY

Construct	Reliability and validity		
	Cronbach's α	C.R.	AVE
Curriculum Organization	0.721	0.827	0.545
Video Quality	0.717	0.840	0.637
Learning Evaluation	0.736	0.835	0.558
Learning Analysis	0.732	0.832	0.554
Socialized Interaction	0.736	0.834	0.557
Perceived Usefulness	0.751	0.858	0.667
Satisfaction	0.786	0.862	0.610
Continuance Intention	0.749	0.856	0.665

Discriminant validity was assessed based on the squared correlations between variables and their extracted respective average variance. To test the discriminant validity, the average variance shared between a construct and its measures should be greater than the variance shared by the construct and any other constructs in the model (Fornell & Larcker, 1981).For the correlation analysis shown in Table II, the extracted average variance value for the reflective variables is consistently greater than the off-diagonal squared correlations, suggesting satisfactory discriminant validity among variables.

TABLE II. INTER-CONSTRUCT CORRELATIONS AND DISCRIMINANT

Construct	Discriminant Validity							
	LE	LA	CI	PU	SA	SI	CO	VQ
LE	.747							
LA	.585	.745						
CI	.477	.557	.815					
PU	.501	.608	.675	.817				
SA	.566	.664	.737	.747	.781			
SI	.584	.645	.426	.527	.544	.746		
CO	.639	.675	.607	.605	.664	.517	.738	
VQ	.54	.641	.526	.539	.597	.505	.617	.798

VALIDITY (I.E., BOLD NUMBERS)

B. Structural Equation Model

The 12 hypotheses presented above were tested collectively using structural equation modeling (SEM) implemented via partial least squares (PLS).Figure 2 illustrates the R² and the resulting path coefficients of the proposed research model. Table III described the results obtained from the PLS analysis. The 8 hypotheses were supported, and 4 hypotheses had not reached significant levels. In terms of the variance of the interpretation, the study model explained the variance of the persistent use of MOOCs with 57.8%, 46.9% perceived usefulness, and 55.8% satisfaction.

TABLE III. MODEL PATH ANALYSIS

The hypothesis	Path Coefficient and significant		
	Path Coefficient	P-value	Support
H1a	0.272	0.001	Yes
H1b	0.286	0.000	Yes
H2a	0.133	0.099	No
H2b	0.160	0.017	Yes
H3a	0.037	0.613	No
H3b	0.093	0.145	No
H4a	0.215	0.018	Yes
H4b	0.250	0.003	Yes
H5a	0.158	0.047	Yes
H5b	0.100	0.117	No
H6	0.280	0.001	Yes
H7	0.528	0.000	Yes

V. DISCUSSION

This study primary discussed the influence of perceived usefulness, satisfaction and MOOCs design quality factors in the ECM-IT model on the continuous use intention of MOOCs. Overall, 8 out of 12 hypotheses are supported by the data.

A. The impact of curriculum organization and video quality

Research showed that curriculum organization on perceived usefulness ($p = 0.272$, $p = 0.001$) and satisfaction ($p = 0.286$, $p = 0.000$) has a direct impact, and through them indirectly influence on continuance intention. Which requires the MOOCs teachers and administrators should try best to improve the quality of MOOCs course, in order to attract and keep learners. In addition, the research showed that video quality had not a significant positive effect on perceived usefulness ($p = 0.133$, $p = 0.099$), but had not a significant positive effect on satisfaction ($p = 0.160$, $p = 0.017$), and indirect effect on continuance intention. Thus, we suggest that administrators should to improve video quality and to keep a certain help for learners of MOOCs.

B. The impact of learning analysis and learning evaluation

Research shows that learning analysis on perceived usefulness ($p = 0.215$, $p = 0.018$) and satisfaction ($p = 0.250$, $p = 0.003$) has a direct impact, and indirectly influence on continuance intention. We suggest that the administrators should to improve the learning analysis functions on MOOCs platform. In addition, learning evaluation was not significant in the perceived usefulness ($p=0.037$, $p=0.613$) and satisfaction ($p=0.093$, $p<0.145$).It is possible that the learning evaluation service in MOOCs platform is still not perfect, which can not provide a good experience for users.

C. The impact of socialized interaction

Structural model verification showed that the social interaction of MOOCs had a significant impact on perceived usefulness ($p=0.158$, $p=0.047$), but not significant for satisfaction ($p=0.100$, $p=0.117$).In other words, users feel that it is helpful for teachers or students to interact with them when they study in MOOCs, but they are not satisfied with the current social interaction services. In this regard, we think it is possible that the decline in service quality caused by the explosion of the registration number of MOOCs platform makes the interaction between teachers and users of MOOCs an obstacle. Therefore, how to improve the quality of social interaction service is an important issue in MOOCs development.

VI. CONCLUSION

Based on the ECM-IT model, the research model was constructed by introduced MOOCs design quality factors and the following conclusions were obtained through empirical analysis. First, the perceived usefulness and satisfaction in the classical ECM-IT model are still the core factors that influence on the intention of continuous using. Secondly, from the design quality of MOOCs, the course organization, learning analysis and socialized interaction have significant influence on learners' continuance intention. Third, the impact of learning evaluation on the continuous use of intention has not been verified in this study, but it does not mean that it is not important. It may be that the service has not met the

expectation of learners at present. Further research is expected to help generalize our findings and future discussions the influence of learning evaluation on MOOCs using.

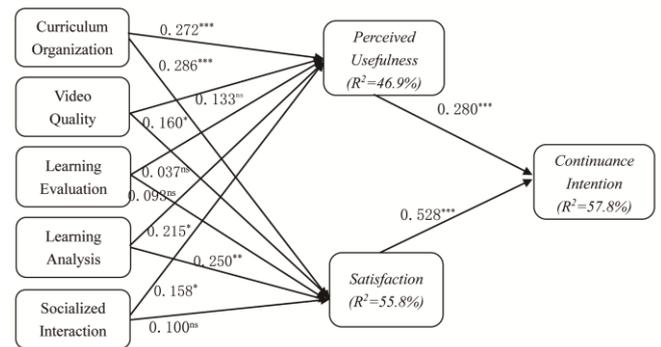


Fig. 2. Structural Equation Model PLS Result

ACKNOWLEDGMENT

This work was supported in part by grants from HangZhou Dianzi University Humanities and Social Science Fund(NO.2017B08) and Zhejiang Information and Economic and Social Development Research Center(NO.16XXHJD08).

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