Research on Influencing Factors of MOOC Learning Effect based on Structural Equation Model

Xu Fang

School of Education Science, Nantong University, Nantong, Jiangsu, China 226019

Abstract:

At home and abroad, MOOC has been applied to higher education to realize the reform of higher education model. The state has also issued relevant documents to encourage the implementation of MOOC credit conversion. In this study, the influencing factor model of MOOC learning effect was first established, and then the structural equation model was used for verification. It is found that curriculum construction and policy have a significant positive effect on learning effect. Curriculum construction has a significant positive influence on the learning process. The policy has a significant positive influence on the curriculum construction. The model explained the learning effect with a force of 53.5%. On the basis of the above research, this paper puts forward some countermeasures and suggestions to promote the MOOC credit conversion.

Keywords: *credit conversion; MOOC; influence factor; empirical study.*

I. INTRODUCTION

At present, MOOC (massive open online courses) is developing rapidly. MOOC, with its outstanding advantages such as flexible learning and low cost, has been applied to higher education at home and abroad to realize the reform of higher education model. The state has also issued relevant documents to encourage the implementation of MOOC credit conversion. MOOC credit conversion refers to the system whereby students take courses on MOOC platforms and are awarded the credits they need for graduation. At present, many universities in Our country have made some attempts in this aspect [1,2]. MOOC is a new thing, and the teaching of MOOC at home and abroad is still in the preliminary stage of practice. How is the

effect of MOOC credit conversion and what are the influencing factors? There is still a lack of empirical research on this aspect at home and abroad. In order to further verify the relationship among curriculum teaching, learning process, related policy and learning effect, this study first established the influencing factor model of MOOC learning effect, and then adopted the structural equation model for verification. The course includes course video construction, learning support service construction and so on. Learning support service includes teacher guided learning management service, information service, consultation service, learning facility service, etc. Learning process refers to the process during which students learn MOOC courses, including how they watch the course videos, complete the assignments, complete the quizzes, and interact on the forums. Policy refers to the establishment of MOOC credit conversion policies at the national, local and organizational levels, including MOOC construction policies such as credit conversion policies. Learning effect refers to the effect achieved by students after studying in MOOCS, including the expansion of their understanding of knowledge.

II. MODEL BUILDING

One of the main motivations for students to take MOOC is that they are able to learn quality courses off campus and have flexibility in learning. The quality of course construction, including the video quality and the level of learning support services, has a great impact on students' MOOC learning results. The higher the course quality is, the better the learning effect will be, which is also consistent with previous studies [3,4]. Therefore,H1 is proposed in this study.

H1: Curriculum construction is positively correlated with students' learning effect

The harder students study, including the more active they watch videos and the more active they interact in forums, the better their learning effect will be, which is also consistent with previous studies [5]. Therefore, H2 is proposed in this study.

H2: The learning process of students is positively correlated with the learning effect

The more complete the relevant policies are, such as the school's policies on credit transfer, the better the motivation of MOOC learning will be, and the better the learning effect will be. The better the policy, the more motivated and effective the students will be for fear of being punished for not taking MOOC. Therefore, H3 is proposed in this study.

H3: Policy is positively correlated with learning effect

The quality of curriculum construction has a direct impact on students' learning process. When the course construction quality is higher, for example, when the course video quality is higher and the learning support service is better, students will learn more actively, and therefore, the learning effect will be better. On the contrary, when the quality of curriculum construction is poor, students' learning interest decreases and learning effect becomes worse. This research is consistent with previous studies [6]. Therefore, H4 is proposed in this study.

H4: Curriculum construction is positively related to learning process

The more complete the relevant policies are, the more students' perception of the usefulness of MOOC learning will be improved, and the more active students' learning will be, which is also consistent with previous studies [7]. Therefore, H5 is proposed in this study.

H5: Policy is positively correlated with the learning process

The more perfect the relevant policies are, the stronger the motivation of teachers will be, and the enthusiasm of students to learn MOOC will also be stimulated, so that the quality of curriculum construction will be higher. Therefore, H6 is proposed in this study.

H6: Policy is positively correlated with curriculum construction

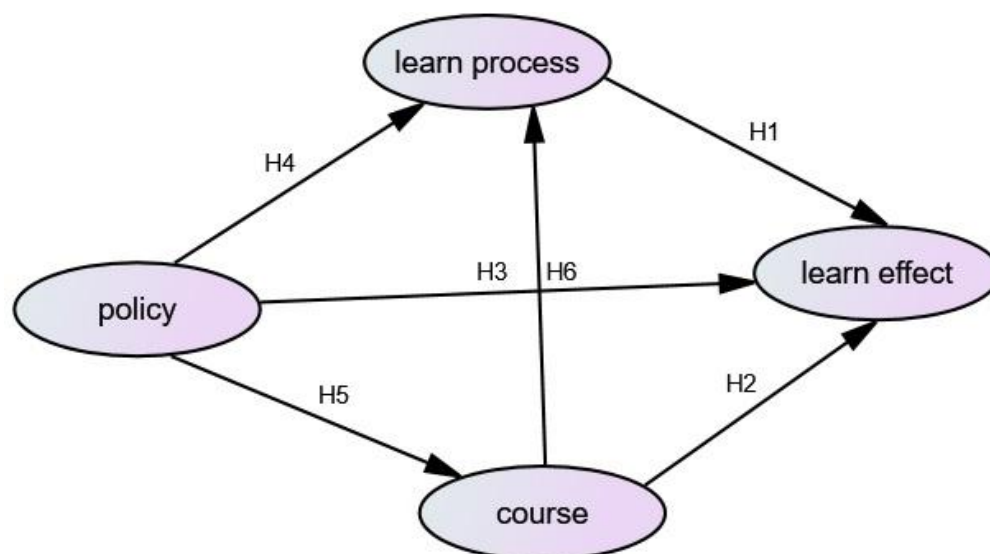Finally, a model of factors influencing MOOC learning effect is proposed. See Fig 1.

Fig 1: Model of factors influencing MOOC learning effect

III. RESEARCH RESULTS

The questionnaire design refers to the existing mature questionnaires [8]. All questionnaires were distributed through the questionnaire star. 425 questionnaires were recalled, and after the highly consistent questionnaires are presented, 365 valid questionnaires are retained. Effective rate is 85.9%.

The reliability and validity of the questionnaire were tested. According to the calculation results, the Cronbach consistency coefficient of each latent variable is greater than 0.7, which indicates that the questionnaire has good reliability. The reliability of each factor loading combination and the average extraction variance are calculated with AMOS21.0 , and found that the factor loading of all the other observed variables was greater than 0.5, the combination reliability of each variable was greater than 0.7 and the average extraction variance was greater than 0.5, which indicated that the questionnaire had good validity. See TABLE I.

TABLEI. Reliability and validity test

		factor loading	Cronbach α	CR	AVE
Learn process, LP	LP1	0.823			0.6135
	LP2	0.836		0.8871	
	LP3	0.882	0.824		
	LP4	0.919			
course	CO1	0.778	0.879	0.9031	0.6658
	CO2	0.818			
	CO3	0.884			
	CO4	0.803			
	CO5	0.823			

policy	PO1	0.867	0.889	0.8745	0.7655
	PO2	0.778			
	PO3	0.879			
Learn effect	LE1	0.769	0.719	0.8345	0.5144
	LE2	0.879			
	LE3	0.674			
	LE4	0.775			

The fitting degree of the model was tested [9]. All the indicators were found to meet the conditions (TABLE II).

TABLE II.Test of Goodness for Fit

variate	X2/df	GFI	RMR	RMSEA	AGFI	NFI	CFI	IFI	AIC	ECVI
Standard	<3.0	>0.9	<0.5	<0.1	>0.9	>0.9	>0.9	>0.9	the smaller,the better	the smaller,the better
actual value	2.132	0.987	0.043	0.076	0.943	0.979	0.955	0.982	284.939	1.439
Pass or not	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

AMOS21.0 was used for calculation, and H1, H3, H5, H6 pass the test, while H2, H4 fail the test. See TABLE III. First, curriculum construction and policy have a significant positive impact on learning effect, while learning process does not have a significant impact on learning effect. This research result is consistent with some previous empirical research results [10]. The purpose of students' MOOC learning is to focus more on the courses of famous universities,

which has a great impact on the learning effect. However, students pay more attention to the qualitative aspects of MOOC learning and may not care much about the amount of learning, which may lead to the fact that the learning process does not have a significant positive impact on the learning effect. In addition, due to the fear of punishment and the reference of others, the relevant policies also have a positive impact on students' learning results. In addition, due to the fear of punishment and the reference of others, the relevant policies also have a positive impact on students' learning results. The quality of course construction, such as the quality of video learning support services, will have a positive impact on students' learning results. Students' motivation for taking MOOC is mainly due to the quality of course resources and flexible learning characteristics of MOOC, which may not be due to external policies. Therefore, relevant policies do not have a great impact on the learning effect. Thirdly, the policy has a significant positive influence on the curriculum construction. National school policies on MOOC teaching, including investment policies and incentive policies on MOOC, have a significant positive impact on the quality of curriculum construction. Relevant policies will have a great impact on teachers' investment and the production of MOOC. Teacher's input plays an important role in the quality of curriculum construction. When teachers put their minds to it, the quality of MOOC is likely to improve. And the investment in MOOC curriculum construction is also important. Make a high-quality MOOC, and guarantee the smooth operation of the period, there is no corresponding fund protection is not. As policies improve, the quality of MOOC courses is likely to improve further.

TABLEIII.Standardized coefficients and significance

path			estimated value	significance	hypothesis	Pass or not
Learn effect	<---	course	.55	***	H1	Y
Learn effect	<---	Learn process	.10	N	H2	N
Learn effect	<---	policy	.20	*	H3	Y
Learn process	<---	policy	-.20	N	H4	N
course	<---	policy	.55	***	H5	Y

Learn process	<---	course	.68	**	H6	Y

Through the calculation of complex correlation coefficient, it is found that the explanatory power of this model to the learning effect is 53.5%, which shows that the model has a good explanatory power.

IV. ADVICE

4.1 More Specific Policies at the National Level

First, the state can issue a more specific MOOC credit conversion document, which includes a clear stipulation on the evaluation standards and related roles of MOOC construction courses, and serves as the basic basis for MOOC credit conversion in China. This is of great significance for ensuring the smooth progress of MOOC credit conversion in China and the quality of MOOC credit conversion. Local governments can refer to this standard to formulate more specific standards in line with regional development. Second, the establishment of specialized regulatory bodies. A national committee of MOOC can be established to uniformly take charge of national MOOC related affairs, including the establishment of checks and balances, implementation and evaluation of MOOC course quality standards, credit transfer and other policies.

4.2 Ensure the Construction and Teaching Quality of MOOC

The credit conversion of MOOC in India can provide us with some inspirations. India's national MOOC platform is SWAYAM platform. The SWAYAM platform has specially set up course evaluators. After each MOOC is completed, it is generally reviewed by two experts in the relevant field. First, it is necessary to establish a unified national standard for the construction of MOOC courses, and stipulate the curriculum elements from the aspects of design technology requirements of MOOC. After the completion of MOOC construction, relevant experts will be invited to review the courses and put forward suggestions for improvement. Only courses that pass the expert evaluation can be converted into credits.

4.3 Establish Effective Evaluation Mechanism

Malaysia MOOC credit conversion experience is worthy of our reference [11]. The MOOC credit conversion in Malaysia clearly puts forward the following principles of authenticity and

adequacy. Authenticity means that the application can be demonstrated by any form of evidence as the result of the learner's own efforts. The applicant's evidence must be unique, authentic and valid in order to be verified by the higher education provider.

Adequacy means that applicants must be able to demonstrate the breadth and depth of their MOOC learning and provide supporting evidence. This evidence includes a reflection of MOOC learning outcomes and curriculum capabilities. In order to verify completion of MOOC, applicants must submit course construction and evaluation documents. Malaysia also has to verify the authenticity of MOOC learning before it is allowed to convert MOOC credits. Malaysia must confirm that the applicant is the same person as the MOOC learner in order to convert credits. There are three specific cases. One is on-site proof, that is, if learners take an exam supervised by a special person on site at the end of MOOC learning, they can directly convert MOOC credits. However, if on-site proof is not available, additional assessments by higher education providers must be attended. There are several forms of evaluation. You may choose one or other of the following methods of evaluation, including spoken evaluation, written evaluation, product evaluation, performance evaluation, etc. For MOOC courses that require credit conversion, there should be supervised on-site testing. In the absence of supervised testing, additional assessment of the student's performance is required. Credit conversion can only be carried out if the assessment is qualified. In addition, big data technology can be used to evaluate students' performance in daily life, such as how much they watch videos.

4.4 Set Standards for Credit Transfer

Credit conversion standard includes what kind of course can carry out credit conversion how much is the academic component and the total amount of credit conversion. Malaysia's practice in this regard can provide us with some experience and inspiration. Malaysia requires that at least 80% of the content of MOOC be equivalent to the description of the courses to be converted. Compare MOOC with courses that will be converted to credits based on the following elements: Course learning outcomes; List of topics; Course persistence. Credit conversion introduces description (Mapping) to compare and evaluate the contents of MOOC courses and credit conversion courses. Credit is given for a specific course, not just any course. For AEC optional credit programs, many organizations in the United States offer a range of high quality educational programs, but only those we review and recommend in our national guidelines for credit conversion [12]. The national guidelines include institutions accredited by the American Board of Education that offer courses and tests. Country guides are constantly updated. At present, there are three courses added in EDX, and the score must be above 70% before credit conversion can be carried out.

Many MOOC credit conversion programs abroad are generally calculated in two ways. One is in terms of learning time. When calculating the learning time in foreign countries, it usually includes not only the time of learning videos, but also other learning activities such as interactive reading of learning materials in forums. India and Malaysia are representative among them. For MOOC credit conversion in India, each credit is equivalent to 13 to 15 hours of study activities covering course content, participation in course forums and other communications, assignments and course design activities. Different universities also have different regulations on credit transfer. The other is to combine learning time and learning difficulty for comprehensive calculation. For example, for the AEC's optional program, there are special credit advice services to help adults earn credit for nontraditional learning. These organizations provide details on how long and when courses will be offered, as well as credit Suggestions, which learners can look up online. Malaysia stipulates that up to 30% of credits in a program can be converted. In India, 20% of credits are transferable. According to the survey results, 42.7 percent of students expect to be awarded credits based on the content and difficulty of the course. See Fig 2.The credit conversion course should be compared with the original course. Credit conversion can only be carried out if there is a certain degree of similarity in the course content, course objective, course difficulty and other aspects. There should be an upper limit on the total number of credits transferred.
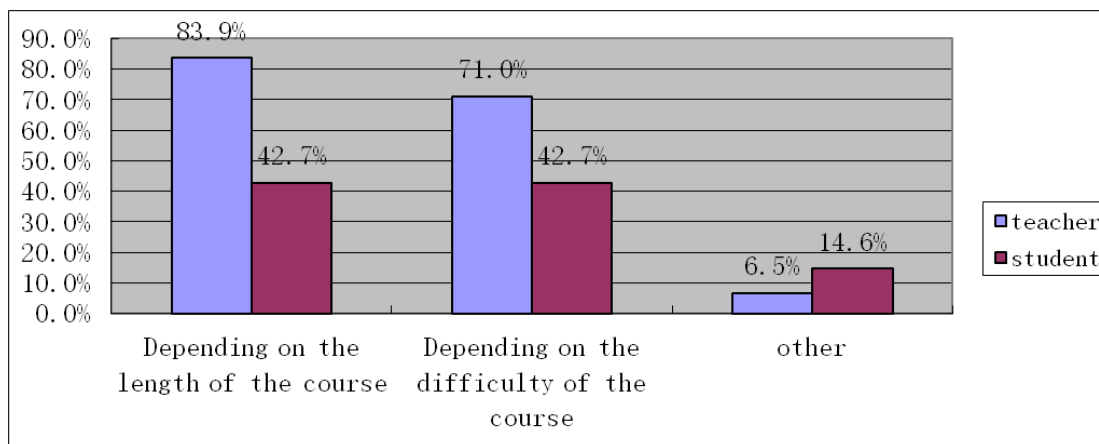

Fig 2: Credit conversion criteria

4.5 Improve the Range of MOOC Credit Conversion

The overseas MOOC credit conversion program covers multiple academic education stages such as certified bachelor's degree and doctoral degree. MOOC credit conversion in India

covers multiple levels of certification, such as undergraduate degree, postgraduate certificate, postgraduate study and postgraduate degree. In Malaysia, MOOC credits can be converted from bachelor's degree to master's and doctor's degree. According to the survey, 66.2% of students and 71.0% of teachers strongly agree to have more credit conversion courses, which indicates that most teachers and students hope to have more credit conversion courses. In view of this, Chinese universities can increase the number of MOOC courses with convertible credits and expand the educational level of MOOC credit conversion.

ACKNOWLEDGEMENTS

REFERENCE

[1] Baoding Polytechnic Institute. [2020-3-26]Notice on the implementation of MOOC credit exchange for on-campus course credit. http://xxx.cuggw.com/3g/show.asp?m=1&d=13288.

[2] Guizhou Normal College. [2015-4-23] Notice on assessment requirements and credit accounting for undergraduate students taking Elective MOOC courses, http://jiaowu.gznc.edu.cn/content.php?id=69&page=1

[3]Webster, J., Hackley, P. (1997) "Teaching Effectiveness in Technology-Mediated Distance Learning". Academy of Management Journal 40 (6): 1282-1309.

[4] Zhang JH., Zhang HP.(2009) Factors influencing Network learning and LICE model E-education Research 6:73-77.

[5] Wang ZJ. (2017) Explore the key factors influencing the effectiveness of online learning--take the principles of Economics online course for example, Master's thesis of East China Normal University.

[6] Fan YQ., Wu L., Song DM., Wang W. (2016) Analysis of influencing factors of application effect of micro-lesson , modern educational technology 2:59-64

[7] Zhang XX. (2009)Research on influencing factors and Countermeasures of online learning effect of College students, Higher education Research and evaluation 2:84-85

[8]Fan YQ., Wu L., Song DM., Wang W. (2016) Analysis of influencing factors of application effect of micro-lesson , modern educational technology 2:59-64

[9] Rong TS. (2009)AMOS and research method. Chongqing University Press

[10] Ye JS, Zhu ZL., Guo YJ. (2015)Quality assessment of modern distance education: The perspective of learning engagement. China Educational Technology 7:60-65

[11] Fang X., Wang J. (2017)Higher education MOOC credit conversion in Malaysia, modern educational technology 27(11):85-91

[12] Fang X. (2019)A theoretical and empirical study on credit conversion in MOOC. People Press