

Examining User Acceptance of MOOCs: The Role of Openness, Task Technology Fit, and Self-Efficacy

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Abstract— This study has purpose to understand the main psychological processes in technology acceptance of massive open online courses (MOOCs). We proposed extending expectation confirmation model (ECM) model with openness, task technology fit, and self-efficacy. A sample of 210 high school and university students participated as respondents in this study. After the sample data passed the validity and reliability checking, the research hypotheses were examined with correlation analysis to prove the relationship among variables and causal effect analysis using structural equation analysis (SEM) to prove the causal effect among the variables. The results revealed that: openness and task technology fit have significantly direct effect on perceived usefulness and then on continue intention to use MOOCs; self-efficacy and task technology fit have significantly direct effect on satisfaction and then on continue intention; and the last, task technology fit has significantly direct effect on confirmation and then on perceived usefulness and satisfaction. This significantly factors of the study can contribute to people who interest on the development of MOOCs leaning model through keeping the factors to gain continue intention to use MOOCs.

Keywords— MOOCs, ECM, openness, task technology fit, self-efficacy

I. INTRODUCTION

Massive Open Online Courses (MOOCs) are growing rapidly and being used by various groups to spread knowledge. MOOCs is an open education to people around the world. MOOCs is innovations that always feature novelty in online learning with an ever-increasing virtual technology-based learning environment.

MOOC has videos with a duration of 5-10 minutes. Some video lectures add quizzes and have subtitles. In addition to recordings, the instructor can serve live video sessions. The students' understanding of course concepts can be tested using instructional activities given. In most cases, MOOCs do not require students to buy books, the reading materials can be accessed online or sometimes instructors offer them in person. Ratings in MOOCs are based on evaluations via auto-rated multiple-choice questions or through peer-reviewed assessments that are assessed by peers according to established principles. The interaction between students, and students and instructors use “forum”. The forum contains general discussions, subject-specific discussions, and course feedback [1].

MOOCs are still being developed in terms of student enrollment, university participation and variety of courses,

especially for MSMEs. Currently, MOOCs have been successfully implemented and developed rapidly.

The researchers emphasize that it is important to check students' adoption in using MOOC. They have also investigated students' readiness to adopt MOOCs, as MOOCs become interesting for students in their learning.

This study has purpose to recognize whether and to what degree the factors including openness, task technology fit, and self-efficacy effect on the confirmation, perceived usefulness, and satisfaction in using the MOOCs learning system with the result that the user intent to continue using the system. We propose a research model to integrate the Expectation Confirmation Model (ECM) model with openness, task technology fit, and self-efficacy factors and examine the factors to testify their significantly effect in the model.

ECM is a suitable model that predicts key factors of Information System (IS) success. In particular, ECM proposes two main drivers of “confirmation” performance and perceived usefulness, which together are related to customer satisfaction and, in turn, the sustained intention to use IS [2], [3], [4], [5], [6], [7]. There are few MOOC adoption studies employing task technology fit [8], [9] and openness [2]. Openness is interesting variable in e-learning studies but still limited in MOOC adoption study. Self-efficacy is also an important variable on e-learning adoption [3], [10], [11], [7] and this study employs the variable to integrate with ECM model. Based on these reviews, this study adds openness along with task technology fit and self-efficacy on ECM model to examine their significantly direct effect on the variables on the model including perceived usefulness, confirmation, and satisfaction.

This study has contribution on disclosing factors predisposed users to adopt MOOCs learning model.

This paper is organized as proposed model and hypotheses in Section 2, which provides a brief overview of ECM, openness, task technology fit, and self-efficacy factors and their relations to support the proposed model in the study. The research methodology is presented in Section 3, followed by the result and discussion in section 4. The most relevant findings obtained from this study are presented and discussed in this section. The section 5 draws conclusions and summarize the contributions of this study.

II. PROPOSED MODEL AND HYPOTHESES

Reviewing several literatures on user acceptance of MOOCs, e-learning, and other related studies, resulted the proposed model and hypotheses discussed in this chapter.

Openness on Perceived Usefulness

According to Khaled [2], openness is defined as freedom of students to access the educational content. Khaled conduct study on understanding the MOOCs continuance intention and revealed that openness has direct effect on perceived usefulness. The study also confirms that openness has direct effect on continue Intention [2]. Hence, we propose:

H1: Openness has positive effect on continue intention to use MOOC's systems

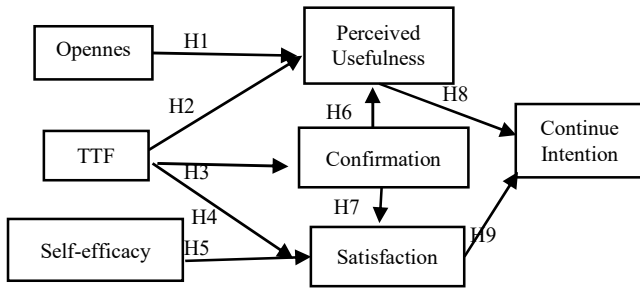


Fig. 1. Proposed Model

Task technology fit on Perceived Usefulness, Confirmation, and Satisfaction

Adapted by reference [8], Task technology fit (TTF) is the ability of MOOCs systems with reference to the task must be carried out by the student. The reference [9] studied on MOOCs adoption and they have result on TTF has positive direct effect on perceived usefulness (PU). Task technology fit also has positive effect on Satisfaction [9] and perceived usefulness [8]. Therefore, we proposed:

H2: Task technology fit has positive effect on perceived usefulness

H3: Task technology fit has positive effect on confirmation

H4: Task technology fit has positive effect on satisfaction

Self-Efficacy -> Satisfaction

Self-efficacy is the satisfied of student in accessing academic content of MOOCs by using computers [3]. Several research conducted studies on e-learning and stated that self-efficacy has direct effect on satisfaction [3], [10], [11], [7]. Hence, we propose:

H5: self-efficacy has positive effect on satisfaction

Confirmation on Satisfaction and perceived usefulness

Adapted from [12], Satisfaction was defined as "the end user's affective attitude towards a MOOCs application. Several studies showed the significantly effect of Confirmation on Satisfaction [2], [3], [4], [5], [6], [7]). Khaled [2] and Day [4] conducted research on user acceptance of MOOCs, Prasetya [3], Prasetya [5], and Widiatoro [7] examine the adoption of eLearning systems on young people, and Prasetya [6] studied on consumer acceptance on e-marketplace.

Furthermore, other studies on MOOCs and e-learning adoption stated that confirmation has direct effect on PU ([2], [6], [7]) and Continue Intention [3].

Therefore, we proposed:

H6: confirmation has positive effect on satisfaction

H7: confirmation has positive effect on perceived usefulness

Perceived Usefulness -> Continue Intention

Adapted from Harnadi [13], Perceived usefulness (PU) is the extent to which student believes that using MOOCs systems will help them to achieve their gains. PU has significantly direct effect on continue intention to use MOOC's systems ([2], [5], [6], [13], [14], [15], [16], [17]). Hence, we propose:

H8: perceived usefulness has positive effect on continue intention to use MOOC's systems.

Satisfaction -> Continue Intention

Satisfaction is important variable on adoption technology studies. Adapted from Prasetya [6], Satisfaction was defined as a positive emotional state resulting from the assessment of the use of MOOCs, and continuance intention to use the MOOCs systems. Several studies stated that satisfaction has positive effect on Continue Intention ([2], [3], [6], [14], [15], [17], [18], [19]). Meanwhile Day [10] and Widiatoro [7] proved that satisfaction has effect on continue intention to use e-learning through mediating variable, attitude. Therefore, we proposed:

H9: satisfaction has positive effect on continue intention to use MOOC's systems

III. METHODOLOGY

This study employed purposive sampling method with 203 sampled data from respondents including senior high school and university students. The questionnaires were distributed to respondents using google-form in one month and obtained 210 sample. Seven sample data is an outlier's data and must be removed.

The descriptive and causal effect analysis were conducted using SmartPLS software to authenticate the research hypotheses. The demography of respondents was revealed to show the characteristic of respondents in the study.

The questionnaires were examined by validity and reliability analyses to ensure the validity and reliability of the research instrument. Furthermore, the correlation analysis must be conducted by path coefficient analysis to examine the relationship among variables on the proposed model.

Finally, causal effect analysis using SEM was employed to test the significant effect of the relation among variables in the model. The analyses of the model were discussed to get the findings and contributions of the study.

IV. FINDINGS AND DISCUSSION

A. Demographic of Respondents

The demographic of respondents can be seen in table 1. Table 1 shows that the most of respondent are in 20-29 years old (59%), male (60%) and a diploma-undergraduate education level (76%).

TABLE I. DEMOGRAPHICS OF RESPONDENS

Total (n=203)		
Age:		
<20	37	18%
20-29	120	59%
30-39	24	12%
>=40	22	11%
Gender:		
Male	123	60%
Female	80	40%
Education:		
<High School	14	7%
Diploma - Undergraduate	155	76%
Master-Doctor	33	17%

B. Measurement Model Test

1. Convergent validity

The proposed model in Figure 1 was tested with SmartPLS and the resulted values of the outer loading was shown in Table 2.

TABLE II. THE LOADING FACTOR VALUE TO TEST THE VALIDITY OF THE INDICATOR

	CI	Conf	OP	PU	SE	Sat	TTF
CI1	0.930						
CI2	0.946						
CI3	0.928						
Conf1		0.894					
Conf2		0.897					
Conf3		0.888					
OP1			0.855				
OP2			0.823				
OP3			0.840				
PU1				0.890			
PU2				0.892			
PU3				0.829			
SE1					0.882		
SE2					0.857		
SE3					0.888		
Sat1						0.875	
Sat2						0.866	
Sat3						0.905	
TTF1							0.866
TTF2							0.877
TTF3							0.824

Note: CL = continue intention; Conf = confirmation; OP = openness; PU = perceived usefulness; SE = self-efficacy; Sat = Satisfaction; and TTF = task technology fit

Table 2 explains the value of each indicator loading outer value is greater than 0.7. Meanwhile, the result of the Average Variance Extracted (AVE) value is shown in Table 3.

Table 3 shows that all variables have an AVE value more than 0.5. The results on Table 2 and 3 show that the model fulfills the requirements for convergent validity.

TABLE III. AVERAGE VARIANCE EXTRACTED (AVE) VALUE

Average Variance Extracted (AVE)	
CI	0.874
Conf	0.797
OP	0.705
PU	0.758
SE	0.767
Sat	0.778
TTF	0.733

2. Discriminant Validity

Testing for discriminant validity used the Fornell-Lacker criterion. The result was seen in Table 4.

TABLE IV. FORNELL-LARCKER CRITERION VALUES

	CI	Conf	OP	PU	SE	Sat	TTF
CI	0.935						
Conf	0.597	0.893					
OP	0.529	0.609	0.840				
PU	0.654	0.758	0.647	0.871			
SE	0.636	0.665	0.631	0.710	0.876		
Sat	0.736	0.790	0.623	0.751	0.760	0.882	
TTF	0.612	0.637	0.604	0.647	0.659	0.680	0.856

Based on Table 4, each variable is compared with each other and the greatest value is in the comparison between the same variables. Consequently, the model is qualified for discriminant validity.

3. Reliability Test

Reliability is the consistency or stability of an indicator. The reliability is reviewed using the value of composite reliability and Cronbach's alpha. The composite reliability and cronbach's alpha values of each construct are shown in Table 5.

TABLE V. THE VALUE OF COMPOSITE RELIABILITY AND CRONBACH'S ALPHA

	Cronbach's Alpha	Composite Reliability
CI	0.928	0.954
Conf	0.873	0.922
OP	0.790	0.877
PU	0.840	0.904
SE	0.848	0.908
Sat	0.857	0.913
TTF	0.817	0.892

Table 5 explains that all constructs have a composite reliability value more than 0.7, it means that the variable is reliable.

C. Structural Model Test

Testing the structural model was conducted to analyze the structural relationship between the measured variables and their latent variables. The test involves path coefficients and coefficient of determination tests.

1. The path coefficients Test

The path coefficients are a test to determine a hypothesis is accepted or not. The path coefficients values were seen in Table 6.

TABLE VI. VALUE OF PATH COEFFICIENTS

	CI	Conf	OP	PU	SE	Sat	TTF
CI							
Conf				0.499		0.374	
OP				0.226			
PU	0.221						
SE						0.310	
Sat	0.571						
TTF		0.637		0.191		0.141	

Table 6 and Fig. 2 show that the values of path coefficient more than 0.1 for the correlation of perceived usefulness (0.211) and satisfaction (0.571) on continue intention. The other correlations also show the same results: openness has correlation to perceived usefulness (0.226); task technology fit has correlation to perceived usefulness (0.191), confirmation (0.637), and satisfaction (0.141); self-efficacy has correlation on satisfaction (0.310); confirmation has correlation on perceived usefulness (0.499) and satisfaction (0.374).

2. Coefficient of Determination Test

The purpose of examining the coefficient of determination (R-Square) is to find out the accuracy of the prediction of proposed model.

The coefficient of determination describes how much the ability of independent variable to describe the variance of the latent variable. The interpretation of coefficient of determination can be classified into 3 levels including small, medium or large effect. The coefficient of determination of the four factors used in the model was seen in Table 7.

TABLE VII. R SQUARE AND R SQUARE ADJUSTED VALUES

	R Square	R Square Adjusted
CI	0.566	0.562
Conf	0.406	0.403
PU	0.648	0.643
Sat	0.734	0.730

The determination values on Table 7 are more than 0.26 or 26% (large/strong effect size)

3. Hypothesis Test

The hypothesis was tested by comparing p-values with a significance level of 5% (two-tailed test). SmartPLS was used to calculate mean, standard deviation, t-statistics, and p-values. The structural validity of hypothesis was checked to determine the accepted or rejected of hypothesis by comparing the p-value with the level of significance.

The hypothesis will be accepted if p-value is below 5%, and rejected if p-value is above 5%.

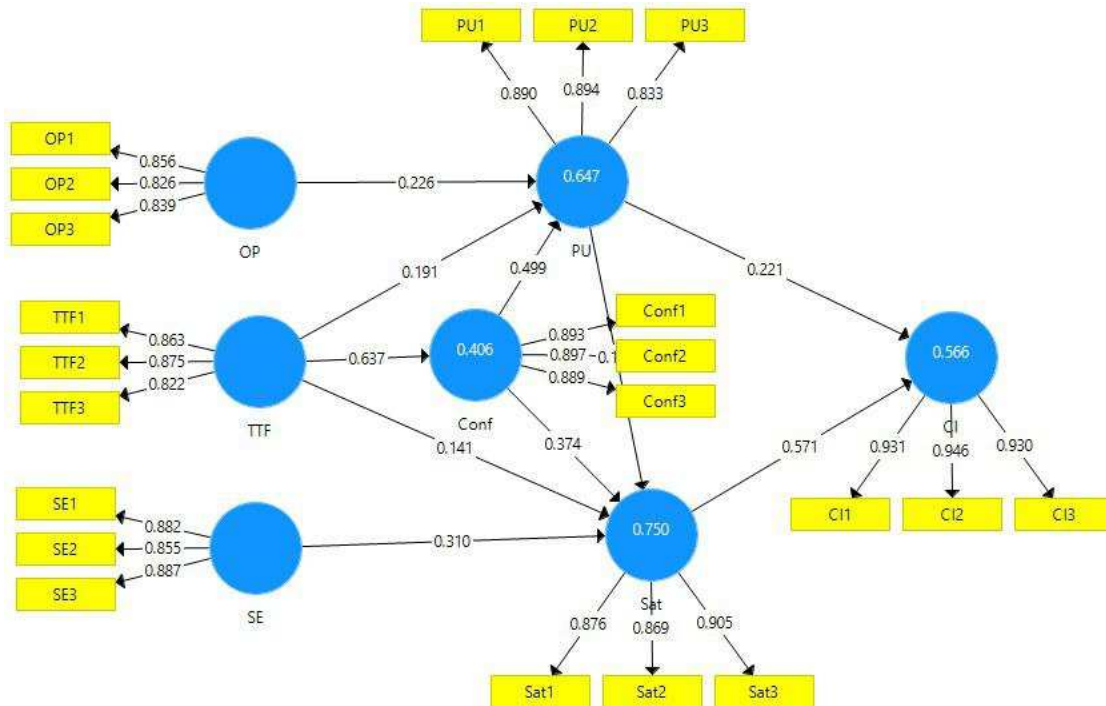


Fig. 2. Final model.

TABLE VIII. HYPOTHESIS TEST RESULTS

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	P Values	Hypothesis
Conf -> PU	0.496	0.499	0.068	0.000	Accepted
Conf -> Sat	0.454	0.374	0.067	0.000	Accepted
OP -> PU	0.228	0.226	0.074	0.002	Accepted
PU -> CI	0.233	0.221	0.103	0.024	Accepted
SE -> Sat	0.354	0.310	0.067	0.000	Accepted
Sat -> CI	0.562	0.571	0.093	0.000	Accepted
TTF -> Conf	0.637	0.637	0.040	0.000	Accepted
TTF -> PU	0.193	0.191	0.073	0.008	Accepted
TTF -> Sat	0.158	0.141	0.070	0.025	Accepted

Table 8 shows that the all of the hypotheses are support, (p value is 0.05 or above). Fig.2 shows the final model.

D. Discussion

The most of respondent of the study are young people, male and student in a diploma and undergraduate degree. The questionnaires as instrument to collect data was passed convergent validity, discriminant validity, and reliability tests.

Structural model test has conducted to analyze the causal effect among variables in the model and the results are discussed in the following paragraphs.

The final model on Figure 2, all of the hypotheses are accepted. Firstly, openness and task technology have significantly direct effect on perceived usefulness. The result regarding to the relationship of openness to perceived usefulness is suitable to the research conducted by Khaled [2], and the relationship of perceived usefulness to continue intention is consistent to several studies conducted by [5], [6], [13], [14], [15], [16], [17].

Secondly, task technology fit has significantly direct effect on perceived usefulness, confirmation, and satisfaction. The results are consistent to studies conducted by Wu and Chen [8]. Confirmation also has significantly direct effect on perceived usefulness and satisfaction. The significantly result regarding to the relationship of confirmation on satisfaction is also in accordance with the study conducted by [2], [3], [4], [5], [6], [7]). The significantly result regarding to the relationship of confirmation to perceived usefulness is suitable with the studies conducted by [2], [6], [7].

Finally, the result of self-efficacy has significantly effect on satisfaction is in accordance with the study conducted by [3], [10], [11], [7]. Furthermore, the result regarding to satisfaction has significantly direct effect on continue intention is corresponding to the study by [2], [3], [6], [7], [14], [15], [17], [18], [19].

The implication of this study in the theory side is the extending ECM model to utilize on MOOCs adoption study. This study revealed that openness, task technology fit, and self-efficacy are reasonable variables to be integrated to ECM model. The implications on practice are related to the

contribution of this study on their significantly relation among variables to work up people who are interested in MOOC. The behavioral perception of people using the MOOCs system could be boosted by the positive openness, task technology fit, and their self-efficacy in using MOOCs.

V. CONCLUSION

This study revealed several findings regard to behavioral research of technology adoption. The 302 data of the research express that most of respondents are young, male, and students of high school and university. The variables associated with ECM verify the significantly effect among variables in the model and establish that perceived usefulness and satisfaction have significantly direct effect on continue intention in using MOOCs system. The others variables including openness, task technology fit, and self-efficacy represent the significantly effect on perceived usefulness, confirmation, and satisfaction. Openness and task technology fit have significantly direct effect on perceived usefulness. Task technology fit has significantly direct effect on confirmation. Finally, self-efficacy and task technology fit has significantly direct effect on satisfaction. The significantly effect of variables in the research contribute to people and institution who have interest on MOOCs development. They can use the behavioral perception related to the variables in this MOOCs research naming positive openness, task technology fit, self-efficacy, perceived usefulness, confirmation, and satisfaction to increase people adoption of the system.

REFERENCES

- [1] Alghamdi, T., Hall, W., & Millard, D. (2019). A classification of how MOOCs are used for blended learning. ACM International Conference Proceeding Series, 2006, 1–7. <https://doi.org/10.1145/3345094.3345107>.
- [2] Khaled M. Alraimi, Hangjung Zo, Andrew P. Ciganek. Understanding the MOOCs continuance: The role of openness and reputation, Computers & Education, Volume 80, 2015. Pages 28-38. <https://doi.org/10.1016/j.compedu.2014.08.006>.
- [3] F. H. Prasetya, B. Harnadi, A. D. Widiatoro and A. C. Nugroho, "Extending ECM with Quality Factors to Investigate Continuance Intention to Use E-learning," 2021 Sixth International Conference on Informatics and Computing (ICIC), 2021, pp. 1-7. <https://doi.org/10.1109/ICIC54025.2021.9632995>.
- [4] Hai Min Dai, Timothy Teo, Natasha Anne Rappa. Understanding continuance intention among MOOC participants: The role of habit and MOOC performance, Computers in Human Behavior, Volume 112,2020, 106455. <https://doi.org/10.1016/j.chb.2020.106455>.
- [5] F. H. Prasetya and B. Harnadi, "Investigation of Adoption of Smartphone Technology for Learning," 2019 23rd International Computer Science and Engineering Conference (ICSEC), 2019, pp. 251-254. <https://doi.org/10.1109/ICSEC47112.2019.8974802>.
- [6] F. H. Prasetya, B. Harnadi, A. D. Widiatoro, A. N. Hidayanto and A. C. Nugroho, "Investigating the Impact of System and Service Qualities on Customer Loyalty in Acceptance of E-Marketplace," 2020 Fifth International Conference on Informatics and Computing (ICIC), 2020, pp. 1-6. <https://doi.org/10.1109/ICIC50835.2020.9288597>.
- [7] Widiatoro, A. D., Murniati, C. T., & Hartono, H. (2022). Examining user acceptance and satisfaction of HE's E-learning platform. World Journal on Educational Technology: Current Issues, 14(5), 1234–1245. <https://doi.org/10.18844/wjet.v14i5.7200>.
- [8] Widiatoro, A. D., & Harnadi, B. (2019). Voluntariness Difference in Adoption of E-Learning Technology among University Students. ICSEC 2019 - 23rd International Computer Science and Engineering Conference, 402–408.
- [9] Bing Wu, Xiaohui Chen. Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task

technology fit (TTF) model, *Computers in Human Behavior*, Volume 67, 2017, Pages 221-232. <https://doi.org/10.1016/j.chb.2016.10.028>.

- [10] A. Suzianti and S. A. Paramadini, "Continuance intention of Elearning: The condition and its connection with open innovation," *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 97, 2021.
- [11] Razak, F. Z. A., Bakar, A. A., & Abdullah, W. S. W., "The role of system quality and content quality in explaining e-learning continuance intention: An Evidence from Malaysian e-learning users," In *Journal of Physics: Conference Series* (Vol. 1529, No. 5, p. 052095). IOP Publishing, May 2020.
- [12] Apollos Patricks Oghuma, Christian Fernando Libaque-Saenz, Siew Fan Wong, Younghoon Chang, "An expectation-confirmation model of continuance intention to use mobile instant messaging ", *Telematics and Informatics*, vol. 33, pp. 34-47, 2016.
- [13] B. Harnadi, "An investigation of the adoption of online game technologies in Indonesia", *International Journal of Gaming and Computer-Mediated Simulations*, vol. 8, no. 4, 2016.
- [14] W. Chiu, H. Cho, and C. G. Chi, "Consumers' continuance intention to use fitness and health apps: an integration of the expectation-confirmation model and investment model," *Inf. Technol. People*, 2020, doi: 10.1108/ITP-09-2019-0463.
- [15] Aslam, W., Ham, M. and Farhat, K., "Building Brand Loyalty: An Application of Expectation Confirmation Model in Mobile Social Commerce," *Journal of Commerce and Social Sciences*, Vol. 13, no.4, pp. 806-825, 2019.
- [16] E. Park, "User acceptance of smart wearable devices: An expectation-confirmation model approach," *Telemat. Informatics*, vol. 47, no. December 2019, 2020, doi: 10.1016/j.tele.2019.101318.
- [17] C. Tam, D. Santos, and T. Oliveira, "Exploring the influential factors of continuance intention to use mobile Apps: Extending the expectation confirmation model," *Inf. Syst. Front.*, vol. 22, no. 1, pp. 243-257, 2020, doi: 10.1007/s10796-018-9864-5.
- [18] Bhattacharjee, A., "Understanding information systems continuance: an expectation-confirmation model," *MIS Quarterly*, vol. 25, pp. 351370, 2001.
- [19] G. Dağhan and B. Akkoyunlu, "Modeling the continuance usage intention of online learning environments," *Comput. Human Behav.*, vol. 60, pp. 198-211, 2016, doi: 10.1016/j.chb.2016.02.066.