Learner retention in MOOC environment: Analyzing the role of motivation, self-efficacy and perceived effectiveness

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ABSTRACT

Massive Open Online Course (MOOC), an unconventional method of learning has paved way for educational opportunities for learners of all age groups at any time. However, evidence suggests that MOOC has posed many challenges such as low completion rates, low motivation of learners and low perceived value compared to traditional methods. In MOOC, learners are expected to display a self-regulating behaviour and hence motivation of the learner is imperative to successful completion of the course. This study analyzed the role of motivation, perceived effectiveness and self-efficacy in enhancing learner retention. The research was carried out with a sample of 375 participants who had enrolled in a MOOC program of their choice within the past two years. A structured instrument was used to elicit the responses. The data was analyzed using Binomial logistic regression. The resulting model accounted for a 49.8% of variance in learner retention according to the Cox & Snell's R^2 value and 70.2% variance according to Nagelkerke R^2 value indicating that motivation, perceived effectiveness and self-efficacy are significant predictors for learner retention. This study provides insights to developers/instructors to understand learner intent and design interventions to make learning more personalized that will increase the retention rate.

1. INTRODUCTION

MOOC has been acknowledged as a disruptive innovation in the field of education (Ernst & Young 2012) and has led to massive transformation of the traditional learning environment (Norton et al. 2013). MOOC has gained prominence with improvements in technology and with the growing acceptance of the online mode of learning. The MOOC environment helps learners overcome the constraints of cost and geography, provides greater flexibility in creating a self-paced learning environment (Milligan & Littlejohn 2017) and presents an opportunity for learners to access high-quality content from renowned scholars and teachers (Rieber 2017). It has opened up the learning environment to the set of learners who are required to upgrade their knowledge to stay relevant (Milligan & Littlejohn 2017; Zhenghao 2015).

However, despite their popularity and growth, the low completion rates have triggered numerous debates and are a major challenge to providers of MOOC. Prior studies have indicated that completion rates are as low as 7-11% (Gamage et. al. 2015; Daniel 2013; Lewin 2012; Meyer 2012; Hone & Said 2016). Some of the major reasons identified for the low completion rates are low motivation among the learners and low perceived value for the course. As MOOC courses depend on the self-regulation of the learner, motivation of the learner has been identified as a determinant that drives the learner to complete the course. The self-efficacy of the learner also plays a significant role in the MOOC environment. This is due to the limited interaction with co-learners and with faculty. The purpose of the study is to illuminate the theoretical relation underlying learner retention with motivation, self-efficacy and perceived effectiveness of the course.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Learner Retention

Retention rate is a vital parameter as it determines the sustainability and financial feasibility of the course (Wild & Ebbers 2002). Though retention of learners has been a problem in the traditional educational system, the MOOC environment presents a unique scenario. The retention of learners in MOOC has been explained using the 'funnel of participation' (Clow 2013) which indicates that the number of participants in a MOOC course decreases as it progresses (Freitas et al. 2015; Greene et al. 2015). Research has identified diverse reasons for this pattern. These include academic and personal reasons (Gutl, et. al. 2014), lack of time (Belanger & Thornton 2013), low levels of learner motivation and commitment (Yuan & Powell 2013), lack of self-determination, difficulty in the subject, unchallenging activities and lack of monitoring mechanism are some of the often cited reasons for high drop-out rates.

Understanding the reason for low retention rates helps MOOC providers formulate strategies for improvement of student engagement and learning (Keller & Suzuki 2004). Quality of the content provided, increasing peer interaction, creation of a positive learning environment (Adamopoulous 2013) and improving the activities embedded within the course are some of the commonly used strategies to improve retention.

2.2 Motivation

Motivation is the process through which goal directed activity is instigated and sustained (Schunk et. al. 2008). Since 1970s, motivation has been widely researched to gain an understanding of its impact on performance and achievement of the learner. 'Learner intent' affects the level of motivation of a participant. In a face-to-face learning environment, research has indicated that motivated learners exhibit several characteristics. They are more likely to undertake challenging activities, are more engaged, adopt deep-learning approaches, identify relevant academic activities to attain the goals and obtain intended benefits from them. The level of motivation also depends on the experience of the learner in earlier courses (Coffrin et al, 2014). In a traditional learning environment, learners are motivated if they have similar goals and incentives.

As in the traditional learning environment, motivation has been identified as a significant variable in the online learning context (Sha et al. 2012). However, only limited studies have been conducted to examine motivation in the online learning environment. These studies have established that motivation influences the learning process and achievement (Chanlin 2009; Johnson 2012). The interaction with peer learners is absent or limited and motivation gained from social interactions is also lacking in MOOC. In MOOC, some learners enrol to have learning experience where as many participants enrol out of curiosity and do not possess the motivation to complete the course. Moreover, learners are expected to display a self-regulating behaviour and hence motivation of the learner is imperative to successful completion of the course (Huang & Hew 2016). Therefore it is hypothesised that,

> H1 : Motivation of the participants will have a positive impact on learner retention in MOOC environment

2.3 Perceived Effectiveness

Learner retention is not only dependent on content and quality of the MOOC course but also on how a learner perceives the effectiveness of the course. Perception is an important determinant towards motivating and engaging students with the learning process (Fesol et. al. 2017). A positive perception of the course increases involvement of the learner and creates interest in

fulfilling the requirements of the course. Cheng et. al (2016) found that online forum activities create a positive influence on perception of the learners towards MOOC. Prior literature examining the perceived effectiveness of the courses has focused on the quality of the instructor, instructional materials used, extent of interaction and dynamic assessment of the course; found that courses met the requirements of the learner. Hence this study proposed a hypothesis as

> H2: Perceived Effectiveness of the course will have a positive impact on learner retention in MOOC environment

2.4 Self-efficacy

Self-efficacy refers to the 'beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments' (Bandura 1977). It determines the level of commitment and persistence that an individual assigns to the task to ensure successful completion. Self-efficacy has been found to affect students learning, motivation and achievement (Pajares & Urdan 2006; Schunk 2003; Zimmerman et. al. 1992). Learners with high self-efficacy have been found to work harder, pursue goals that are challenging, put in greater effort towards the goal, be persistent and participate better in the course (Bandura 1997; Pajares 2003; Schunk 1991). In the context of MOOC, high self-efficacy is crucial to complete the course as the onus is on the learner (Wang & Newlin 2002; Zimmerman 2000). Prior studies have found that pre-course training, exposure to online learning technology (Bates & Khasawneh, 2007) and experience in a MOOC environment (Littlejohn et. al. 2016; Zimmermann 2000) influence the extent of self-efficacy of the learner. Successful completion (Mastery experience) of MOOCs has also been found to result in high self-efficacy. The performance of the students was also found to be positively related to self-efficacy (Hsieh et al. 2007). It is pertinent to understand self-efficacy as it helps to identify interventions and strategies to retain the students. Therefore the following hypothesis is proposed:

> H3 : Self-efficacy of the participants will have a positive impact on learner retention in MOOC environment

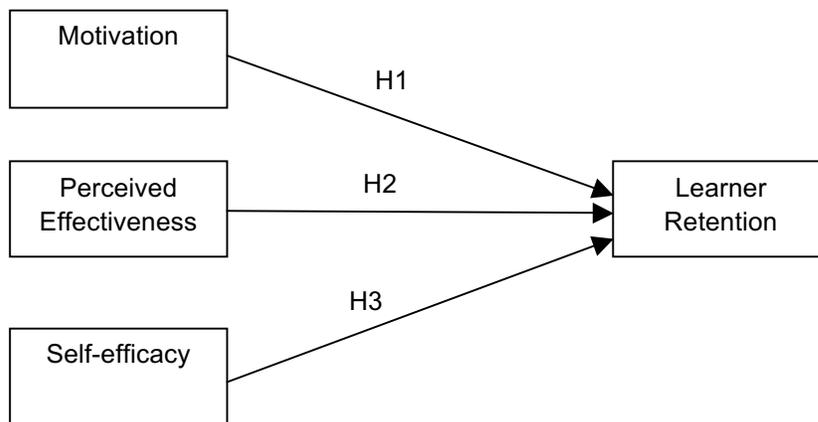The theoretical framework for the study is given in Figure 1.

Figure 1: *Theoretical Framework*

3. RESEARCH METHODOLOGY

3.1 Measures

A structured questionnaire was used to collect the data required for the study. The instrument comprised of three sections, the first part to capture demographic information about the respondents (age, gender, and educational qualification), number of MOOC courses completed and few open-ended questions that sought response about the pros and cons of MOOC courses. The second part captured information about the independent variables. The 'Motivation' construct was developed based on the ARCS model and had 36 questions adopted from the IMMS survey instrument (Keller & Kopp 1987). This construct was categorised into four sub-constructs namely, attention, relevance, satisfaction and confidence. Perceived effectiveness was measured using 3 items that were adopted from Peltier et. al (2003). The 'Self-efficacy' construct had 17 questions that were drawn from Sherer et. al. (1982). All the responses were obtained on a five-point Likert scale, where 1 represented strongly disagree and 5 for strongly agree. The third part measured the dependent variable 'Learner Retention' using 3 questions. A pilot test was conducted to evaluate the validity and reliability of the instrument. Based on the inputs received few questionnaire items were rephrased to improve clarity.

3.2 Population and Sample

The population for the study included any person who had enrolled/completed one or more MOOC courses of their choice within the past two years. The survey was administered online using Google forms. The URL for the online survey was circulated through emails and social networking platforms. Regular follow ups were done to elicit responses. The data for the study was gathered over a period of 3 months. The survey yielded 463 responses of which 375 valid responses were identified and used for analysis. The profile of the respondents is given in Table 1.

Table 1: Profile of Respondents

Items	Scale	Frequency	Percent
Age	21-30	276	73.6
	31-40	47	12.5
	41-50	40	10.7
	51-60	12	3.2
Gender	Male	199	53.1
	Female	176	46.9
Enrolment/ Completion of MOOC	Currently Undergoing	154	41
	Completed	86	23
	Enrolled but not completed (drop outs)	135	36

It was found that most respondents were in the age group of 21-30 years (73.6 percent) indicating that learners undergo MOOC courses during their under graduation or post graduation. Also there was almost equal participation of the male and female respondents in the study. Finally, the statistics indicated that 23 percent of respondents enrolled and completed the course and 36 percent of respondents enrolled but did not complete the course.

4. ANALYSIS AND RESULTS

4.1 Learner Retention

Table 2: Learner Retention

		Frequency	**Percent**
Exercises/Assessments completed in MOOC	All	72	19.2
	Most	97	25.8
	Around Half	87	23.2
	Some	56	15.0
	None	63	16.8
MOOC content watched or read	All	67	17.9
	Most	102	27.3
	Around Half	98	26.1
	Some	58	15.4
	None	50	13.3
When did you drop out	First Few Days	17	12.6
	First Few Weeks	32	23.7
	Towards the Middle	46	34.1
	Towards the End	18	13.3
	Just before the End	22	16.3

The analysis given in Table 1 indicates that 31.8% of the respondents completed some or none of the exercises/assessments in MOOC course. A similar pattern (28.7%) was observed in reading or watching the content. This shows that these were likely to drop out from the course. An examination of the drop-out rates showed that majority of the learners dropped out towards the middle of the course.

4.2 Analysis of Pros and Cons

The questionnaire had open ended questions for which the respondents were asked to provide pros and cons of enrolling in a MOOC course. The responses were analysed. Some of the advantages mentioned by the respondents were ease of access, flexibility in timing, no age restrictions, access to knowledge from top notch universities, global participation and interaction, assessment in comparison with global peers, learning at one's own pace and content through visual effects.

However, respondents had also mentioned some of the cons such as lack of transparency in assessment, more theoretical focus, ineffective teaching, no personal attention, monotonic, lack of interaction with co-learners, requires greater concentration, real-time Q&A sessions absent, on-spot doubt clarification is not possible, lack of student-teacher bonding, peer evaluations lack transparency, evaluations are machine-based, feedback is missing for assessments, unrestricted time-periods to complete assignments makes participants lazy.

4.3 Reliability and Confirmatory Factor Analysis

The reliability of the constructs was examined using Cronbach's Alpha. The reliability scores are given in Table 3. The values indicate that the reliability scores of all constructs and sub-constructs were more than the accepted value of 0.7 (Cuieford 1965; Nunnally 1978).

Table 3: Reliability Scores

Constructs	Cronbach Alpha
Motivation	0.9435
Attention	0.8306
Relevance	0.8660
Confidence	0.7832
Satisfaction	0.8676
Perceived Effectiveness	0.7857
Self-Efficacy	0.7024

A confirmatory factor analysis was done to establish the dimensions of the instrument. The analysis showed that the items relating to each construct loaded onto the respective dimensions. The factor loadings are given in Table 4.

Table 4: Factor Loadings

Items	Factor Loadings
Motivation	
Attention	
There was something interesting at the beginning of this course that got my attention.	0.654
The materials are eye-catching.	0.764
The quality of the videos helped to hold my attention.	0.685
This course is so abstract that it was hard to keep my attention.	0.758
The web-pages of this course look dry and unappealing.	0.720
The way the information is arranged on the web pages helped keep my attention.	0.689
This course has things that stimulated my curiosity.	0.793
The amount of repetition in this course caused me to get bored sometimes.	0.843
I learned some things that were surprising or unexpected.	0.765
The variety of lectures, reading passages, exercises, illustrations, etc., helped keep my attention on the course.	0.812
The style of presentation of the facilitator is boring.	0.834
The lectures were too long that it is irritating.	0.723
Relevance	
It is clear to me how the content of this material is related to things I already know.	0.624
There were cases, pictures, or examples that showed me how this material could be important to some people.	0.687
Completing this course successfully was important to me.	0.683
The content of this material is relevant to my interests.	0.664
There are explanations or examples of how people use the knowledge in this course.	0.663
The content and style of delivery in this course convey the impression that its content is worth knowing.	0.646

Items	Factor Loadings
This course was not relevant to my needs because I already knew most of it.	0.623
I could relate the content of this course to things I have seen, done, or thought about in my own life.	0.679
The content of this course will be useful to me.	0.685
Confidence	
When I first looked at this course, I had the impression that it would be easy for me.	0.628
This material was more difficult to understand than I would like for it to be.	0.795
After reading the introductory information, I felt confident that I knew what I was supposed to learn from this course.	0.694
Many of the lectures had so much information that it was hard to pick out and remember the important points.	0.637
As I worked on this course, I was confident that I could learn the content.	0.619
The exercises in this course were too difficult.	0.694
After working on this course for a while, I was confident that I would be able to pass a test on it.	0.760
I could not really understand quite a bit of the material in this course.	0.703
The good organization of the content helped me be confident that I would learn this material.	0.761
Satisfaction	
Completing the exercises in this course gave me a satisfying feeling of accomplishment.	0.711
I enjoyed this course so much that I would like to know more about this topic.	0.698
I really enjoyed studying this course.	0.659
The wording of feedback after the exercises, or of other comments in this course, helped me feel rewarded for my effort.	0.811
I felt good to successfully complete this course.	0.772
It was a pleasure to work on such a well-designed course.	0.769
Perceived Effectiveness	
I would recommend this course to friends/colleagues	0.658
I have learned a lot in this course	0.721
I have enjoyed taking this course	0.714
Self-Efficacy	
When I make plans, I am certain I can make them work	0.626
One of my problems is that I cannot get down to work when I should	0.750
If I can't do a job for the first time, I keep trying until I can	0.726
When I set important goals for myself, I rarely achieve them	0.759
I give up on things before completing them	0.801
I avoid facing difficulties	0.771
If something looks too complicated, I will not even bother to try it	0.713
When I have something unpleasant to do, I stick to it until I finish it	0.720
When I decide to do something, I go right to work on it	0.729
When trying to learn something new, I soon give up if I am not initially successful	0.745
When unexpected problems occur, I don't handle them well.	0.683
I avoid trying to learn new things when they look too difficult for me.	0.755
Failure just makes me try harder	0.783
I feel insecure about my ability to do things	0.740
I am a self-reliant person	0.755
I give up easily	0.763
I do not seem capable of dealing with most problems that come up in life	0.740

4.4 Model Results

Binomial Logistic Regression model was used to determine the extent to which learner motivation, self-efficacy and perceived effectiveness of the course predict the learner retention in a MOOC environment. Table 5 presents the fit and variance of the logistic regression model to estimate learner retention. The model indicated an overall fit for the independent variables included in the study (-2Log Likelihood= 176.43). The model accounted for a 49.8% of variance in learner retention according to the Cox & Snell's R^2 value and 70.2% variance according to Nagelkerke R^2.

Table 5: *Fit and Variance of Model*

Step	-2 Log Likelihood	Cox & Snell's R^2	Nagelkerke R^2
1	176.43	0.498	0.702

The Table 6 displays the ability of the logistic regression model to correctly estimate the respondents who intend to complete the MOOC course that they have enrolled. The model had an overall estimated rate of 62.2% and was able to estimate the respondent's intention to complete the course 97.8% of the time.

Table 6: *Classification Table* of logistic regression*

Observed			Predicted		
			Learner Retention		Percentage
			Yes	No	Correct
Step 1	Learner Retention	Yes	222	5	97.8
		No	132	3	2.2
		Overall Percentage			62.2

*The cut value is 0.500

Table 7 presents the results of the logistic regression for the three independent variables included in the study. All the three variables significantly contributed to the model (Sig<.05). The results indicate that learner retention is high when the respondents perceive a higher effectiveness of the course and have high levels of motivation and self-efficacy. The odds ratio for motivation (1.402) indicates that a one-point increase in the level of motivation increases the probability of learner retention by a multiplicative factor of 1.402. The odds ratio for perceived effectiveness and self-efficacy were 0.673 and 0.772 indicating that a one-point increase in the level of perceived effectiveness and self-efficacy increases the probability of learner retention by a multiplicative factor of 0.673 and 0.772 respectively.

Table 7: Logistic Regression Showing Learner Retention in the course

		B	S.E	Wald	df	Sig.	Exp(B)
Step 1	Motivation	0.338	0.240	1.986	1	0.009	1.402
	Perceived Effectiveness	0.396	0.185	4.590	1	0.032	0.673
	Self-Efficacy	0.258	0.253	1.044	1	0.037	0.772
	Constant	0.498	0.896	0.309	1	0.000	0.646

These findings support the hypotheses (H1, H2 and H3) that motivation, perceived effectiveness and self-efficacy positively influences learner retention in MOOCs.

5. DISCUSSION AND CONCLUSION

This research was done to examine learner retention in MOOC courses and the influence of motivation, perceived effectiveness and self-efficacy on retention. The study found that out of the 375 respondents, 36% did not complete the course. A further analysis revealed that 69% of the drop-outs quit the course half-way through or before. This finding is supported by previous studies (DeFreitas et al. 2015; Greene et al. 2015; Hone & Said 2016). The effectiveness of a MOOC course depends on the quality of content (Sugant 2014) and the extent to which the participants read/watch the content. This study found that the respondents who completed the course had read/watched 70% of the course content. They also had finished 69% of the exercises/assignments of the course. Similar to prior studies, this study also found that ease of access to knowledge; flexibility and self-paced learning were strong reasons for enrolments in MOOC. Lack of student-teacher bonding, feedback and peer-interaction were identified as inherent weaknesses that led to drop-outs after enrolment.

The study hypothesised that motivation will have a positive influence on learner retention. The results of a binomial logistic regression showed that learner retention was high among highly motivated participants. This result is consistent with the study done by Huang & Hew (2016) who found that the 'completed course group' were motivated than the 'uncompleted course group'. This clearly indicates that MOOC providers can improve retention by creating a MOOC environment that is highly motivating (de Barba et al. 2016).

Self-efficacy was also found to positively influence learner retention. Designing courses that are more challenging, easier to self-monitor and have more transparent assessments are imperative to boost the self-efficacy of the learner (Bandura 1997). As self-efficacy improves with prior experiences, first-time MOOC enrollers may be provided a mock session to have a feel of the virtual environment. The study found that perceived effectiveness of the course has a significant positive influence on learner retention. MOOC providers can therefore focus on aspects such as content, quality and interaction to enhance the perceived effectiveness of the course (Peltier et al. 2003). Motivation, self-efficacy and perceived effectiveness explained a 70.2% variance in learner retention. This study provides insights to developers/instructors to understand learner intent and design interventions to make learning more personalized that will increase the retention rate.

Future researchers can extend this study by examining the effect of factors such as engagement, quality, interaction with peers and instructor on retention. The respondents of this study

comprised of individuals who enrolled/completed a MOOC course from any university or online learning platform. Research specific to MOOC providers can be undertaken to explore other relevant factors that impact the retention rate of their courses.

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