EVALUATING EFFECTIVENESS OF MOOCS USING EMPIRICAL TOOLS: LEARNERS PERSPECTIVE

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Abstract

Massive Open Online Courses (MOOCs) are found to be the latest disruption in online education. Since 2012 up to day, there are many MOOCs introduced in many platforms. Some of the platforms are namely Coursera, edX, NovoEd, FutureLearn, Open2Study. For an instance Coursera has more than 700 courses in their platform. Although there is increase demand for online courses, very less percentage of participants complete the courses. Some researchers claim this is due to lack of self discipline, yet it is still sceptic on the reasons for higher dropout rates. However, examining reviews of the courses by participants and experiencing by ourselves as active MOOC participants it is understood that not all the courses meet the user goals or effective to the users. In this empirical research we tried to evaluate the effectiveness of MOOCs. We enrolled in 22 courses from 5 different platforms and evaluated the courses while actively participating. We used 2 evaluation frameworks based on empirical research in this process. Evaluation results indicated a quality variation in the platforms and in between courses within the same platform as well. Our conclusion strongly emphasize the requirement of quality control in designing and implementing of any MOOC course as many courses lacks to meet the user goals proving a quality learning experience.

Keywords: MOOC, quality, eLearning, online learner, online courses.

1 INTRODUCTION

Massive Open Online Curses (MOOCs) became the "buzz" word in online education since introduction of the xMOOC platforms; Cousera, Udacity and edX. MOOCs are by nature massive in participants and open to any interest party either free of charge or at a considerable low cost. Although online education has been practising for decades, arrival of Massive Open Online Courses (MOOCs) brought new aspects, experiences and views to online education. It is mainly because unlike earlier, MOOCs are open to any interest party and subsequently it allowed many interest learners to explore and experience online education. Due to the popularity and demand the New York Times pronounced 2012 as the year of MOOC [21]. Many researchers state that MOOCs are proving sounded pedagogical features. Such as short videos to enhance the retention and focus, short videos with quizzes to enhance mastery base learning, peer and self assessment to enhance the retrieval of learning experience, online forums to enhance collaboration [10]. At the same time research found that the students in MOOCs performed and achieved higher gains than the face to face campus base classroom [1]. However, a latest research revealed that MOOC hype is fading and at the same time some researchers are sceptic about the future of MOOC [8]. They are concern about the pedagogy behind MOOCs and doubt whether there is an active learning taking place in MOOC. Despite the popularity and the demand, MOOC providers revealed that they are facing higher dropout rates and it was identified as a common factor of 13% as stated by [19]. Although the researchers stated that completing a MOOC depends on participant's personal agenda and commitment [12], it is evident that some MOOCs are not meeting the user expectations. In other words it has found that MOOCs are facing quality challenges. During past 3 years, number of MOOCs increase rapidly and participants are facing challenges to identify the quality courses. Since quality related researches are lacking in the MOOC research arena, this research focuses to illustrate empirically that there is a quality variation in MOOCs where necessary quality control actions should be taken. This research attempted to evaluate MOOCs using frameworks or tools specifically designed, tested and validated using MOOC participants to evaluate effectiveness of MOOCs.

The paper is organized such that firstly we stated the objective of this research followed by a comprehensive review of literature. Secondly, we explained the methodology use to evaluate the MOOCs followed by results and analysis. Finally, we discussed the findings in details followed by the conclusion remarks.

2   OBJECTIVE

Although cMOOCs or connectivist MOOCs have been practising since 2008, xMOOCs became popular since 2012. As at now xMOOCs are attracting wide range of participants. At the same time number of xMOOC platforms and number of courses are increasing at a higher rate. However, not all of the courses in MOOC platforms provide effectiveness or meeting the user's goals. Since the MOOC concept is not matured, considerably lack of attention has been drawn in terms of evaluating the effectiveness. Our objective in this research is to provide evidence that there is lack of empirical tools to evaluate MOOCs effectiveness. At the same time our goal was to reveal the quality variations in MOOCs empirically by incorporating available MOOC effectiveness tools.

3   REVIEW OF LITERATURE

Effectiveness defined as meeting the user goals. For eLearning, many tools and techniques found in order to evaluate effectiveness [17],[22],[20],[24]. Although eLearning has been practicing and improving for decades, arrival of MOOCs disrupts the online education. MOOCs have its unique features than a normal eLearning course [3]. Since the arrival of MOOCs changed the perception of the eLearning participants, it is necessary to re-generate frameworks and dimensions identifying factors affecting to an effective eLearning in MOOC.

Although there are literature evaluating MOOCs in terms of quality, effectiveness and success, the evaluation techniques were not based on tested and validated tools which specifically designed to evaluate MOOCs. Research in that direction, [18] evaluated MOOCs using a model of six factors: Brand, Reputation, Funding, Subjects, Interactivity and Open social view. These factors were defined under three categories: Organizational, Pedagogical and Social factors. The research does not reveal any empirical exploration behind selecting the factors however it was evident that these factors were based on analysis of previous literature.

The research work conducted by [6] evaluated MOOCs using 6 perspective and it is based on a conceptual model. Although later the researcher has taken pre survey results from users to consider more criteria, yet the argument in our research is that the evaluation tools and criteria to be tested verified and validate using MOOC participants.

Searching toward more literature, we found lack of relevant research towards the frameworks for evaluating MOOCs. However, in the search we found there is number of literature sharing scenarios, experience and case studies lessons learnt with explaining the process of MOOC design development and experience in terms of effectiveness [13]. Yet we found very limited literatures which directly propose frameworks or evaluation tools, instruments to evaluate MOOCs effectiveness. Among the limited researches works towards effectiveness in MOOCs, we found 2 main categories of frameworks and dimensions as described in the follows:

- Empirical researches towards quality/effectiveness of MOOC

- Proposal frameworks based on literature reviews

3.1   Empirical research on effectiveness/quality of MOOC

Empirical research is a way of gaining knowledge by means of direct and indirect observation or experience. In this case the empirical evidence (the record of one's direct observations or experiences) can be analysed quantitatively or qualitatively straight from MOOC participants and/or MOOC courses. Although very limited number of researches resulted as empirical, research conducted by [23] categorise MOOC quality criteria in to 2 dimensions (Technical criteria and Pedagogical criteria) and 6 categories: Instructional Design, Assessment, User Interface, Video Content, Learning and social Tools and Learning Analytics. The research has used 107 students and 98 professors who take part in MOOC courses.
The research conducted by [9], found 10 dimensions directly affecting to the effectiveness of MOOC: Interactivity, Collaboration, Pedagogy, Network of Opportunity, Content, Technology, Usability, Motivation, Assessment and Support for Learners. They have used 5 MOOC platform and 16 MOOC courses in their research in revealing the 10 dimensions.

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3.2 Proposal frameworks based on past literature

Proposal frameworks were mainly based on past literature. It has not taken direct observations results. However, as the MOOC concept is yet maturing, there are many numbers of conceptual effectiveness frameworks and measurement quality criteria were found. The MOOC quality project which is one such an initiative of European Foundation for Quality eLearning (EFQUAL) attempted to identify quality issues specifically focusing to MOOC. In this project series of blog post by experts relating to quality of MOOC were taken into consideration to produce a quality report of MOOC [4]. The report of this project highlight some factors related to the perception of MOOC quality: the notion of choice, what pre-course information is provided, the pedagogical approaches supported in a course, the level of student commitment required, is a course scheduled or not, technical requirements, the role of the teaching team, availability and level of interaction, whether certification is availability. An expert in the project, [7] argues success of a MOOC will not depend on number of drop outs, counting test scores, adding up students' satisfaction and states four success factors: Autonomy, Diversity, Openness & Interactivity. Another expert [2] in her research argues that xMOOCs simply based on the interactions between content by following the behaviorists learning approach. Her research introduced the 7c's approach to bring enhancements in leaner experience and quality assurances. In order to achieve effective learning [2] argues it is essential to meet characteristics of good learning; Encourages reflection, Enables dialogue, Fosters collaboration, Applies theory learnt to practice, Creates a community of peers, Enables creativity, Motivates the learners. Further her argument is to incorporate 7C to make effective learning experience in MOOC. The 7C's are Conceptualize (what is the vision for the course?), Capture (a resource audit), Communicate (mechanisms to foster communication), Collaborate (mechanisms to foster collaboration), Consider (assessment strategies), Combine (overarching views of the design), Consolidate (implementing and evaluating the design in a real learning context).

The research carried by [14] proposes 10 dimensional instructional design criteria to evaluate MOOCs quality. The research is highly focuses in pedagogical perspective of a MOOC by arguing that the instructional design quality of a course is a critical indicator and prerequisite of the potential of the course for effective learning. It states that a learner or participants experience with opinions may not reflect the effective result of a MOOC quality because learners typically do not have the expertise to assess instructional design. Therefore the paper states it is critical to evaluate the quality of MOOC design by drawing on the knowledge of expert instructional designers. The 10 evaluation criteria's were drawn from First Principles Instructions - interrelated prescriptive criteria for effective instruction abstracted from key instructional design theories and models [16]. Those are 1) Problem Centred, 2) Activation, 3) Demonstration, 4) Application, 5) Integration, 6) Collective Knowledge, 7) Collaboration, 8) Differentiation, 9) Authentic recourses, 10) Feedback. Although this dimensions do not provide an empirical evidence to be applied to MOOC, the researcher evaluated 76 MOOC courses using dimensions by focusing on the pedagogical importunacy for quality in instructional design in learning. Their results reflected as instructional design quality of MOOCs are essentially low by arguing out of 72 possible total points that each course could score according to the Course Scan instrument, none of these MOOCs scored above 28 points.

The framework provided by "Quality Matters" program proposes to use its metrics rubric in assessing MOOCs. This program consists with the latest quality dimensions for online learning [25]. The rubric contains 8 dimensions – Course Overview and Introduction, Learning objectives, Assessment and measurement, Instructional materials, Learner interaction and Engagement, Course Technology, Learner support and Accessibility. The program has evaluated 21 peer reviewed journals and other academic databases such as ERIC, ProQuest and Google Scholar in order to produce the elements in the rubric. Although the 8 dimensions appear to provide a reasonable argument for online learning, it does not specifically address the context of MOOC. The primary focus of this literature is to be focus on MOOC literature and study based on MOOC participants in particularly.

4 METHODOLOGY

In order to evaluate MOOCs for effectiveness, we were required to decide an evaluation tool, MOOC platforms and courses. We used 2 tools, based on empirical research tested using MOOC participants. The tools as follows:

- Tool 1: 2 Dimensions and 6 Category Model by [23] has 74 items
- Tool 2: 10 Dimensions 41 Category Model by [9] has 41 items

A mix of qualitative and quantitative methods was used to evaluate the effectiveness. The criteria in the tools were used to analyse the participants' perspective on effectiveness in MOOCs. The reviews were taken into a quantitative figure with a 5 point likert scale as well as taking qualitative views on their experience during the course. If the course in the MOOC platform matches' with criteria in the tool, scores were given accordingly reflecting 1 point for least matching and 5 points for most matching item in the tool. Table 1 describes the possible highest and lowest values could occur in the evaluation. This process systematically provides the quality variance while revealing a detail description of the problems and concerns faced by the users.

TABLE 1
Minimum and Maximum values for Tool 1 and 2

	Minimum points	Maximum Points
Tool 1	(74*1)=74	(74*5)= 370
Tool 2	(41*1)=41	(41*5)= 205

4.1   Sample and Data Collection

In this evaluation, we focused on courses from 6 MOOC platforms. Those are namely; Cousera, edX, FutureLearn, Oepn2Study, NovoEd and Iversity. Enrolled in 22 courses and at least 2 courses were selected for a platform. Table 2 depicts the courses and the platforms used to evaluate.

TABLE 2
Enrolled courses and platforms

Course number and Name	Platform
1.Foundations of virtual instructions	Coursera
2.Human Computer Interaction	Coursera
3. Advanced Instructional Strategies in the Virtual Classroom	Coursera
4. Design thinking for Innovative Problem solving	Cousera
5. Introduction to Marketing	Cousera
6.University Teaching	Coursera
7.Understanding research Methods	Coursera
8.Design Thinking	Iversity
9. Idea Generation Methods	Iversity
10.Teaching Adult Learners	Open2learn
11.Leaders of Learning	edX
12. Technology Entrepreneurship I	NovoEd

13.Developing your research project	FutureLearn
14.Digital Marketing	FutureLearn
15.User Experience for Web	Open2Study
16.Creative Problem Solving	Coursera
17. Technology Entrepreneurship II	NovoEd
18.Entreprenourship 101	edX
19. Entrepreneurship 102	edX
20.Story telling for a change	NovoEd
21. Human Centered Design	NovoEd
22. Assessment and Teaching of 21st Century Skills	Coursera

We used 2 tools as a structure and conducted semi structured interviews using 41 students randomly while making more qualitative data. Qualitative researchers recommend a sample size to vary from minimum 6 to 30, therefore the sample size in this research is adequate to provide results [5]. At the same time, review of literature on sample size conducted by [15] stated 15 to 30 sample size is adequate for a structured interview. Our intention was to collect more accurate data while understanding the needs of the users listening to their experience. We maintain the empathy while taking in part of the courses actively and experiencing the user behaviours.

We used online tools - Goolge hangouts and Skype in order to interview participants and they all geographically scattered around the world representing most of the regions such as United States, Asia, Europe, Russia, Africa and Middle East.

5   RESULTS

The evaluation results using the Tool 1 and Tool 2 are depicted in the Table 3. The evaluation results in the Table 3 were plotted in a line graph where it visualizes results. The graph is shown in Fig.1 where it is depicting the variation of the evolution results among the platforms.

TABLE 3
Evaluation points in Tool 1 and Tool 2

Course platform	Course number in Table 2.	Participants Average points scored in 5 point scale	
		Tool 1	Tool2
Coursera	1	102	56
	2	336	201
	3	246	193
	4	230	140
	5	190	132
	6	192	113
	7	283	145
	16	213	161
	22	198	123
Iversity	8	211	112
	9	153	93

Open2Study	10	103	51
	15	114	84
NovoEd	12	284	180
	17	296	169
	20	273	132
	21	198	141
edX	11	203	161
	18	109	72
	19	195	102
FutureLearn	13	142	85
	14	187	97

As depicted in Fig.1, Tool 1 and Tool 2 results followed a similar pattern in variation within evaluation scores in MOOC platforms and courses.

According to the results in Too1 1 and 2, highest scores were achieved by course number 2 in Cousera platform. Tool 1's lowest score was the course number 1 which again is the Cousera platform. However, the lowest score resulted by Tool 2 is the number 10 course in Open2study MOOC platform.
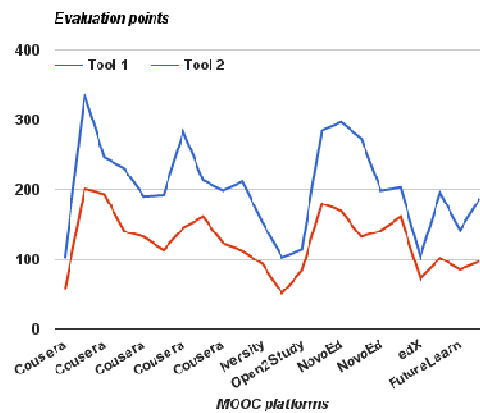

Fig. 1 Evaluation results against the MOOC Platforms

Analysing through the statistic data, observations and the interview notes, we found that the courses which had highest scores were equipped with some features which students found very effective in their learning. Such as course number 2 in the Cousera platform used extensive peer reviewing and the course was organised providing pedagogically sound activities. Among those, live feeds with live chat sessions, instant feedback on the course work by community Teaching Assistants (TA's), effective peer review tools, online meetup schedules using external tools as "Talkabout" were no match to the other courses. Also the course enabled to corporate and collaborates in executing the projects while embracing the learning culture to"learning by doing".

Courses which had the lowest values commonly had many pit falls that did not match the effective criteria in the tools. Analysing the review of interviews and observations of the Tool 1's lowest score course which is course number 1, we found that course consisted poor quality video and contained distractions in some of the videos. At the same time course component lacked collaoarativeness and interactivity. Live activities were not practiced in the course although the course objectives, outcomes and content were well structured, the course was in short of on time feedbacks and the interactions to the course found to be passive. However Tool 2 resulted lowest scores in course number 10 in Open2Study platform. Although it was not significantly different relating to course number 1 in scores, we found this course also had the isolation, lack if interactivity and collaborativeness. Mainly it lacked the peer collaborations other than the forum feature. Assessment consisted of quizzes assessed by the computer, yet lacked peer evaluations which has been identified as a major requirement for an effective learning experience in both tools.

Analyzing the overall evaluation scores, this research found that the courses highly varied in scores where as if there is a proper quality criteria to follow in MOOCs, it is expected to change into less variations. For example, analyzing Coursera courses, we found courses significantly varied in effectiveness scores as results in Tool 1 – 102 to 336 and Tool 2 – 56 to 201.

6 DISCUSSION

The purpose of this research was to identify MOOC effectiveness tools and evaluate MOOCs using the tools which provide empirical evidence on quality variation. Scrutinising into the general course reviews stated by course participants in various secondary resources such as reviewer sites – CourseTalk (www.coursetalk.com) and experiencing the same by us as active MOOC participants, it is visible that many MOOCs lacked to meet the effectiveness goals. Our literature survey resulted 2 main evaluation tools to measure effectiveness in MOOCs. Although the MOOC concept is relatively new to eLearning which has been practising for decades, it is attacking a wide range on participants. However, this research conducted an evaluation using 6 MOOC platforms. A mix of quantitative and qualitative methods was used in the evaluation as the purpose is to prove the quality variations more illustratively yet understanding deeply on a causes in the platforms which do not meet quality criteria. The evaluation tools were empirically tested for MOOCs and therefore it is well representing the gaps in many courses in MOOC platforms.

Main 2 evaluation tools consisted categories and dimensions and those appeared to have some criteria in common. Such as Pedagogy, User interface, Assessment and Content of Tool 1 intersected with Tool 2 items. However, Tool 2 consisted with unique dimensions such as Network of opportunity, Support for learners and Interactivity. Nevertheless, measuring with both the tools covered the criteria that could not exposed by one another.

Although researchers argue MOOCs completions are due to their own personal agenda and goals [14], [11], this research opens up a new direction that it is not merely the user's personal goals and intentions, but the lack of effectiveness of the MOOCs will lead in incompletion or dropouts in MOOCs. As we analysed the interview data, it is visible that many MOOCs lacked the student to student interactions as the platforms facilitated only forums feature. However, the courses found in NovoEd MOOC platform provided small group base studies which enabled the collaborative project work and supported live discussions via Google hangout tool. Although the evaluation results in NovoEd platform did not varied the quality significantly, but Coursera MOOC platform effectiveness differed significantly. Since the Tool 1 and Tool 2 provided the highest effectiveness in a Coursera course and lowest also in a Coursera course, it is evidenced that despite of the platform it is feasible to include features which can increase the effectiveness. In this case it is important to emphasise the features such as live streaming events, project base learning, small group discussions enabled via special tools- Talkabout. As [7] explain his work, it is particularly important to integrate features which makes any course more interactive.

Apart from above facts, our research found that students highly value the networked learning culture and exposes to potential industry. Although course number 18 in edX platform and up to a certain extend NovoEd platform supported this feature.

For an example, course 11 in edX platform invited students to participate in industry advertised projects using a special platform– Coursolve (www.coursolve.com). Students were given opportunity to practice what they learn in the course with the industry needs. In NovoEd platform, the courses were designed to enable small group based projects where students get to know each other in depth than the other platforms. This enables the participants to be exposed to a wide range of potential networks around the world.

7 CONCLUSION

eLearning is changing rapidly to cater the demands of users. MOOC which is a technology used for eLearning is trending due to its unique features of being free, massive and open to any interest user. However, due to the increase number of MOOC providers and courses, it is facing quality challenges. Participants claim that not all the courses in MOOC provide a quality learning experience neither meet the goals of the user. In this research we tried to provide empirical evidence of MOOC effectiveness. Our research found very limited empirical researches in evaluation MOOCs and tools supporting to evaluate MOOCs. However, we used 2 empirical tools to evaluate MOOCs and our results proved that there is a significant quality variation among MOOCs. Our detail qualitative interviews and data revealed that many MOOCs lacked extensive interactivity and collaboration between participants. Hence, based on our findings we emphasise the need of indentifying the quality factors, success factors of MOOC and applying it when designing and developing a course in MOOC platforms.

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