Exploring MOOC as a New Instructional Technology Tool: the Relationship of Students' Challenges, Perceived Benefits and Satisfaction

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ABSTRACT

This research objectives to determine the barriers, perceived benefits and satisfaction of Massive Open Online Course (MOOC) as distinguished by university students via case study at Malaysian university. A total of 763 university students from variety field of studies have participated this case study. The results exhibit a statistically significant differences between students' field of study on MOOC challenges. Students who study engineering encounter least challenges on MOOC practicing. Unclear assignments and course expectation is their main challenge when conducting MOOC. Students from "no challenges" cluster have shown significantly highest perceived benefits and satisfaction among other challenge groups of students. However, students who from "lack of time" challenge group have shown their lowest perceived benefits and satisfaction on MOOC learning. Lastly, the strategies or improvements have been recommended to solve the students' challenges when they are practicing MOOC to increase student satisfaction in MOOC.

Keywords:
Case study; challenges; MOOC;
perceived benefits; satisfaction

1. Introduction

E-Learning creates flexible and sophisticated interactive learning environment. It has been adopted by all universities and changed the delivery path of teaching and learning in the majority universities. As shown in the past studies, scholars have studied the effectiveness of e-learning platforms or applications in the educational or training system in universities, such as WebCT, Blackboard and Moodle [13,27,29]. In Malaysia, the Ministry of Higher Education (MOHE) has launched Malaysian Higher Education Strategic Plan (PSPTN) to realize Malaysia to be a developed, prosperous, and competitive country in the world [28]. The development and launching MOOCs in Malaysian universities, participation the international MOOC platforms, such as EdX, Coursera, OpenLearning, FutureLearn, and branding Malaysian educational system internationally are

emphasized in the 9th shift in the Malaysian Education Blueprint (MEB) 2021-2025 (higher education).

There are four pilot MOOCs (Islamic Civilization and Asian Civilization, Ethnic Relationship, Introduction to Entrepreneurship and ICT competency) have been practiced in Malaysian public universities to enhance the quality of instruction and learning [26,31]. These initiatives have been started since end of 2013 until now and they are hosted by OpenLearning.com. In the prior reports and studies, these four pilot MOOCs have been studied their usage profile, suitability of curriculum, learning design, pedagogy, content, assessment, students', perceptions on the quality enhancement, quality of infrastructure and info structure, and the report shown that students have shown their agreement and significantly positive responses from the descriptive and frequency analysis [15]. However, there are some problems need to be solved so that the MOOC employment in tertiary education institutions become successful and sustainable in this digital education era.

MOOC special features, such as open-access, multiplicity, easy-access and lower-cost enable more users to use the great superiority learning materials and promote lifelong learning with innovation technology. The MOOC development progress is remained new in Malaysia aligned with the appearance of Industrial Revolution 4.0 and majority universities have just started to get on its waves and making sense out of MOOC to fit into their blended learning model. MOOC can be designed to meet the demands of Malaysia's learners and maturity of technology making the accessibility of internet and MOOC relevant in Malaysia's education landscape. The implementation of MOOCs at universities are not only to bring innovations in teaching a learning practice, but also can bring a plenty of positive outcomes, such as cost reduction, high quality of learning materials, branding, positioning, visibility and extending reach of Malaysia higher education system to the global. MOOC has changed the trend of university students' teaching into life-long learning for every person who want to learn, study without the barriers of age, culture, urban and rural areas. Malaysia is still in the preliminary stage of implementation of MOOC. Recently, the challenges and issues like authenticity, quality assurance, credentials problems, assessment system are faced by the university for the practicing MOOC. Despite the fact that MOOC offers excellent education for public, but MOOC also have several drawbacks. Thus, this study is aimed to examine the existing and authentic status of issues, perceived benefits and satisfaction of using MOOC from the university students' perspectives.

This research tends to reply the research questions as stated:
1.   What are the challenges faced by the university students when using MOOC?
2.   Are there significantly differences in the challenges faced by university students regarding their gender and field of study?
3.   What are the perceived benefits and satisfaction on MOOC implementation from the university students' perspectives?
4.   What are the impacts of different challenge profiles on university students' perceived benefits and satisfaction on MOOC?

2. Challenges of MOOC

Although MOOCs are provided without charges and students can access anytime, anywhere, but there are several studies have reported the issues and challenges in practicing MOOC among university students [26,30,33,40]. The most common challenge is completion rate low and drop-out rate high or low retention rate among students [5,38]. For instance, some students' motives to learn MOOC is due to their personal interest, it easily to consider that they might quit after they complete

what they want to learn. Further, students also claimed that insufficient time to learn MOOC because of other tasks or commitments, no incentives when using MOOC, cannot focus during discussion forum, nobody turn up to assist, no existing knowledge or information to start MOOC, and unclear assignments and course expectations [17]. Quality assurance for MOOC is another concern point [2].

Credentials and credit award is one of the controversial issues and challenges of practicing MOOC [6,12]. One of the barriers to awarding credits for MOOC is the challenge to assure the scholar integrity within learners [16]. The evaluation method was criticized and questioned by the researchers. Not many platforms have integrated verification system for the authenticity of participants [2]. Hence, Minister of Higher Education Malaysia has announced that Malaysia was the pilot nation from the worldwide to establish and launch credit recognition policy for MOOCs in year 2016 [11].

Pedagogy still appear as an issue or challenge of implementation of MOOC at university. There are some studies revealed that students may have the difficulties to learn if they learn with connectivism way [8]. Flipped classroom worked as an effective approach that encourage lifelong learning and enhance engagement between students and learning materials [34]. Thus, "Blended" and "Flipped" course design also encourages MOOC practicing with the integration of pedagogy elements. Students are aware of the blended learning since they have started online learning due to lockdown because of the COVID-19 pandemic [35]. The pre-recorded instructional video will be viewed by the students beyond the lecture room, whereas having peer discussion and collaborative learning activities in the physical classroom. Students are unable to undertake in physical-world interaction and experience in their own learning [16]. Due to lack of supervision, academic dishonestly may become an issue. Lecturers should leverage pedagogical methods in conducting blended or flipped classroom learning via applying asynchronized learning materials before and after live video instruction [19].

Lastly, applications, equipment, software, and internet support are the technical problems which need to be concerned for MOOC practicing. Some developing countries may have the issues of internet connectivity [8]. In the preliminary phase of MOOC development, these technical or technological issues must be reviewed and resolved before the design and development of MOOC. The sufficient supports can make good quality MOOCs. Fast broadband, internet coverage and high technology mobile devices or tools are needed to support MOOC practicing. This is because the capacity to place instructional videos and other digital contents in a high capacity storage for MOOC are necessary [8]. Instructors need to have full internet or Wi-Fi coverage to ensure MOOC can be conducted constantly during the duration of the course.

3. Perceived Benefits in MOOC

Students' experience when conducting MOOC which impact their internal necessity and individual manner is considered as internal and external advantages of MOOC, named benefits of MOOC. When they perceive a certain level between two elements of MOOC, and expected they are interacted, they are rather to search the advantages from MOOC. This is because branding with its learning environment is perceived to be of high quality, to generate emotional feedbacks and to develop an intrinsic meaning for self-assessment [23]. Hence, perceived benefits is defined as an optimal utilization when a system use is always explained as advantages from utilization, especially in the context of enforced usage [37]. Moreover, emotion, satisfaction and behavioural intention are influenced by perceived benefits from the previous studies [18,23]. Students' perceived MOOC

benefits and goal setting ability are significantly affected students' satisfaction from another study [32].

Besides that, there is a study about the pattern of perceived benefits on MOOC [36]. They found three components of the pattern, which are initial expectations, the usefulness of acquired knowledge and constructive skills, and foreseen advantages or awards. Upon MOOC completion, students did not obtain any certificate, but they rather to put it in resume. Meanwhile, there are some students perceived that paid certificate for completing MOOC is added value for them for international labour market [36]. From the learners' viewpoint, they do expected to gain new knowledge and practical skills from MOOC learning and increase their career opportunities in the future.

4. Satisfaction in MOOC

Students' satisfaction is determined as MOOC success indicator from the recent study [32]. Satisfaction influence students' motivation to learn [4] and students' perceived learning experience also affected on their contentment in MOOC [24]. According to DeLone and McLean's study [7], system elements, instruction characteristics, services and supports that offered to the consumers are perceived as contentment. When students feel satisfied with MOOC that they have enrolled, they will attract more students to join MOOC and raise up the university branding and reputation. Moreover, the researchers also studied the impact of satisfaction on continuance to use MOOC [20], students' demographic factors, self-regulated learning strategies [25], MOOC benefits, online self-regulated learning and perceived course usability [32].

Satisfaction's role in MOOC cannot be denied as students' motives to participate MOOC for various reasons than searching formal education. In particular study, scholars revealed that user fulfilment is influenced by perceived benefits and give rise to increase brand knowledge and induce brand loyalty [22]. There is a statistically significant relationship between quality, satisfaction and behavioural intention from the prior studies [14]. Thus, it can be stated that students experiencing satisfaction with MOOC, they will likely be eager to employ more character behaviour, like opposition to adverse details of MOOC.

5. Methodology

This research uses descriptive analysis, two-way ANOVA, clustering analysis throughout exploring the challenges, perceived benefits, and satisfaction of utilizing MOOC at university perceived by the university students.

5.1 Participants

There are 763 university students from nine faculties have participated this study by giving their responses regarding the challenges, perceived benefits and satisfaction of using MOOC in university. These participants were invited to complete the questionnaires via Google form. Table 1 shows the distribution of the participants according to age group, gender, ethnic, and field of study.

Table 1
Descriptive statistics on participants' age group, gender, ethnicity and field of study

Variable	Categories	Frequencies	Percentage
Age	19 – 20 years old	300	39%
	21 – 25 years old	454	59%
	26 – 30 years old	9	1%
Gender	Female	526	69%
	Male	237	31%
Ethnic	Chinese	293	38%
	Indian	56	7%
	Malay	410	54%
	Others	4	1%
Field of study	Art and Social Science	138	18%
	Built Environment	29	4%
	Business and Accountancy	297	39%
	Computer Science and Information Technology	68	9%
	Engineering	56	7%
	Language and Linguistics	52	7%
	Medicine	41	5%
	Science	72	9%
	Others	10	1%

5.2 Instrumentation

The researcher has modified and developed the questionnaire based on the existing study [17]. The questionnaire consists four sections. First section acquires university students' demographic information, such as age, gender, ethnic, and field of study. The second section has six items which explore the university students' perceived benefits when they practicing MOOC at university. Third section consists of six items for evaluating satisfaction of using MOOC from the university students' perceptions. Last part has seven items that determine the challenges of using MOOC which perceived by the university students. The responses were collected by using Likert scales (from strongly disagree -1 to strongly agree -5) for evaluating students' perceived benefits, satisfaction and challenges of using MOOC.

5.3 Validation and Reliability of Instrument

The questionnaire was revised and validated by three experts. They are specialized in MOOC practising at the local universities. The format and the structure of the instrument items were refined and revised correspondingly from the reviews and comments by the experts. A pilot test was carried out on the final version of the instrument. This test has been conducted by a group of university students (30 students) from the outside of the research sample. The Cronbach's alpha value was measured for the 19 items of the instrument, and it was .903. The high Cronbach's alpha value exhibits these items of the instrument were reliable and suitable in this educational studies [39].

6. Findings

With the aim of exploring the challenges faced by university students when using MOOC, descriptive analysis has been done via calculating means, standard deviations of seven items of challenges. The descriptive statistics has been displayed in Table 2.

Table 2
Means and standard deviations of challenges faced by university students while practicng MOOC

Rank	Item	Mean	Standard Deviation
1	A lack of motivation to learn MOOC.	3.13	1.005
2	A lack of focus on the discussion forum.	3.17	1.004
3	Having insufficient prior knowledge about the topic.	3.13	.984
4	Having no one to turn to for help when learning in MOOC.	3.15	1.017
5	Fail to understand the contents of MOOC.	2.92	1.033
6	A lack of time due to other important priorities and commitments.	3.18	1.068
7	Ambiguous assignments and course expectations.	3.19	.991

Item 7 "ambiguous assignments and course expectations" has the highest mean (M = 3.19, SD = .991), whereas item 5 "fail to understand the contents of MOOC" has the least mean (M=2.92, Sd = 1.033). The overall mean for challenges of using MOOC is 3.12, SD = 1.027. Since the implementation MOOC at university, lecturers integrate MOOC in their teaching, especially for university courses. Nevertheless, unclear assignment tasks and course expectation, insufficient time, and scarce emphasize on discussion forum are frequently faced by the university students as their means are ranged from 3.17 – 3.19. If viewed from the mean measures for each item of challenges when using MOOC, deficient of motivation, having inadequate prior knowledge about the topic, and nobody turn to for help when learning in MOOC are their moderate challenges as perceived by them, with mean between 3.13 – 3.15. Whereas fail to understand the contents of MOOC is not considered as their main issues and challenges which prevent them from practicing MOOC.

To address the second research question, the significant differences between the university students' gender and field of study in reference to MOOC challenges is determined via ANOVA test. Table 3 has shown the two-way ANOVA findings of students' reviews on MOOC challenges based on gender and field of study.

Table 3
Two-way ANOVA results of students' perceptions on challenge of MOOC based on gender and their field of study

Source	Sum of squares	Df	Mean Square	F	Sig.
Gender	2.117	1	2.117	3.005	.083
Field of study	13.499	8	1.687	2.395	.015*
Error	524.875	745	.705		
Corrected Total	544.798	762			

Note. Dependent variable: Challenge of using MOOC
  R squared = .037 (Adjusted R squared = .015)

Table 3 indicated that there is a significant influence of students' field of study on MOOC challenges, with F = 2.395, p < .05. In another words, the difference between students' field of study and MOOC challenges is significant. However, there is no differences between students' gender on MOOC challenges. Post hoc for multiple comparisons by utilizing LSD method was further analysed and the significant findings are presented in Table 4.

Table 4
Post Hoc results (LSD method) for multiple comparisons for students' field of study on MOOC challenges

(I) Field of study	(J) Field of Study	Mean difference (I-J)	Standard Error	Sig.
Art and Social Science	Science	-.333	.122	.006*
Built Environment	Business and Accountancy	.347	.163	.034*
Business and Accountancy	Built Environment	-.347	.163	.034*
	Language and Linguistics	-.257	.126	.042*
	Science	-.362	.110	.001*
Engineering	Science	-.392	.150	.009*
Language and Linguistics	Business and Accountancy	.257	.126	.042*
Medicine	Science	-.363	.164	.027*
Science	Art and Social Science	.333	.122	.006*
	Business and Accountancy	.362	.110	.001*
	Engineering	.392	.150	.009*
	Medicine	.363	.164	.027*

Note. Sig. < .05

The findings revealed that there is four significant difference between science and four field of study (Art and Social Science, Business and Accountancy, engineering and medicine). However, there are two filed of studies (computer science and Information Technology and others) show no significant differences with other field of studies. Figure 1 has plotted the estimated marginal means for challenge of MOOC based on students' gender and field of study. It is obviously male students have faced MOOC challenges than female students. The students from built environment and language and linguistics encounter more challenges compared to other students. Meanwhile, engineering students show least challenges when using MOOC.
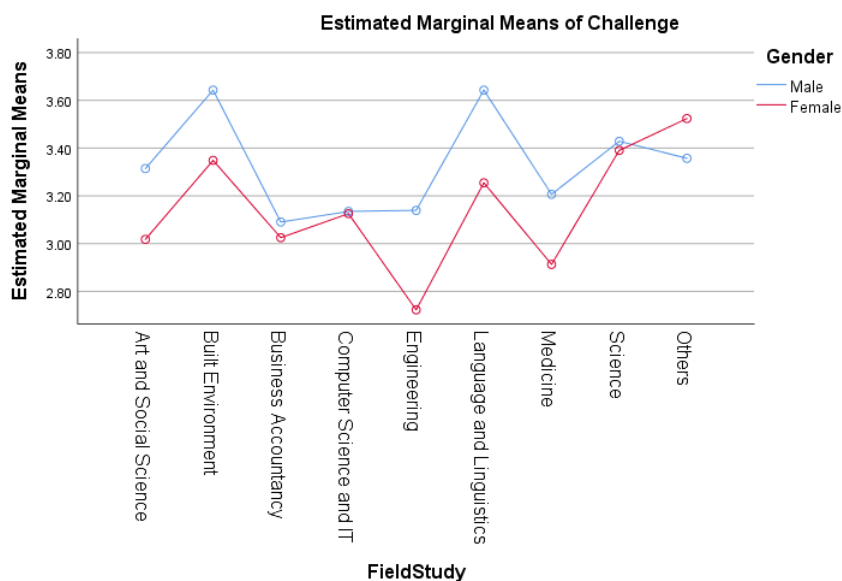

Fig. 1. Estimated marginal means plot for MOOC challenges based on university students' gender and field of study

To identify the university students' perceived benefits and satisfaction on MOOC implementation, descriptive statistics was used to calculate means and standard deviations for these two variables. Table 5 has listed out means and standard deviations of perceived benefits and satisfaction by university students.

Table 5 presents that "I feel MOOCs' activities is a good key element and help for learning process" shows the highest mean (M = 3.90, SD = .824) among the tested perceived benefits of MOOC, whereas "I feel satisfied with the peer assessment system in MOOC" receives the highest mean (M = 3.71, SD = .852) among the evaluated satisfaction of MOOC. Indeed, all six tested perceived benefits MOOC have achieved higher means, at least 3.80 until 3.90. This means that university students' perceived that MOOC's organization, learning community, work invested, encouraged to join, and forum are great elements and assist for their learning process besides MOOC's activities. On the other hand, all six evaluated satisfaction items also shown higher means, ranged from 3.57 – 3.71. Instead of peer assessment, university students also gratified with their experience with technical faults, like video quality, responses on the forum, quality and format of online discussion, interaction level in online discussion and chat room, laboratory experiment simulations, home deadlines, midterm and final examinations in MOOC.

Table 5
Means and standard deviations of the perceived benefits and satisfaction by university students' perceptions

Variable	Item	Mean	Standard Deviation
Perceived Benefits in MOOC	I feel MOOCs' organization is a good key element and help for learning process.	3.89	.801
	I feel MOOCs' activities is a good key element and help for learning process.	3.90	.824
	I feel MOOCs' work invested is a good key element and help for learning process.	3.84	.797
	I feel MOOCs' received motivation to participate is a good key element and help for learning process.	3.84	.828
	I feel MOOCs' learning community is a good key element and help for learning process.	3.85	.820
	I feel MOOCs' forum is a good key element and help for learning process.	3.80	.824
Satisfaction in MOOC	I feel like taking a real class with simulated lab experiments, home deadlines, a midterm and a final exam in MOOC.	3.57	.963
	I feel satisfied with the level of interaction in online discussion boards and chat room for MOOC.	3.65	.863
	I feel satisfied with the quality and format of online discussions in MOOC.	3.66	.860
	I feel satisfied with the response on the forum in MOOC.	3.66	.880
	I feel satisfied with the experience concerning technical glitches, such as video quality in MOOC.	3.69	.847
	I feel satisfied with the peer assessment system in MOOC.	3.71	.852

For research question four, clustering analysis is used to explore the impacts of different challenge profiles on university students' perceived benefits and satisfaction on MOOC. Based on the findings, university students' challenges have been categorized into five groups, which are various challenges (included all challenges item 1-7), lack of motivation (item 1), unclear tasks and helpless (item 2-5,and item 7), lack of time (item 6), and no challenges (not include all items). University

students from the cluster of "no challenges" have shown the highest mean for perceived benefits (M = 4.25, SD = .61) and satisfaction (M = 4.10, SD = .69). However, students who are lack of time group are least perceived the benefits (M = 3.63, SD = .74) and satisfaction (M = 3.46, SD = .64) when they are practicing MOOC if compared to the students with multiple challenges when using MOOC. The same results also happened on students who are lack of motivation cluster, with perceived benefit mean (M = 3.68, SD = .62) and satisfaction mean (M = 3.48, SD = .64). Table 6 has presented the F test results for university students' challenges when using MOOC on their perceived benefits and satisfaction. Post hoc test via Scheffe's method is done for further determine that cluster 5 has shown significantly different from other clusters in perceived benefits except cluster 3. However, all students in five cluster profiles were significantly different in satisfaction of MOOC.

Table 6
F test results for university students' challenges when using MOOC on their perceived benefits and satisfaction

Variables / Factors	Mean (S.D.)					F	Scheffe's Test
	Cluster 1 (Various Challenges, N = 153)	Cluster 2 (Lack of motivation, N = 239)	Cluster 3 (Unclear tasks and helpless, N = 93)	Cluster 4 (Lack of time, N = 157)	Cluster 5 (No challenges, N = 121)		
Perceived benefit	3.93 (0.89)	3.68 (0.62)	4.03 (0.67)	3.63 (0.74)	4.25 (0.61)	18.356**	(5) > (1), (2), (4)
Satisfaction	3.74 (1.02)	3.48 (0.64)	3.75 (0.68)	3.46 (0.64)	4.10 (0.69)	17.400**	(5) > (1), (2), (3), (4)

*Note. **p < .01*

7. Discussions

The findings aforementioned that ambiguous assignments and course expectations is frequently faced by the university students when they are practising MOOC. As stated in some scholar's [41] report, students feel irritated with the MOOC which provide unclear instruction or guidance in the assignments and course prospect. This cause students feel unsatisfied for MOOC learning. However, fail to understand the contents of MOOC is least considered as their barrier to use MOOC. This uncovered that majority students did not have the problems to understand MOOC contents, but claimed that instructions of assignments are insufficient for their clarity to complete the tasks. Besides that, lack of time to conduct MOOC and lack of focus in discussion forum are another two barriers of conducting MOOC. Lack of time is one of the factor cause MOOC completion and dropout rate as stated in Eriksson, Adawi and Stohr's study [10]. They claimed that they have other commitments such as sickness, family life and works. These matters have competed with their time spent on MOOC learning. Thus, MOOC designers may suggest some ways to leverage the difficulties that students have. While MOOC learning encountered with student's own original work and university traditional tasks, MOOC learning is not their priority to reach [10]. In addition, lack of focus in discussion forum factor is supported by the interview study which reported that students did not extend the utilization of discussion forum, mainly due to lack of encouragement to do it [10].

Regarding the significant difference in challenges faced by university students when utilizing MOOC based on their field of study. This finding can support and consistent with the statement which mentioned the MOOC implementation has impacted the students from various field, such as

engineering, languages, Islamic education and many more [44]. Simultaneously, MOOC also influenced academic potential, achievement, motivation, interaction and self-confidence [9].

In existing study, perceived benefits can determine user satisfaction [21]. For the current study, MOOC's activities, organization, work invested, forum, learning community and received motivation to participate are all six perceived benefits by university students with high means. This finding is consistent with the existing study which stated that extra activities in MOOC may assist student to widen their understanding of certain topics [17]. Forum and discussion board also foster and promote interaction from the students' perceptions. Peer assessment system, experience regarding technical malfunctions, responses on forum, quality and format of online discussion, interaction in online discussion board and chatroom, and real class with simulated experiments are the six satisfaction perceived by university students with high means. Quality of MOOC is directly connected to the instructional design [42]. MOOC quality has been studied in prior studies including quality assurance of MOOC, quality assessment, self- and peer- assessment in MOOC [42]. One of the scholars also mentioned that peer assessment and self- assessment should be used as assessment in MOOC instead of other assessment of learning [1].

At last, the clustering analysis found that students from "no challenges" cluster has perceived highest mean in perceived benefits and satisfaction while using MOOC. It is surprisingly the findings revealed that "lack of time" group students have shown lowest mean in perceived benefits and satisfaction, but not "various challenges" group. "Lack of motivation" group of students which consist of large number of students (N = 239) also achieve low perceived benefits and satisfaction in MOOC. "Lack of time" is one of the significant factor which influence retention in MOOC [3, 10]. Motivation is the major factor that affect dropout or completion of MOOC from the learners' perceptions [10, 43]. Thus, our findings are consistent with these existing studies.

Recently, COVID-19 pandemic has forced an unprecedented shift to whole online learning system at universities or higher education institutions from the worldwide, students and lecturers are having their online class from home, and many people are looking for something to learn, sustain their skills when they are suddenly locked at home due to the closure of higher educational institutions. The improvement of the online learning environment has been extended in all over the world. Within this context and reason, MOOC plays a vital role to offer the free courses for all via several platforms, such as Udacity, FutureLearn, edX, and Coursera. Hence, MOOCs offer a reasonable and flexible method to learn new skills, promote carriers, and offer premium quality of learning experiences to the students.

8. Conclusion

Most of the universities in the world are emphasized on students satisfaction with their learning experiences while using MOOC. Thus, this study takes this significance as the criterion to explore students' challenge, perceived benefits and satisfaction when using MOOC via the case study. Firstly, ambiguous assignments and course expectations, lack of time due to other important priorities and commitments, and lack of focus on the discussion forum are definite challenges faced by the university students although MOOC has been practice in their university courses learning. Second, students from different field of studies is statistically different as challenges faced by them while using MOOC. Built environment and language and linguistics students have encountered greater challenges compared to other students. Third, the university students perceived that MOOCs' organization and activities are good key elements which help them in learning process. Peer assessment and experience regarding the technical glitches, like video quality of MOOC are two most

satisfied matters when university students practicing MOOC at campus. Lastly, students from "no challenges" category have shown significantly highest perceived benefits and satisfaction among other challenge groups of students. Hence, the stakeholders and practitioners should design and rethink the strategies or improvements to solve the students' challenges when they are practicing MOOC to increase student satisfaction in MOOC. Student satisfaction in MOOC is rather vital than completion rate to measure MOOC success nowadays and these light of findings have revealed the extent on how is the impact of MOOC challenges on students' perceived benefits and satisfaction in MOOC. In future, multiple factors should be incorporated to explore the successful MOOC implementation in developing countries from the open education perspective.

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