INTERNATIONAL JOURNAL OF ICT AND MANAGEMENT
A Chronicle of Wisdom

Massive Open Online Courses: Awareness, Adoption, Benefits and Challenges in Sub-Saharan Africa

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ABSTRACT

Massive Open Online Course (MOOC) is an emerging learning platform aimed at infinite participation and access through the Internet. Recently, MOOC is globally becoming a key instrument in digitally mediated learning and teaching, due to its ability to provide interactive user forums to support community interactions among participants and instructors. Despite its global acceptance, countries in sub-Saharan Africa suffer some drawbacks within the context of awareness and adoption. Kano state is one of the cities in Sub-Saharan Africa with high population where MOOCs participation is significantly needed. Therefore, the rationale of this study is to appraise the level of awareness, perceived benefits and challenges of MOOCs adoption among University students of Kano State, Nigeria. The study was conducted in form of a survey using structured questionnaire administered to three hundred (300) randomly selected respondents. Finding from the study revealed a variation in the level of awareness among IT and non IT inclined students. The investigation of MOOC benefits indicates improved learning performance and effectiveness among study samples. The study further revealed user unfriendliness, inadequate Internet connectivity, power instability and cost of enrolments as factors influencing slow adoption of MOOC. The evidence from the study suggests that, awareness and adoption of MOOCs can be enhanced through establishment of hubs, provision of national accredited curriculum and subsidized cost of enrollments.

Keywords: *Regular Research Paper-- MOOCs, Cloud Computing and Sub-Saharan*

I. INTRODUCTION

Cloud computing is a computing paradigm aimed at delivering IT facilities on a pay-as-you-use basis [1]. It has revolutionized and transformed education, business, government and IT industry. Several success and challenges have emanated in the use of cloud computing for efficient education delivery. The most notable of this success is Massive Open Online Course (MOOC) [1].

The need to create "Linux of education" [1] brought about the emergence of MOOCs. They are Internet mediated courses available to any computer literate from any place in the world [2][3]. The rapid development of MOOCs in recent years can be attributed to adovates (Coursera, Udemy, edX, Udacity, FutureLean, among others) interest in creating, researching, sharing and managing Open Educational Resources (OER) online [3].

Since MOOCs were first introduced, there has been an ongoing debate about their academic value and significance [4]. Advocates of MOOCs consider them as means for providing virtual classrooms, low cost education, job opportunities, increased class size, qualitative learning materials and lifetime skills. Others consider MOOC as tsunami to Higher Education (HE) due to its potential to "servitize" the HE industry [5]. These controversies have been envisioned. The more autonomous, diverse and open MOOC is, the more the potential for students' learning to be limited due to lack of accreditation, regulated structure and face-to-face teacher support [6].

Despite the benefits of MOOCs, countries in Sub-Saharan Africa suffer major drawbacks from being active participants of the platform. These drawbacks are attributed to perception about online education, availability and cost of Internet access, power instability, cost of enrolments and technicalities involved in preparing learning environment. Around this premise, this paper attempts to appraise the level of awareness and adoption, explore the benefits and challenges of MOOCs among University students of Kano State, Nigeria. The paper is structured under headings that include literature review, methodology, results, discussion and conclusion.

II. LITERATURE REVIEW

The significance of MOOC as effective model for education delivery has triggered the conduct of considerable amount of literatures [7]-[14]. Recently, [7] investigated the importance, satisfaction and perception of learners and instructors on the level of interaction in MOOCs. Data for the study were gathered from MOOCs participants through two (2) web-based learner and instructor surveys. The surveys were based on [15] five-step (access and motivation, online socialization, information exchange, knowledge construction and development) interactivity model. Findings from the survey revealed high level of satisfaction in MOOCs by both students and instructors. Students rated interactions in MOOCs as highly important, while instructors rated nearly half of Salmon criteria as less important. Furthermore, lack of instructor interaction was found as the only factor influencing dissatisfaction in MOOCs. As a result, strategies such as Trained Teaching Assistants (TTAs) and peer-based assessment were suggested to enhance instructor interaction with students of MOOCs, thereby bridging the student-to-instructor interaction gap.

In an investigation of disruptive innovations, [5] explored cloud computing and MOOCs as "servitizers" of IT and education. The study was based on theory of disruptive innovations. He described these two phenomena as new disruptive innovations, "servitizing" the IT and education industry. He argued that, the emergence of cloud computing represents new paradigms for morphing physical products into services, while MOOC "servitizes" education in an unprecedented manner.

Another recent study [8] explored the awareness of MOOCs among International Black Sea University (IBSU) students, Georgia. The study employed quantitative method to gather primary data from IBSU bachelor students. The findings suggested that technology must be used more efficiently for educational purposes, and instructors should help students improve their computer skills. Also, digital

literacy will promote lifelong learning and motivate students' self-development. However, this study failed to specify the extent of awareness and the causal factors of inadequate awareness.

In an analysis of students' preferences and views about learning in MOOCs, [16] specified the criteria that make MOOCs a constructive learning environment. The study was based on [17] socio-cultural theory of constructivism with emphasis on knowledge construction and learning enhancement. Qualitative data for the study were gathered through online survey and interviews with forty nine (49) gifted Al-Qasemi College undergraduate students. Overall, this study revealed five factors influencing MOOC participation, persistence and consistence: English language competence, prior knowledge, broad-mindedness, self-regulation and efficacy, and communication skills. Also, the study found four (4) design features affecting student participation in MOOC: clarity of explanations, visualization of abstract concepts, support and communication, and variety of assignments. Based on this, the study recommended independent access to Internet among students for self-learning and revision of Georgian legislation in order to enhance accreditation perspective for online learning and teaching.

Furthermore, [9] investigated the advantages and challenges of MOOCs thereby projecting its fad or future. The study examined the rise of MOOCs with a review of its history, characteristics, advantages, and challenges. It was found that, though MOOC is still in its infancy, it tends to bring a new perspective to traditional education through the provision of high-end alternatives such as high productivity, low cost (or free), and utilization of leading edge technology.

Within the context of Nigeria, [10] examined the Opportunities and Challenges of OER and MOOCs in Nigeria. The paper focused on exploring the extent of awareness and use of, as well as willingness to adopt OER in the country. The study outlined that, Nigerian universities have lots of opportunities to appraise, use and even participate in the creation of OER materials and standards thereby significantly contributing to the per-year intake and infrastructural development of academic institutions in the country.

Majority of the studies presented thus far proved that, perception about MOOCs influences the level of adoption and participation. However, they are devoid of MOOCs benefits and challenges based on exploration of user awareness and adoption. Hence, this study attempts to investigate the level of awareness, adoption, opportunities and challenges of MOOCs in Sub Saharan Africa.

III. METHODOLOGY

A structured closed ended questionnaire was designed as the only primary data collection instrument. The questionnaire focused on the exploration of views and experience of University students in Kano, Nigeria. The survey instrument (see appendix I) was administered to students of Bayero University, Kano, Northwest University and Kano University of Science and Technology, Wudil. One hundred (100) students were randomly selected from each of these universities. This sampling technique gave each student an equal chance of participating in the study. Overall, three hundred (300) students participated in the study. The data collected were sorted, analyzed using bar graphs, descriptive, correlation and regression statistics and computed on Statistical Package for Social Sciences (SPSS V 22).

IV. RESULT AND DISCUSSIONS

4.1 Background Information of Respondents

Based on the analyzed responses summarized in table 1, more than half of the respondents are male. This indicates a slight dominance of male participation in the study. Also, majority of the respondents are educated young adults, currently enrolled in tertiary universities either as pre-degree, degree or post-degree students. However, approximately four-fifth of the respondents are undergraduate students. Regarding the field of study, half of the respondents are from IT inclined fields such as Computer Science and Information Technology, Engineering and

Sciences, while the other half are from non-IT inclined fields that includes Arts and Islamic Studies, Social and Management Sciences, Education, Clinical Sciences, Law and Agricultural Sciences.

Table 1: Demographic Characteristics of Respondents

Gender	Frequency	Percentage
Male	171	57.0
Female	129	43.0
Age		
<20	85	28.3
20-30	194	64.7
31-40	19	6.3
>40	2	0.7
Education		
Pre degree	32	10.7
Undergraduate	243	81.0
Postgraduate	25	8.3
Specialization		
IT inclined	150	50.0
Non IT inclined	150	50.0

4.2 Awareness and Adoption of MOOCs

MOOC providers play a significant role in enhancing student awareness and engagement [18]. MOOCs irresistibly draw attention of participants due to its low cost or freeness [19]. The bar chart of awareness and adoption in Figure 1 shows a significant variation in level of MOOCs awareness among IT and non IT inclined students. It was observed that, majority of the IT inclined students are more aware and engaged in MOOCs than non-IT inclined students. Researches [20][21] revealed that, one of the fastest growing MOOC providers is Coursera, with at least half a million monthly enrollments in IT and Science related courses. Also, [5] found that Coursera, Udacity and edX are the leading providers of MOOCs.

Furthermore, this variation in level of awareness and adoption can be attributed to student orientation. In view of this, [10] suggested that, university staff should encourage and motivate students to find, use and adopt OER materials. In addition, [13] consider prior knowledge about online learning as a determinant for engagement. Other studies [11]-[14][22]-[28] considered curiosity and desire to learn new skills or improving already acquired skills as the motivation for enrolling in MOOCs.

Table 2: Multiple Linear Regression Summary of MOOCs Awareness and Socioeconomic Characteristics

Predictors	R^2 adj	df	F	Sig.
(Constant)	.784	4	9.037	.000
Gender		295		.953
Age				.001
Education				.275
Specialization				.000

[P<0.05, R^2-cal=0.784, df=299]

A multiple regression was run to predict awareness of MOOCs from socio-economic characteristics of respondents. The summary is shown in table 2.

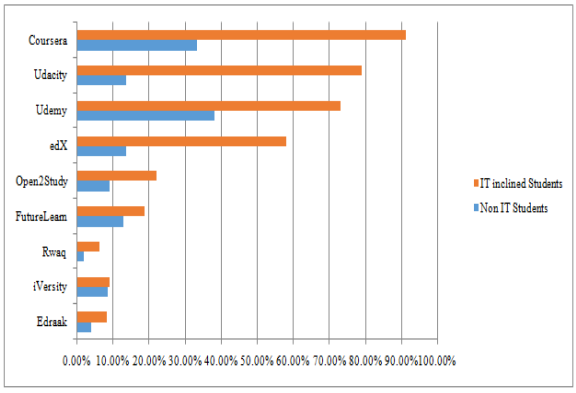

Figure 1: Awareness and Adoption of MOOCs

A significant non-coincidental R2 adj (0.784) was observed. This implies that the regression model explains 78.4% of the variance in MOOCs awareness. Hence, these variables (gender (0.953); age (0.001); education (0.275); specialization (0.000)) significantly predicts MOOCs awareness $F(4,295)= 9.037$, $p<0.05$. Therefore, socioeconomic characteristics are perfect positive significant predictor of MOOCs awareness. Similarly, [29] showed that, more than a million people from different part of the world have taken MOOCs. Also, the freeness, global reach, pre-requisite absent, and

race insensitivity of MOOCs act as driving force for massive enrollment [30].

4.3 Benefits of MOOCs

Study findings regarding participant's benefits from MOOCs are mixed. Some are based on satisfaction while others on opportunities. Advocates of MOOC initiatives see it as the ultimate democratization of education, thereby adding value to higher education institutes, professors and students [23]. Based on the analyzed data, the frequency and mean score of respondent's views and experience with respect to MOOCs benefits are summarized in table 3 below.

Table 3. Frequency and Mean Score of MOOCs Benefits

Benefits	SA	A	U	D	SD	Mean	Remarks
B1	125	140	22	11	2	4.25	Accept
B2	66	133	59	35	7	3.72	Accept
B3	62	123	67	40	8	3.64	Accept
B4	77	122	71	26	4	3.80	Accept
B5	65	116	72	39	8	3.80	Accept
B6	47	156	67	18	12	3.69	Accept

Decision Rule: Mean (x) = +ve Accept > 2.5, -ve Reject < 2.5 (N=300)

The benefits of MOOCs cannot be overemphasized. The highest mean (x) score for MOOCs benefit is improvement of learning performance and effectiveness. Others include: provision of cost efficient skills acquisition, addressing the need for more universities, bridging institution centric nature of teaching and learning and providing job placement. [22] confirmed that some learners enroll in a MOOC for personal challenge, such as affirming whether they could make it through an MIT course. Additionally, others consider MOOC as beneficial due to high enrollment size of participants [31] hence providing user support and discussion forums [32], facilitating learning performance and effectiveness [33]. Online learning contributes to independent and lifelong learning [8]. A correlation was computed to examine and describe the strength and direction of the linear relationship between awareness and benefits of MOOCs. The summary of the correlation is presented in table 4.

Table 4. Zero Order Correlation for Awareness and Benefits

Variables		Y	X_1	X_2	X_3	X_4
Y	AA1-AA9	1				
X_1	B1	**0.423**	1			
X_2	B3	**0.226**	0.333	1		
X_3	B4	**0.192**	0.364	0.289	1	
X_4	B6	**0.137**	0.182	0.191	0.183	1

[N= 300; zero-order coefficients p<0.01; control (Y) = Awareness and adoption of MOOCs]

[N= 300; zero-order coefficients p<0.01; control (Y) = Awareness and adoption of MOOCs]

The result of the partial correlation as highlighted indicated a moderate positive relationship between the variables. This significance (r= .423, .215, .226, .192, .014, .137; n= 300; p=.01) suggests that, MOOCs awareness and use have moderate positive influence on improved learning, job placement, skills acquisition and institution-centric teaching and learning. Therefore, the higher the awareness and use of MOOCs, the higher the benefits derived. Relatively, [13][25] revealed that MOOCs can serve as a tool for universities to market themselves to potential students, faculty, and donors. On the other hand, [23] revealed that MOOCs will offer a watered-down education, promote prestigious institutes and pose serious threats to non-prestigious ones. Furthermore, [22] reported that gaining skills and knowledge, employment/job advancement, and personal challenge as benefits of MOOCs. Lastly, students perceive skills acquired from MOOC as the driving motive rather than certificates acquired after completion [34].

4.4 Challenges of MOOCs Adoption

The pace of engaging and completing a MOOC is completely student-centric, yet only 10% of participants complete a MOOC [34]. Moreover, since personal interest is the major reason for attending a MOOC, it is reasonable to assume that the personal will and motivation may be lost along the line [34]. The table below summarizes the respondent's views and experiences in MOOCs.

Table 5. Frequency and Mean Score of MOOCs Challenges

Challenges	SA	A	U	D	SD	Mean	Remarks
C1	106	102	42	33	17	3.82	Accept
C2	101	120	50	23	6	3.96	Accept
C3	77	150	49	20	4	3.92	Accept
C4	49	117	90	36	8	3.54	Accept
C5	47	105	85	43	20	3.39	Accept
C6	34	64	82	103	17	1.24	Reject
C7	52	105	78	36	29	3.38	Accept

Decision Rule: Mean (x) = +ve Accept > 2.5, -ve Reject < 2.5 (N=300).

Majority of the formulated challenges were found accepted by the respondents. The highest mean (x) score for challenges of MOOCs is instability of power with others being: technical requirements, high cost of Internet connection, cost of enrollment, non recognition of certificate and loss of cultural values and norms. However, decrease in enrollment level of universities was not perceived as a challenge posed by MOOCs. Prior studies [13,14,25,26,28,30,34] stated that students drop out due to lack of incentive, insufficient prior knowledge, lack of focus on the discussion forum absence of life teacher support, low level of course content understanding, unclear assignment, course outcome mismatch and lack of time. Also, [35] affirmed that MOOC certificates will never be as valuable as traditional degrees from a university, hence a challenge impeding enrollment. Additionally, [36] pointed out that succeeding in MOOCs does not deserve formal course credit from institutions. Furthermore, learners may experience unnecessary anxiety if cultural values and norms are ignored [37]. On the same note, [38] reported that MOOC participants are mainly from Europe and North America, rather than Africa, hence not a threat to enrollment level of African universities.

IV. CONCLUSION

Evidences have shown that MOOCs are new disruptive innovations. MOOC which is a new educational delivery model is highly needed in Africa due to its usefulness. In view of this, the current study was designed to assess the awareness, adoption, benefits and challenges of MOOCs among university students of Kano state-Nigeria. Questionnaire was used to collect data. Analysis of responses revealed that the level of awareness and use of MOOC is considerably average. This places the study samples as passive rather than active participants of MOOC. Also, an awareness and use gap was observed between IT and non-IT inclined students. Furthermore, participants perceived improved learning performance and effectiveness as the most significant benefit of MOOCs. However, the study found power outage, technical requirements, high cost of enrolment and Internet connection, among others as challenges faced by participants of MOOCs. This shows that the global openness of MOOCs to anyone with Internet access appears void within Kano state. Hence, the study suggests subsidized cost of enrollments and Internet access, development of offline MOOC content, establishment of MOOCs hubs, provision of national accredited curriculum and implementation of systems for real-time detection of user dissatisfaction. As a future work, focus will be on other parts of Sub-Saharan Africa and their environs.

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APPENDICES: SURVEY INSTRUMENT

	SURVEY ITEM	**SCORING CRITERIA**
	Awareness and Adoption	3- Aware and Use (AU) 2- Aware (A) 1- Not Aware (NA)
AA1	Udemy	
AA2	Coursera	
AA3	edX	
AA4	Udacity	
AA5	Open2Study	
AA6	FutureLearn	
AA7	Rwaq	
AA8	Iversity	
AA9	Edraak	
	Benefits	
B1	Using MOOCs improves my learning performance and effectiveness	5- Strongly Agree (SA) 4- Agree (A) 3- Undecided (UD) 2- Disagree (D) 1- Strongly Disagree (SD)
B2	MOOCs Courses are offered by prestigious Universities.	
B3	MOOC providers recommend me for job placement	
B4	MOOCs provide cost efficient life time skills thereby increasing literacy level	
B5	MOOCs address the need for more universities	
B6	MOOCs bridge the institution centric nature of teaching and learning	
	Challenges	
C1	The cost of Internet connection to participate in MOOCs is high	
C2	There is no stable power supply	
C3	The technicalities of preparing MOOCs learning environment requires computer proficiency	
C4	The cost of enrolling and completing a MOOC is high	
C5	Certificates acquired from MOOCs are not recognized by institutions or organizations	
C6	MOOCs decrease the enrollment level of universities	
C7	There is possible loss of culture and traditional norms and values through MOOCs	

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