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**MASSIVE OPEN ONLINE COURSES (MOOCs) IN A GLOBAL CONTEXT:
AWARENESS, ADOPTION AND BARRIERS IN HIGHER EDUCATION
INSTITUTIONS, THE SUB-SAHARAN AFRICAN PERSPECTIVE**

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ABSTRACT

There is growing interest in the study of awareness, intention to use and the adoption of Massive Open Online Courses (MOOCs) in online learning ecosystem all over the globe, In particular, this is ascribed to the transformation occasioned by the efforts towards democratizing and providing accessible and affordable higher education to a wide range of learners irrespective of time, space and place. MOOCs have been studied in different contexts; enrolment, pedagogy, learners retention, completion rate, learner's patterns of engagement and business model. Nonetheless, there are very few discussions around MOOCs awareness and adoption in developing/resource constrained/Low- and Middle-Income countries (LMICs), especially, sub-Saharan Africa (SSA) where challenges of the infrastructural deficit, poor internet connectivity and other developmental issues have overshadowed the growth of Information and Communication Technologies. This study reviewed forty (40) published articles in refereed journals, proceedings and reports that satisfied the set criteria from "the year of the MOOCs"2012 -2018 for the review. Results revealed a growing interest in MOOCs research in the sub-region. Furthermore, resources, budget constraints, policy and administrative challenges were the major barriers identified as obstacles to MOOCs implementation in SSA. The paper recommends widening of scope and advocates further research to identify implementation strategies in the SSA region.

Keywords: *Massive Open Online Courses, MOOCs, Awareness, Adoption, Sub-Saharan Africa.*

INTRODUCTION

Despite the ongoing debate about the disruptive potentials of Massive Open Online Courses (MOOCs) in the higher education landscape across the world (see, Conole, 2016; Jacoby, (2014); Rambe & Moeti, (2017); MOOCs are the most stimulating and debatable topics in the context of online learning Franco Yanez, Nigmonova and Panichpathom (2014). Undoubtedly, ‘MOOCs’ have significantly influenced a shift in the paradigm of teaching and learning pedagogically and structurally. One aspect of MOOCs influence is in the open educational resources (OER) content produced by teachers and consumed by learners as a vital repository of knowledge that has improved regarding how they are created, co-created, repurposed and shared in a more focused and tangible format.

MOOCs defines the evolution towards the production and offering of structured quality Open educational resources to a diverse range of learners across space and time. Many institutions that were initially reluctant to provide OER have keyed into the MOOC phenomenon (Adams, Williams, & Rekha Liyanagunawardena, 2013). On the other hand, the affordances that MOOCs provides has positioned it as a viable alternative type of learning that raises the hope for some developing countries as a means of broadening access and improving the quality of their higher education.

MOOCs are growing in interest and numbers in the academia (Clow, 2013; Khan et al., 2018). This rising interest is triggered by the realisation of MOOCs potential to address the issues of access, cost of higher education and increase the reputation of the hosting institutions among other complexities. Universities use MOOCs offering as an opportunity for promoting their brand to learners who would have been otherwise difficult to reach (Alario-Hoyos, Estévez-Ayres, Pérez-Sanagustín, Kloos, & Fernández-Panadero, 2017). However, MOOCs and other technology-based innovation in higher education are slow in coming to the global south particularly Sub-Saharan Africa (SSA). According to van Stam, (2013) Africa hardly features in the massive amount of information production worldwide due to the lopsided geography of information. Difficulties in broadening access, escalating cost of infrastructure, desirable quality assurance and facilitating meaningful learning experiences in African higher education (HE) have remained the major cog in the wheels in educational, social and economic development.

The interplay of these issues is at the core of debates on how to transform higher education offerings to satisfy the diverse needs of the heterogeneous learners and how to adapt pedagogical models to the educational realities of low- income countries Rambe and Moeti (2017). Another perspective to the debate is the perception that innovative technologies such as MOOCs are purely an extension of the western

hegemony and quest for continued economic dominance, academic elitism and cultural imperialism in Africa (Czerniewicz & Andrew Deacon, Janet Small, 2014; Rambe & Moeti, 2017)

Rambe et al. (2017) pointed out that the western consortia, universities and online platform providers touted MOOCs as a disruptive medium to open up access and assure quality higher education. Furthermore, they argued that the exclusive selection of top American universities to develop, host and deliver MOOCs. MOOC providers' use of university brand and reputation as benchmarks for charging recruitment fees on headhunters recruiting MOOC graduates. The complex business models involving the sale of students' big data (e.g. learning analytics), betrays the philanthropic and egalitarian drive of MOOCs (pg.631). In agreeing with Rambe, Anthony Bates (2014) in his blog post (<https://www.tonybates.ca/2014/04/15/time-to-retire-from-online-learning>). Asserts that the ivy-league universities (such as Stanford, MIT and Harvard) re-invented online learning in their image to sustain their perceived superiority in higher education aided by the media at the expense of the educationists and psychologists that have a better understanding of learning.

Since its first appearance in 2008 as a connectivism and connective knowledge (CCK08) course (McAuley, Stewart, Siemens, Cormier, & Commons, 2010) MOOCs have undergone an accelerated development that has manifested in research interests amongst major stakeholders in the higher education landscape. These studies were largely concentrated in the developed economies and 'ivy-league' higher education institutions of the world. MOOCs have also remained a popular topic in the educational press such as Time Higher Education Magazine, blog posts posting varieties of viewpoints on blog platforms such as; <http://onestoplearning.blogspot.my>, <http://mooctalk.org> and many more of such MOOCs dedicated platforms (Liyanagunawardena, Adams, & Williams, 2013). Despite these laudable developments in research efforts, only a few studies were conducted in Africa, accordingly, Liyanagunawardena et al. (2013, Pg. 213) noted that many studies that presented the demographics of MOOCs participants indicated that majority are from North America and Europe, with only very few participants from Asia, South-East Asia and Africa (de Waard et al., 2012). These situations underscore the need for continual exploration and research which have manifested in the exponential growth of literature on MOOCs in the developed economies in the last few years of its emergence (Albelbisi, Yusop, Kalsum, & Salleh, 2018). Therefore, research on the trends of MOOCs adoption, implementation, challenges and determinant factors seems to be required, given that MOOCs as designed, its flexibility, openness, and seemingly 'infinite capacity' could address the educational needs and aspirations of low-and-middle-income economies in furtherance of the universal goal of lifelong learning and education for all.

Adopting a systematic review approach this study examines literature published in peer-reviewed journals, conference proceedings and relevant articles in prominent databases that addressed awareness,

adoption, implementation, challenges and determinant factors of MOOCs in SSA. The aims of the review include illuminating publication trends in the MOOCs landscape in SSA. To provide a better understanding of the modes of adoption, implementation and challenges to MOOCs in SSA. That may inform policy and help practitioners keep up with the pace of the increasing volume of published research, therefore facilitating evidence-based practice, better learning outcome and enhanced pedagogical practices in the MOOCs or e-Learning environments in SSA. It is also expected to fill the wide gap of MOOCs literature in SSA. To this end, the study seeks to answer the following research questions:

- (i) What is the state of research on MOOCs adoption, implementation and challenges in SSA?
- (ii) What are the models and research methodologies used in the studies on MOOCs in SSA?
- (iii) What are the determinant factors and challenges identified in the studies on MOOCs in SSA?

Therefore, to address these research questions, the study was structured into sub-sections in the following order: Introduction, and brief overview of previous systematic reviews on MOOCs, the methodology used for the study, results of the search based on set criteria, analysis and coding of identified articles followed by discussion, recommendation, conclusion and study limitations.

LITERATURE REVIEW

Massive Open Online Courses are a nascent and growing phenomenon in higher education, the expectation on MOOC as a potential game-changer in higher education is attracting much attention evident in the growing body of literature. However, there are very few systematic scholarly publications most of which are focused on the different characteristics and taxonomies of MOOCs around the world with little or peripheral mention of SSA. According to Hyman (2012) and Pappano (2012), Empirical research in MOOCs remains thin. Many claims about MOOCs are bound, but much is based on anecdotal evidence limited to western contexts with little understanding about what MOOCs can appropriately deliver in developing countries.

Some systematic analysis focused on descriptive analyses of literature on MOOCs chronicling global trends and geographical spread. Liyanagunawardena, Adams, Williams, et al., (2013) carried out a systemic study of published literature on MOOCs between 2008 to 2012, They identified *forty-five* peer-reviewed papers through journals, database searches and article chaining from reference sources. Their analysis noted that research efforts are more focused on the learner's perspective than the creators/facilitators perspective, neither did they focused on the technological aspects. they recommended future research in that direction and the use of the plethora of digital data.

To have an extensive and comprehensive understanding of MOOCs, Bozkurt, Ozdamar Keskin, and de Waard, (2016) conducted a systematic review of Theses and Dissertations. The purpose of their

study was to identify research trends, themes and conceptual background. Fifty-one(N=51 articles) academic documents were identified published between 2008 and 2015, through comprehensive search in multiple academic journals using systematic review approach. They reported that MOOC research is generally derived from Education, Engineering, Computer science and ICT related disciplines. Only a few of the Theses & Dissertation included theoretical /conceptual framework. Again, the literature reviewed was also devoid of articles substantially dealing with MOOCs in SSA.

Similarly, Bozkurt, Akgün-Özbek, & Zawacki-Richter, (2017) conducted a review and content analysis of research on MOOCs from 2008-2015 they concentrated on trends and patterns in MOOCs. The number of articles ($N=365$) reported in their study suggest a rising trend of MOOCs research with potentials for more. Nevertheless, their review revealed imbalance regarding research areas within the MOOCs paradigm, three in fifteen research articles constituted more than half of the lot with xMOOC been the dominant type of MOOCs in their research. They also indicated that conceptual studies on MOOCs are the most prevalent approach. However, no mention of studies related to SSA was made in their paper which reinforces the need for such reviews. To get a good overview of the developments in eLearning and or ICT trends in Africa more research is needed even if there might not be much to report on(van Stam, 2013).

In a systematic literature analysis of factors influencing success in MOOCs, Albelbisi et al. (2018) included 102 articles based on their set criteria and Biggs 3P model upon which they underpinned their study. Even though they factored in all the agents in MOOCs such as the learner's characteristics including demographics, motivation and interactivity. Instructor factors, pedagogy factor, instructional design, assessment, credit and product factors such as drop out and completion rates. Their systematic analysis did not reflect literature on adoption, implementation and challenges of MOOCs in low- and middle-income economies like SSA. Nonetheless, they emphasised the importance of MOOCs success factors based on the lack of clarity about how MOOCs may successfully and effectively be implemented.

Safana and Nat (2017) Conducted a primary meta-analysis of peer-reviewed articles on MOOCs in global context focusing their search in journal articles, published reports, conference papers and magazines. From the thirty-three articles included in their meta-analysis, only three articles were focused on MOOCs in Africa. High lighting the dearth of research on MOOCs in the African context. They asserted that learners perspectives are the most widely discussed MOOC phenomena in the reviewed articles with most of the literature glossing over other pertinent dimensions such as Institutional and ethical which they contend that as a wide gap in the literature. They concluded that most of the studies limited their findings to Social Media such as Facebook, Blogs Twitter and Traditional LMS discussion forums. Regarding other MOOC formats such as blended MOOCs and MOOCs in Africa, Safana et al. maintained that those aspects and many interesting research areas on MOOCs were ignored, therefore, underscoring the need for further

research efforts in that direction. Most importantly, the need to examine MOOCs from a systematic literature analysis viewpoint in SSA, as it seems virtually non-existent in previous studies.

METHODOLOGY

Data Collection

Researchers use different approaches to source and locate papers to use for the literature review. The conventional method is to search in academic databases or search engines and references to published research papers. According to Fink (as cited in Liyanagunawardena, Adams, Williams, et al. 2013) In a systematic review, it is important that the methods of identifying papers be described and justified such that the approach could be replicated. Therefore, in our study, we searched prominent databases, using search terms and phrases such as ‘MOOCs Adoption in SSA’; ‘African MOOC’; ‘Massive Open Online Courses in Africa’ to search in; Google Scholar, Science Direct, Scopus, LearnTechLib, ERIC and the integrated institutional database (USM Krisalis). Reference pages of the articles accessed from the databases were also searched for relevant literature to boost the review process.

The search criteria used for the systematic review were established based on eligibility, inclusion and exclusion criteria set for the review. The review was limited to the period 2012 to 2018. This period was chosen concerning the year MOOCs began to gain traction across the world tagged “*the year of the MOOC*” and ‘*the year of disruptive education*’ Hyman (2012). The criteria for the systematic review include:

Inclusion Criteria

- (i) Literature published in the English Language
- (ii) Literature that focused on MOOCs, or contextualised MOOCs or Open and Distance Education as ‘e-Learning’ adoption, implementation and challenges SSA (SSA)
- (iii) The literature on MOOCs or contextualised MOOCs or Open and Distance Education as ‘e-Learning’ adoption, implementation and challenges in SSA published between 2010-2018
- (iv) Published articles that clearly defines subjects, sample size, research methodology and models utilised in their study.

Exclusion Criteria

- (i) The literature on MOOCs adoption, implementation and Challenges published outside SSA
- (ii) Literature Published in Language other than the English Language were excluded
- (iii) The literature on MOOCs adoption, implementation and challenges published earlier than 2010

- (iv) Literature that was based on studies in third circle institutions (secondary schools)

Two hundred and sixty-three articles were sourced, zipped into *ris* file and screened using *Abstrackr*. *Abstrackr* is an automated application for screening review articles use Rathbone, Hoffmann, & Glasziou (2015).

DATA CLASSIFICATION/ANALYSIS

The data collected were grouped both quantitative and qualitatively. The quantitative analysis was used to classify the papers according to the year of publication and spread of the publications according to a geographical location in the sub-region. Accordingly, the papers were also sorted by type of research design, i.e. qualitative, quantitative or mixed mode (Creswell,2013).

The subjects of the studies were instructors, students and both instructors and students. While the sample size of subjects was categorised as; small, medium and large samples respectively. Consequently, samples less than one hundred and fifty ($\leq 150 = \textit{Small}$) were coded as *small samples*, samples greater than one hundred and fifty but, less than two hundred and fifty ($> 150 \leq 250 = \textit{medium}$) were coded as *medium samples*, while samples greater than two hundred and fifty (> 250)classified as large samples. Regarding statistical tools utilized, the classification is; qualitative thematic/ narrative (see Creswell,2013) descriptive statistics, correlation, regression/General Linear Modelling/MANNOVA and Structural Equation Modelling Technique-SEM (Kline,2015). Challenges refers to the challenges outlined by the findings of the reviewed studies in the adoption and implementation of MOOCs in SSA. These challenges may be in the thematic areas of system domain, IT infrastructure, skills/training; technical support; leadership support, policy issues; personal issues, time constraints e.tc. The literature identification and selection process are graphically presented in Figure 1.

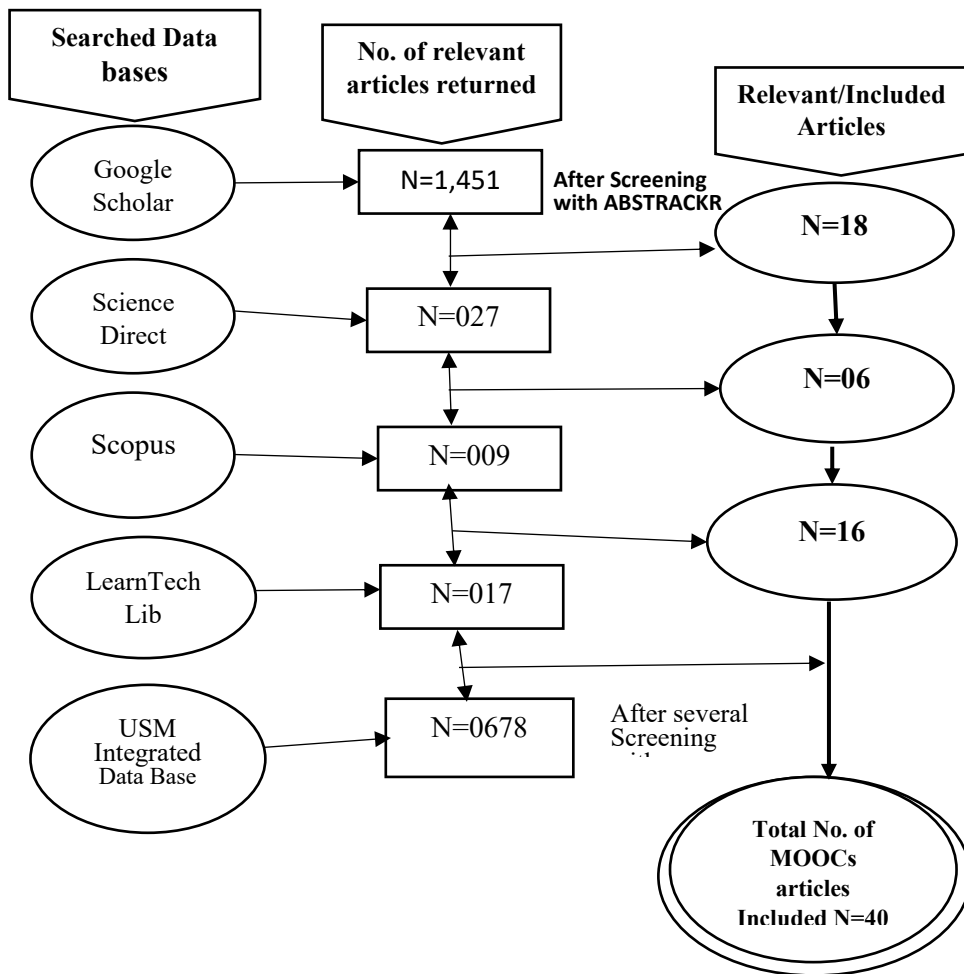


Figure 1. Graphical representation of Article Selection Process using Abstrackr

RESULTS

Quantitative Details

Number of Publication (Trends of MOOCs research) on MOOCs in SSA 2012 to 2018

In ‘the year of the MOOCs’ (2012) five articles were identified as published in respect of MOOCs in SSA, six in 2013, eight in 2014 and a dip in 2015 to four articles, seven papers each for 2016 and 2017, while three were identified in 2018. The pattern of articles demonstrates Gartner's metaphor of MOOCs hype cycle. (see Bozkurt et al., 2016).

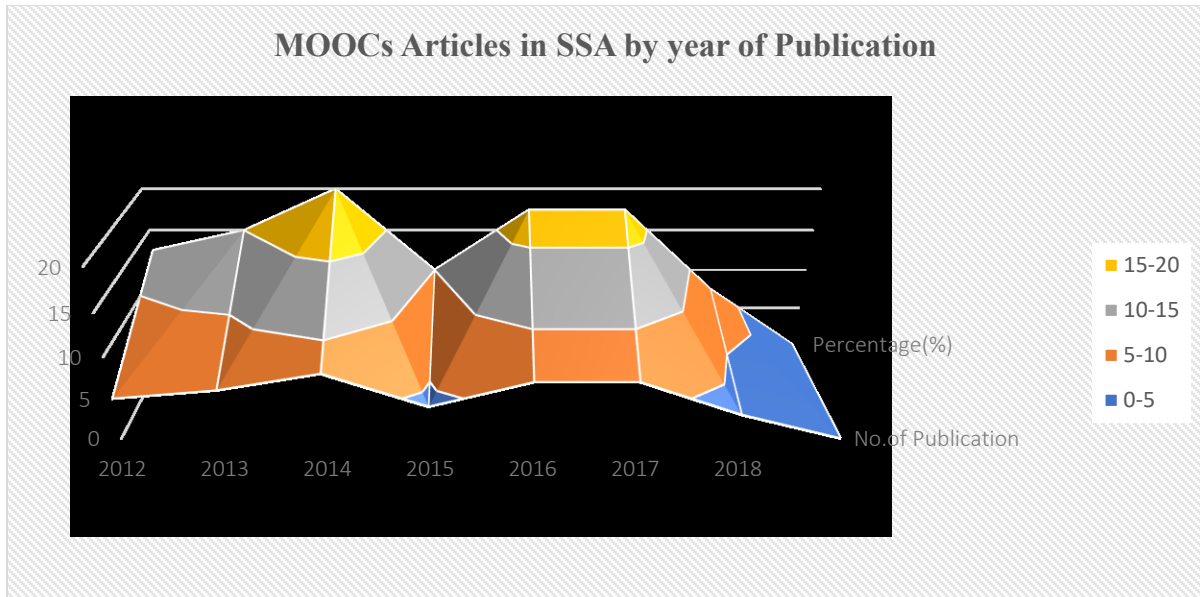


Figure 2. MOOCs Articles in SSA by Year of publication.

Most of the articles included in the systematic review as MOOCs publication in SSA between 2012 to date are in journals (27 papers to be precise) with smaller number of articles appearing in conference proceedings, book chapters and student project/dissertation (7,5 and 1 respectively) Figure 3 is a diagrammatic representation of the percentage of papers by type of publication

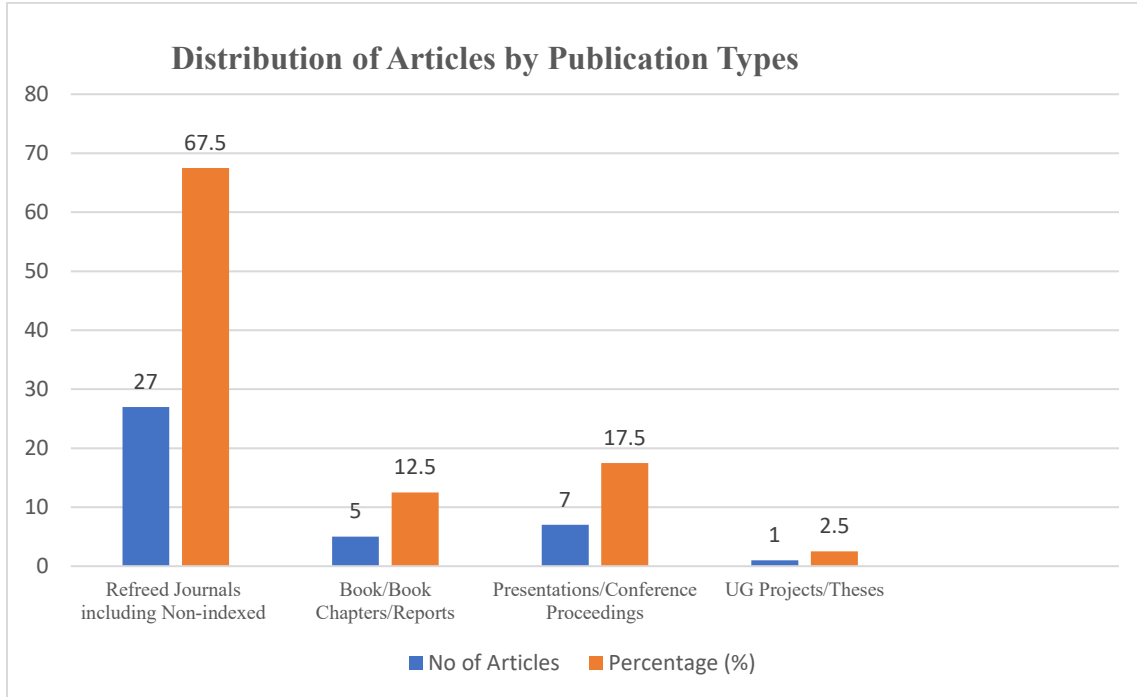


Figure 3. Distribution of Articles by type of publication

To answer the research question one (RQ1). The result of the review revealed the status of research on adoption, implementation and challenges identified in the studies in SSA region could be seen from figure 2 while Table 1 depicts the spread by country and geographical location.

Distribution of articles on MOOCs adoption implementation and challenges according to states and regional geographical location.

Table 1: Distribution of Articles on MOOCs adoption, implementation and challenges in SSA

Country/Context	Sub-region	No. of Studies	Percentage (%)	No. of studies by Sub-region	Percentage (%)
<i>Africa</i>	<i>Africa</i>	04	10%	04	10%
<i>Ethiopia</i>	<i>Eastern Africa</i>	01	2.5	-	-
<i>Ghana</i>	<i>western Africa</i>	01	2.5	-	-
<i>Kenya</i>	<i>Eastern Africa</i>	06	15	11	27.5
<i>Namibia</i>	<i>Southern Africa</i>	01	2.5	-	-
<i>Nigeria</i>	<i>Western Africa</i>	16	40	17	42.5
<i>Rwanda</i>	<i>Eastern Africa</i>	01	2.5	-	-
<i>South Africa</i>	<i>Southern Africa</i>	06	15	08	20
<i>Tanzania</i>	<i>Eastern Africa</i>	02	5.0	-	-
<i>Uganda</i>	<i>Eastern Africa</i>	01	2.5	-	-
<i>Zimbabwe</i>	<i>Southern Africa</i>	01	2.5	-	-
Total		40	100%	40	100%

(RQ3) Research methods employed in the studies on MOOCs adoption, implementation and barrier in SSA.

Concerning research question three, the methods or approaches employed in the researches include research design, data collection, sample size, and statistical tools used for the analysis. The methodology aspect that was assessed was the research design and instruments adopted by the various studies as presented in Table 2.

Table 2: Research Design & Instruments for the reviews of MOOCs adoption in SSA

Design	No. of Studies	Percentage (%)	Instruments		
			Questionnaires	Interview	Both questionnaire & Interview
Qualitative	01	2.5%	12(30%)		
Quantitative	12	30%		01(2.5%)	
Mixed Method	08	20%			08(20%)
Experimental (Design & Development)	01	2.5%			01(2.5%)
Narrative Analysis	18	45%			
Total	40	100%			

Table 2 shows that quantitative research design is the second most dominant design employed in the studies because twelve (30%) out the total studies employed this research design, followed by the mixed method approach with 8(20%) while qualitative and experimental design were the least used design. Narrative Analysis is the dominant research design in the reviewed studies eighteen of the article representing 45% of the corpus. For data collection, the questionnaire was the most dominant instrument, used in twelve studies representing 30%. A mixed method (i.e. survey and interview eight studies (20%) while the least used research design was experimental and qualitative (Interview and testing of MOOCs (e.g. the Kenyan cloud MOOCs) studies, representing 5%.

Subjects and Sample size

The subjects selected for the studies and their corresponding sample sizes featured in Table 3.

Table 3: Subjects and Sample Sizes

Subjects Format	No of Studies	Percentage	Sample Size		
			≤150=Small	>150≤250=Medium	>250=Large
Instructors/ Lecturers	05	12.5%	04(10%)	01(2.5%)	Nil
Students	12	25%	05(12.5%)	02(5%)	05(12.5%)
Both Instructors & Students	02	5.00%	01(2.5%)	Nil	01(2.5%)
Narrative Analysis (Not Applicable) Design & Devt.	19	47.5%	Not Applicable	19 (47.5%)	
Health workers/ Others	02	5.00%	01(2.5%)	-	01(2.5%)
Total	40	100%	11 (27.5%)	22(55%)	07 (17.5%)

Table 3 indicates that nineteen articles (47.5%) used narrative analysis to present their perspectives on MOOCs in SSA. Followed by Twelve articles that used students as their subjects. Five articles Constituting 12.5%, used lecturers as their subjects, while another two studies used both instructors and students (5%). Other studies that focused on Health workers and citizens were pooled together to give two articles(i.e. 5%) of the entire corpus of the study. With regards to sampling sizes, eleven articles used small sample sizes (27.5%) while seven studies used large samples (17.5%), only three studies (7.5%) used medium size sample for their research. The most dominant mode of article structure is narrative analysis with nineteen articles as mentioned earlier.

RQ2 Statistical tools utilised for the analysis in MOOCs research in SSA

The quality and reliability of research findings lie with the analytical tools utilised for the analysis of the study. In that respect, this study sought to find out and aggregate the analytical tools used in the studies on m-learning in Medical Education in SSA as depicted in Table 4

Table 4: Statistical tools

Statistical Tool	No. of Studies	Percentage
Thematic/ Narrative Analysis	16	40%
Descriptive Statistic (Frequency/Percentage)	17	42.5%
Correlation	02	5.0%
Regression/Chi-square/GLMs/ANOVA MANOVA	04	10%
Structural Equation Modelling (SEM)	01	2.5%
Total	40	100%

In Table 4. Most of the studies numbering seventeen (42.5%) used descriptive statistics, i.e. simple frequencies and percentages to analyse their data. Sixteen studies (40%) used thematic and narrative analysis for their data analysis, especially for qualitative data. Four studies employed regression, chi-square and Analysis of variance tools to analyse their data (i.e. 10%). The least used statistical tool was a correlation which featured in only two studies (5.0%) and PLS-SEM used in only one of the studies (2.5%).

RQ3 Challenges involved in MOOCs Adoption & implementation in SSA

The outcome of the challenges identified in the reviewed studies is depicted in figure 2.

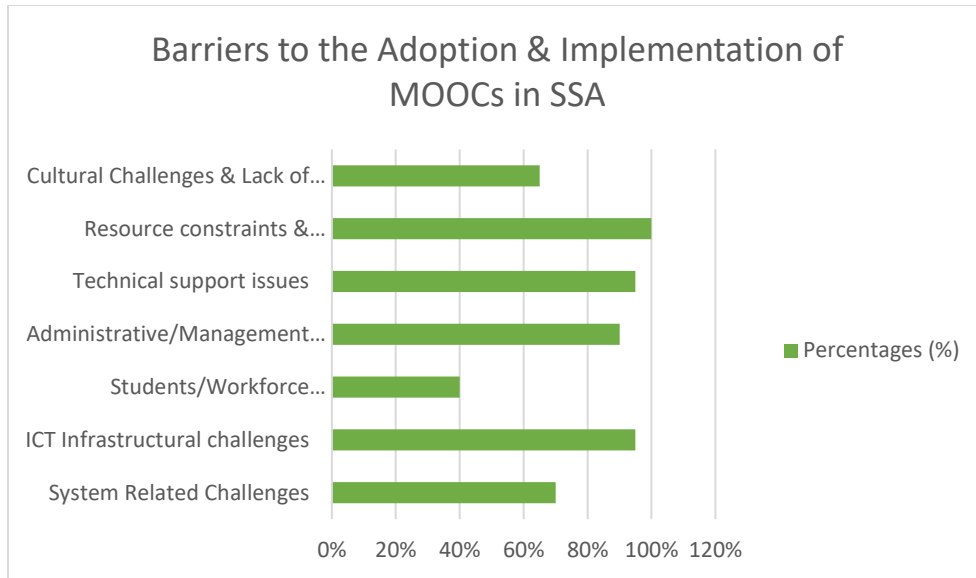


Figure 2. Frequency chart of barriers to the adoption and implantation of MOOCs in SSA

Figure 2 highlights the challenges to effective implementation of MOOCs in SSA. These challenges include Cultural challenges and Lack of awareness; lack of technical skills; poor or intermittent internet access; the cost of acquiring the devices, competing priorities in governance; budgetary restrictions; technical staff shortages, concerns over privacy; ICT infrastructural challenges. A broad spectrum of sixty-five challenges and barriers were identified in the studies. These were then grouped into seven major impediments to MOOCs adoption and implementation in SSA. Thirty-eight studies (95%) reported ICT infrastructure as the most significant barriers to MOOCs implementation, while sixteen studies (40%) reported students/workforce skills /training as a major hindrance to implementing MOOCs in SSA. Twenty-eight studies (70%) reported System related challenges as the major barriers to MOOCs adoption and implementation in SSA.

Additionally, thirty-six (90%) reported Administrative support and policy issues as a determinant factor. Twenty-Six articles (65% of the reviewed articles) noted Lack of awareness and cultural challenges as significant challenges to MOOCs implementation in SSA. All the reviewed studies (100%) reported Resource Constraints and competing for budgetary priorities as the major issues with Technology adoption in SSA.

DISCUSSION, RECOMMENDATIONS AND CONCLUSION

Summary and Discussion of Findings

The study set out to search, collect, analyse and synthesise the literature on MOOCs adoption, implementation, challenges and determinant factors of MOOCs adoption in SSA. Details of the results show a low number of empirical studies on MOOCs in SSA. This outcome is not surprising because consistently records have shown that the region has been slow in the uptake of technological advances in education due to reasons highlighted in the review. Previous studies on e-learning adoption in SSA Bervell and Umar (2017), Mtebe and Raisamo (2016); Muhammad, Mustapha and Haruna (2016) Escher, Noukakis and Aebischer (2014a) have identified the drawbacks attributed to the slow uptake of technology interventions in the region. Aside from the issue of budgetary constraints, other issues such as perception about online education, availability and cost of Internet access, power instability, cost of enrolments and technicalities involved in preparing learning environment still subsists. Escher et al. (2014b) posit that even though there is limited ICT infrastructure in Africa, it is improving: the expanding undersea optic fibre cable network around the continent is rapidly increasing the number of living rooms from which MOOCs can be accessed.

However, results of the reviewed articles revealed slow progress in the adoption of technology in education generally and in MOOCs particularly. In south, west and east African regions, the progress recorded in countries like South Africa, Nigeria, Kenya and Tanzania is not surprising because of the investments the governments have made in recent years coupled with intervention they have received through partnership and collaboration with some of the educational technology consortium and the world bank as an attempt to address the perennial challenge of rising demand for space in higher education institutions. Rambe and Moeti (2017) note that, while “enrollment in tertiary education in Sub Saharan Africa (SSA) grew by 8.6% annually over the last four decades, compared to 4.8% annually on average for the rest of the world, public funding for higher education in SSA increased at only 6% annually from 1970 to 2008. Therefore, The challenge of how to educate a rapidly growing African student population while improving the quality and relevance of educational provision has challenged many African higher educational institutions (HEIs) to experiment with different educational delivery models including MOOCs. Perhaps the economic and sundry benefits associated with MOOCs may be the reason for the marginal progress recorded in those countries. Odebero (2016) observed that the merits of an investment in MOOCs include increased GDP in Africa, increased Women participation in Higher Education, the creation of cultural independence in the continent and recruitment and marketisation of African institutions like their Ivy league counterparts.

Some of the notable MOOC projects in Africa that may provide key insights into how various institutions are navigating the complex task of adopting MOOCs to improve higher education in the contextualised format are visible in countries such as Rwanda. Notably, Partners in Health (PIH Rwanda) contextualized MOOC on the Coursera platform hosted by the University of Geneva Titled: Global health: "An Interdisciplinary Overview" to train employees(health workers) from PIH-Rwanda supported districts (Rwinkwavu, Burera and Kirehe) no educational or content prerequisites, participation was optional. The results of the MOOC experience shows that 20 out of the 38 employees completed the course,(52,6%)85%attended at least 3of 7sessions,80%believed that completing the course will help their career advancement,50% were employed. For learning evaluation, peer assessment was adopted by the course coordinators as a means of evaluation (Warugaba, Naughton, Hedt-Gauthier, Muhirwa, & Amoroso, 2016).

In Kenya, Jobe (2013) reported the design and development of quasi-MOOCs that is set as means of open educational resources and teaching and learning platform for teachers and students across the educational strata in Kenya (i.e. Primary, Secondary schools and Universities). The objectives of the 'Kenyan Cloud School' are the contextualization of subjects. That is to provide each subject taught in the schools in English and Kiswahili through the quasi-MOOCs, To Strictly adhere to the existing approved secondary curriculum in Kenya Learning. Moreover, to combine learning aspects from the different MOOC types (xMOOCs, cMOOCs, quasi- MOOCs) such as structured lectures, interaction, and open resources among others. The expectation is that the Kenyan Cloud School will be a mixture of the different MOOC types where the primary type is a quasi-MOOC with features from both xMOOCs and cMOOCs will be implemented to enhance the learning value.

Escher et al.(2014) also identified the World Bank's New Economy Skills for Africa Program- Information and Communication Technologies (NESAP-ICT) program in Tanzania supplements existing higher education courses with MOOCs from world leading universities to provide students with a higher quality education. The overall goal of the program is to offer a tailored curriculum that improves the Information Technology (IT) skills of graduates and enables them to meet the needs of the Tanzanian job market. Relatedly, The Kepler project in Rwanda is an innovative approach to higher education by building a campus entirely around MOOCs. Structured independently from existing higher education institutions the project allows students to complete a four-year course of study using MOOCs from top universities.

The Kepler project administrators specifically chose the current MOOCs to meet the requirements of Rwandan students. Students in the program live and learn together and receive assistance from knowledgeable staff members (Escher et al., 2014). These efforts at MOOCs adoption and implementation

are coming in the heels of the establishment of the African Virtual University (AVU) in 2009, AVU is an organisation dedicated to providing Africans with access to high-quality education through online learning. AVU operates a collaboration between the governments of 19 African countries and represents the largest network of Open Distance and eLearning (ODEL) institutions in Africa. Since 2009, the AVU has been continuously launching ODeL Centers across Africa and as of 2017 has incorporated 53 partner institutions into its network.

In line with the vision of the African Virtual University and the overall national educational objectives, Nigeria also adopted the National Open University of Nigeria (NOUN) in 2002 to increase access to education and improve quality (see, <http://www.nou.edu.ng>). NOUN is Nigeria's only specialist provider of open and distance learning at the tertiary level. While some universities have added distance and continuing education programs to augment their conventional system (e.g. the University of Lagos, University of Maiduguri, Ahmadu Bello University Zaria, University of Ibadan and a few others). These developments seem to have stimulated the upsurge of research in open and distance learning in Nigeria (see, Adebo and Ailobhio (2017); Kpolovie and Iderima (2016) and Okonkwo (2012).

Regarding the methodology and research techniques adopted for MOOCs adoption studies in SSA. The dominant techniques are a mostly conceptual narrative of the state of MOOCs in the Sub-region (Thematic narratives on challenges of e-Learning generally as it extends to MOOCs in Particular). Mostly, researchers and experts echoed their views about the challenges and advocated the needs for modern approaches to deal with educational challenges. Including proffering solutions and advocating way forward with MOOCs based on existing metrics on education, enrolment and demographic data across the SSA nations (see, Boga & McGreal, 2014a; Escher et al., 2014c; Feehrer, Freud, Lu, & Nkimbeng, 2017; Oyo & Kalema, 2014). Further reinforcing the fact that MOOCs adoption in SSA is very low as a validation of the views of researchers like Sife (2007) and Oluniyi's (2012) position. The low number of MOOCs in SSA has constrained research efforts to advocacy and activism towards the adoption of global best approaches at conferences and academic interactions.

As evident in the number of conceptual papers in the review. Most of the empirical studies dwelled on exploring awareness, readiness, adoption and challenges of MOOCs. Adebo & Ailobhio, (2017); Kpolovie & Iderima, (2016); Muhammad S.H, Mustapha A, Haruna, (2016b) in Nigeria, while very few numbers are focused on feasibility of MOOCs debut Feehrer et al.(2017) and Jobe (2013) which is reflective of the number of quantitative analysis. The most published articles on MOOCs in SSA are in few indexed and grey journals followed by Conference proceedings. However, the limited empirical research approach reflects the need for increased adoption and implementation of MOOCs in order to extend

research focus to more painstaking pedagogical issues like course design, motivation issues, assessment and course attrition and completion rates. In addition to partnerships and collaborations as witnessed in Kenya, Tanzania and some few African countries more advocacy is required to address the perception issue of MOOCs as an extension of the western imperialism and academic elitism Oyo and Kalema (2014) and structure MOOCs in the context of the unique culture of the individual SSA countries(Czerniewicz, Andrew & Small, 2014).

The dominant statistical analysis tools adopted for data analysis of empirical studies in the review on MOOCs in SSA was the quantitative analysis. Narrative methodology is the most recurring approach. The narrative analysis help in giving clarity to quantitative data, quantitative analysis is rigorous and present a clearer picture in term of numbers and indices. Furthermore, the apparent lack of complex statistical tools in the studies may also be part of the larger picture of the poor presence of MOOCs in the African Sub-region. Hence perceptual/quantitative studies on intention to adopt, awareness of MOOCs and challenges may not require a complex statistical analytical tool for analysis and interpretation of the data generated from such studies. Positively, however, the use of Models in technology acceptance and usage research is gaining traction. For instance, Tulinayo, Ssentume and Najjuma (2018) investigated students acceptance and usability of digital technologies in Ugandan universities using a modified Technology Acceptance Model (TAM), They analysed the strength of the relationship(s) among the variables students' capacity to use digital technologies, lecturer characteristics, students' access to digital technologies, students' awareness of digital technologies and the original TAM model constructs. Pearson's correlation was deployed in the SPSS application. Similarly, Fianu, Blewett, Ampong, and Ofori (2018) investigated factor influencing MOOCs usage in Ghana adopting a modified Unified Theory of Acceptance and Use of Technology (UTAUT) beside adopting and modifying a model in their study, They used the Partial Least Square -Structural Equation Modelling (PLS-SEM) for the analysis. The format of the studies and the use of the advanced statistical tools signifies the slow but a steady ascendancy of digital technologies in SSA, Particularly SEM provides more robust detailed results in quantitative research analysis and hence should be encouraged.

The success or failure of MOOCs adoption depends on overcoming the challenges upon which most of the researchers in the review have a common agreement which may, in turn, serve as the determinant factors for MOOCs adoption in particular and e-Learning as a whole in the sub-region. Oyo et al. (2014) outlined five baseline requirement for the implementation of MOOCs in resource-constrained regions. This requirement serves as a minimum threshold for achieving success in adopting MOOCs thus: 'national accredited MOOC curriculum, electronic content development, development of an online and

offline eLearning platform, establishment and funding of MOOC coordination units at public HEIs, and the establishment of MOOC access hubs at strategic locations’(pg.4).

The reviewed articles unraveled many impediments to the adoption and implementation of e-Learning in Africa in general and MOOCs in particular. These challenges were then grouped into seven main challenges based on the submission of researchers such as; (Escher, Noukakis, & Aebischer, 2014b; Feehrer et al., 2017; Garba, 2017; Muhammad, Mustapha, Haruna, 2016c; Nath and Karmakar, 2014; Oyo and Kalema, 2014 etc.). For ease of reference, the challenges are as shown in **Table 5**. Although these challenges look daunting, Experts are of the view that a well thought out and regionally contextualised MOOCs with the appropriate collaboration and support could turn around the educational fortunes of most resource-limited regions of the world.

Against this background, the following suggestions may suffice: African leadership in HEI’s and Heads of states need to mobilise investment in the provision of enhanced internet accessibility for institutions. There should be deliberately crafted programs for the continual training of all the key players in the operation of MOOCs. Also, the Public-Private-Partnerships is the recommended model for implementation of new technologies as in resource-limited areas. Contextualized MOOCs model for Africa will accelerate its adoption and implementation and provide quality education, due to the internet bandwidth challenge, Offline materials, Hubs and instructors on site will serve the need.(Boga & McGreal, 2014b; Garba, 2017; Garrido, Koepke, Andersen, & Garrido, 2016; Oyo & Kalema, 2014).

Table 5. Classification of barriers to the adoption of MOOCs Identified by the reviewed studies

Identified Challenges	Description	Frequency	Percent ages (%)	References
System Related Challenges	Lack of Systemic Approach to the adoption and implementation of Technology and the and system usability which includes ease of access, content download, and online chat	28 Articles	70%	Sife et al. (2007).; Ipaye & Ipaye,(2012).(Onasanya,2010),Drummond 2016,Muhammad et al.(2016) Bervell & Umar,(2017);Kpolovie & Awusa(2016)
ICT Infrastructural challenges	Lack of /intermittent internet services, computers and hardware facilities including power supply challenges	38 Articles	95%	Garrido et al (2016)Rabah Kefa,2016,Boga et al, (2014) Noukakis,(2014); Van Stam(2013)
Students/Workforce Skills/training deficit	Lack of computer literacy, personal skills for operating computer, lack of qualified tutors to handle MOOC related courses are major barriers	16 articles	40%	Lwoga,(2012).in Bervell & Umar,(2017);Oye 2011.; Ssekakubo et al. (2011); Muganda et al. 2016.Escher et al. (2014)

Administrative/ Management Support & Policy Issues	The needed transformational leadership support to drive the adoption of innovation regarding policy and incentive sometimes lacking in the institutions.	36 Articles	90%	Czerniewicz & Brown, (2009).Sife et al. (2007)
Technical support issues	Technical support refers to installation, Operation, Maintenance, Network Administration and security issues with technology in education.	38 Articles	95%	Lwoga (2007), Wambugu et al. (2018)
Resource constraints & Budgetary Issues	Competing priorities amid limited finances, the Brain drain of qualified personnel	40Articles	100%	Liyanagunawardena et al. (2013).; Kpolovie et al. (2016); Ekundayo & Ekundayo 2009, Haddad & Jurich in Liyanagunawardena,(2013)
Cultural Challenges & Lack of Awareness	High cost, Key stakeholders such as tutors and students lack Awareness of MOOCs and some Technologies	26 Articles	65%	Feehrer et al. (2017) Oye et al (2011);Garba (2017)Akuadi,(2012);Kpolovie & Awusaku,(2016);Garrido et al (2016)

Recommendations for future research

Based on the findings of the review the following recommendations are proposed:

1. Given that this article's scope is limited to SSA, Future studies may focus on a wider scope beyond the SSA context. This may yield more literature and provide a wider perspective of MOOCs awareness and adoption in Africa.
2. Future studies may focus on various MOOCs implementation strategies deployed to improve access and quality of education across the entire educational landscape in SSA.
3. There is a need for more research in MOOCs, its impacts in educational practice primarily to ascertain its influence on access, retention, completion and certification that are the central issues with MOOCs in the global context

Recommendations for policy and practice

1. Governments across the Sub-Sahara region and institutional leadership in Higher Education Institutions should re-align their priorities for human capital development by allocating more funds for critical infrastructural provision and development of ICT to accommodate its evolutions such as MOOCs and Innovations in Sub-Sahara Africa.

2. Leadership and Institutional management in the sub-region should encourage research by supporting the training and retraining of physicians, and other categories of Health Care workers on technological trends in medical education and practice in SSA.

CONCLUSION

This paper reviewed articles on MOOCs adoption, implementation and challenges in SSA research trends and challenges to its implementation in medical education in sub-Saharan Africa between 2010 to 2018. It identified the research designs, subjects, sample size, instruments and statistical tools employed for the analysis in the studies. Additionally, it focused on the factors determining m-learning adoption and associated barriers to medical education in SSA. The study provided an overview of the state of the literature in that domain and sought to guide the direction of future studies, policy and practice.

Limitations

1. The review concentrated on articles written in the English language on MOOCs Sub-Saharan Africa without considering studies done in other African Languages.
2. The review focused on MOOCs and Articles that considered MOOCs as digital technology or e-Learning. Without considering other aspects of technology intervention in Africa.

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Declaration of conflicting interest

The authors at this moment declare that they have no conflicting interest regarding this article and the choice of journal.

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APPENDIX I

Table 6. Summary of the Reviewed Studies

Author (s) /Date	Title of the article	Context	Design/Instrument	Sample/Subjects	Statistical tools used	Journal/ Database
Boga, Sandi, McGreal, Rory (2014)	Introducing MOOCs to Africa: New Economy Skills for Africa Program ICT	AFRICA	Theoretical(Based on Authors worldview) of the concept	Not Applicable	Descriptive Narrative Analysis	Common Wealth of Learning, Learning for sustainable development, Athabasca University. Online Book. Education, Learning &
Escher, Gerard Noukakis, Dimitrios & Aebischer, Patrick (2014)	Boosting Higher Education in Africa through Shared Massive Open Online Courses (MOOCs)	AFRICA	Thematic narrative Analysis	Not Applicable	Descriptive Narrative Analysis	Training. International Development Policy 2014 Report(Google Scholar)
Castillo, Nathan M.Lee, Jinsol Zahra, Fatima T. & Wagner, Daniel A (2015)	MOOCs for Development: Trends, Challenges, and Opportunities.	AFRICA	Descriptive/content Analysis	Paper presentations at MOOCs4Development conference 2014	Content/narrative Analysis	Informational Technologies & International Development (Google Scholar)
Garba, Aminata A (2017)	Can MOOCs solve Africa's educational challenges: Education Challenges in Africa	AFRICA	PowerPoint Presentation	Higher Education Not Applicable	Descriptive Statistics, Frequency Counts	www.internetsociety.org/wp-content/uploads/2017/09/Africa-RIDD2017 . Conference Presentation. Proceedings of the 13th International Conference on African Private Higher Education, August 22, 2015, organised by St Mary's University, Addis Ababa
Ayenachew A. Woldegiyorgis & Luis Carvalho (2015)	Massive Open Online Courses (MOOCs) and the 'Revolution' in Higher Education: Implications for the African Higher Education	ETHIOPIA	Theoretical(Based on Authors worldview) of the concept	Not Applicable	Descriptive Narrative Analysis	Proceedings of the 13th International Conference on African Private Higher Education, August 22, 2015, organised by St Mary's University, Addis Ababa
Fianu, Eli Blewett, Craig Ampong, George Ofori, Kwame (2018)	Factors Affecting MOOC Usage by Students in Selected Ghanaian universities	GHANA	Quantitative Survey using questionnaire	204 Students in 2 Ghanaian Universities	PLS-SEM	Education Sciences Journal
Jobe, William (2013)	A Kenyan Cloud School. Massive Open Online & Ongoing Courses for Blended and Lifelong Learning	KENYA	Design Research(Design, Development & implementation)	Production of Curriculum Materials for form-iv as an OER in Kenya	Narrative Analysis.	Open Praxis-LearnTech Lib
Rabah, Kefa (2016)	The Future of Higher Educational Institutions (HEIs) in the Era of eLearning	KENYA	Thematic Narrative	Not Applicable	Thematic/Narrative Analysis	. inf. Sci. Technol. Mara Research Journal of Information Science & Technology
Odebero, Stephen (2015)	The Place of MOOCs in Africa's Higher Education	KENYA	Multi-access learning Theory, Narration	Not Applicable	Descriptive Narratives	Chapter in a BOOK=Handbook of Research on Innovation Technology Integration in Higher Education.

Author (s) /Date	Title of the article	Context	Design/Instrument	Sample/Subjects	Statistical tools used	Journal/ Database
						The USA.IGI Global. ISBN. 146681705
Wambugu, Patricia W. (2018)	Massive Open Online Courses (MOOCs) for Professional Teacher and Teacher Educator Development: A Case of TESSA MOOC in Kenya	KENYA	Exploratory research study, Mixed Method research(Focus Group discussion& survey questionnaire)	Primary, Secondary school & University Teachers in Kenya- 15primary,16Secondary, 40University,22,Higher Education Institutions. 93participants	Descriptive statistics frequencies	Universal Journal of Educational Research (USM, Krisalis)
Mutisya, Dorothy N (2016)	Challenges affecting adoption of e-learning in public universities in Kenya	KENYA	Quantitative Questionnaire	420 Lectures,210 Students	Simple descriptive statistics	E-Learning and Digital Media(SAGE Publishers)
Muuro, Maina Elizaphan,Wagacha, Waiganjo Peter Oboko, Robert & Kihoro, John (2014)	Challenges in an Online Collaborative Learning Environment: A Case of Higher Learning Institutions in Nairobi, Kenya.	KENYA	Quantitative/ Survey questionnaire	183 University Students	Descriptive Statistics Frequency/Percentages	International Review of Research in Open and Distance Learning
Feehrer, Derek Freud, Jamie Lu, Anqi & Nkimbeng, Nde (2017)	Advancing Namibian Higher Education in Promoting the Debut of MOOCs in Namibia	NAMIBIA	Mixed Method, Survey Questionnaire/ Group Discussion	Ten students in a group of 5 for a pilot testing of strategies to promote MOOCs debut in a Namibian Universities.	Descriptive statistics, Using weighted averages	Worcester Polytechnic Institute, Bachelor degree Project. (Report)http://www.wpi.edu/Academics/Projects.
Nwabufu, Bibiana Ngozi., Umoru, Titus Amodu & Olukotun, Jonathan Omoniyi. (2012)	The Challenges of E-Learning in Tertiary Institutions in Nigeria	NIGERIA	Theoretical/ Conceptual	Not Applicable	Not Applicable	International Conference on Future of Education. Pixel Conference Series Google scholar
Adebo, Temilade & Ailobhio, Titilayo (2017)	Massive Open Online Courses Awareness and Adoption by Nigeria University Students (A Case Study)	NIGERIA	Quantitative Study, Questionnaire	120 Undergraduate students, Multi-stage Sampling Technique	Descriptive Stats. ANOVA	International Journal of Computer Engineering and Information Technology(Google Scholar)
Osang, F. (2012)	Electronic Examination in Nigeria, Academic Staff Perspective â€” Case Study: National Open University of Nigeria (NOUN)	NIGERIA	Quantitative, Questionnaire	105 Questionnaire was distributed across five schools for Academic staff perception of e-Examination	Descriptive statistics	International Journal of Information and Education Technology
Osang, Francis (2012)	Internet Access in Nigeria: Perception of National Open University of Nigeria (Noun) Students	NIGERIA	Qualitative, Interview / Focus Group Discussion	35 students x3 geopolitical zones in South-western Nigeria 105	Thematic/Narrative Analysis	International Journal of Emerging Technology and Advanced Engineering
Adebowale, Olusegun (2014)	Disposition of students to online counselling: The Obafemi Awolowo University, Nigerian experience.	NIGERIA	Quantitative using OAUonline counsellors software, online feedback	1200, University registered students	Simple percentages(descriptive stats.)RSI ANOVA, Factor, cluster and Discriminant Analysis	International Journal of Education & Development using Information & Communication Technology

Author (s) /Date	Title of the article	Context	Design/Instrument	Sample/Subjects	Statistical tools used	Journal/ Database
			questionnaire and self-developed questionnaire			
Muhammad S.H, Mustapha A, Haruna, K. 2016	Massive Open Online Courses: Awareness, Adoption, Benefits and Challenges in Sub-Saharan Africa	NIGERIA	Quantitative(Survey)structured questionnaire /	300 Students	Data analysed using bar graphs, descriptive, correlation and regression statistics.	International Journal of ICT Management.
Kpolovie, Peter James moreover, Iderima, E. Christian (2016)	Readiness for MOOCs: learners' inequity in Nigeria	NIGERIA	Comparative ex-post facto research design	Disproportional stratified random sampling/1200 students	Descriptive Statistics, Readiness indicator	EPRA International Journal of Economic and Business Review(Google Scholar)
Okonkwo, Charity Akonadi (2012)	Assessment of challenges in developing self-instructional course materials at the National Open University of Nigeria	NIGERIA	Descriptive Narration based on the Wills, Hills and Skills of Instructional materials development	Not Applicable	Thematic/Narrative Analysis	The International Review of Research in Open and Distributed Learning
Safana, AI & Nat, MC(2017)	Systematic Review On Massive Open Online Courses Based On Primary/Meta-Analysis Opportunities and Challenges for Open Educational Resources and Massive Open Online Courses: The Case of Nigeria.	NIGERIA	Systematic Review / Meta-Analysis	33-Peer reviewed papers(Journal articles, Conference proceedings, reports, blogs.	Descriptive Analysis, Cohen's Interrater scale	International Journal of Scientific & Technology Research (Google Scholar)
Ipaye, Babatunde & Ipaye, Christiana Bamidele (2013)	Commonwealth of Learning Massive Open Online Courses Among Nigerian Postgraduate Students: Fad or Reality?	NIGERIA	Descriptive Narration	Not Applicable	Thematic/Narrative Analysis	Grey Literature(Google Scholar)
Orolade Kayode Stephen Oyewusi Lawunmi Molar (2017)	Application of Massive Online Open Courses in Tertiary Institutions in Nigerian: Prospects and Challenges	NIGERIA	Descriptive survey resaerch design	Proportionate Sampling 1200 Postgraduate Students	Descriptive statistics frequencies(Mean & Percentages).	European Journal of Education Studies(Google scholar)
Sani Ridwan Murtala (2015)	The Challenges and Prospects of the Transition to Open and Distance Learning in Higher-Education Institutions in Nigeria	NIGERIA	Conceptual Narration	Not Applicable	Descriptive Analysis	International Journal of Emerging Technology and Advanced Engineering (Google Scholar)
Oluniyi oluniyioyeleke@yahoo.co.uk, Oyeleke(2012)	Readiness for Online Learning in Higher Education: A Mixed Methods Assessment	NIGERIA	Mixed Method, Questionnaire & Interviews	25 Instructors and 150 Part-time traditional face-face programme	Simple descriptive statistics	Malaysian Journal of Distance Education
Fakinlede, Charity Onovughakpo Yusuf, M .O & Mejabi, O V (2014)	Readiness for Online Learning in Higher Education: A Mixed Methods Assessment	NIGERIA	Mixed Method study	119 University Students	Simple descriptive statistics(Frequencies and Percentages)	Malaysian Journal of Distance Education 16(1),

Author (s) /Date	Title of the article	Context	Design/Instrument	Sample/Subjects	Statistical tools used	Journal/ Database
	of Students at a Nigerian University					
Odunayo, Smart & Otito, Gloria (2013)	The Reality and Challenges of E-Learning Education in Africa: The Nigeria Experience	NIGERIA	Conceptual Narration	Not Applicable	Thematic/Narrative Analysis	International Journal of Humanities and Management Sciences (IJHMS)
Kpolovic, P. J. and Awusaku, O. K. (2016)	ICT Adoption Attitude of Lecturers	NIGERIA	Ex post facto Research Method, Quantitative	400 University Lecturers	Independent t-test and One -way ANOVA	European Journal of Computer Science and Information Technology
Warugaba, Christine, Naughton, Brienna, Hedt-Gauthier, Bethany Muhirwa, Ernest & Amoroso, Cheryl L.(2013)	Experience with a massive open online course in rural Rwanda	RWANDA	Quantitative (Survey) Questionnaires	38 Partners in Health Employees(Ministry of Health Rwanda) as a medium of continuing education of Health professionals	Descriptive stats, Simple percentages.	International Review of Research in Open and Distance Learning
Maboe, Kefiloe Adolphina (2017)	Use of online interactive tools in an open distance learning context: Health studies students' perspective	SOUTH AFRICA	Quantitative, online questionnaire	2nd and third year 410 Health Services Management Students	Descriptive stats, Simple percentages.using graphics.	Health SA Gesondheid. Elsevier
Patient Rambe & Mamello Moeti (2017)	Disrupting and democratising higher education provision or entrenching academic elitism: towards a model of MOOCs adoption at African universities	SOUTH AFRICA	Comparative Analysis of MOOCs in Africa & America	Adoption of Disruptive Innovation theory for comparative analysis of MOOCs across cultural context Africa and America	Narrative Analysis.	Educational Technology Research & Development
Oyo, Benedict & Kalema, Billy Mathias. (2014)	Massive Open Online Courses for Africa by Africa	SOUTH AFRICA	Theoretical(Based on Authors worldview) of the concept	Not Applicable	Descriptive Narratives	The International Review of Research in Open and Distributed Learning
Czerniewicz, Laura Andrew Deacon, Janet Small, Sukaina Walji (2014)	Developing world MOOCs: A curriculum view of the MOOC landscape Laura Czerniewicz, 1 Andrew Deacon, 2 Janet Small, 3 and Sukaina Walji 4 University of Cape Town, South Africa	SOUTH AFRICA	Theoretical(Based on Authors worldview) of the concept	Not Applicable	Descriptive Narration	Journal of Global Literacies, Technologies, and Emerging Pedagogies
Liyanagunawardena, TR & Adams, AA (2014)	Globalisation and technology-mediated distance education: developing countries' perspective	SOUTH AFRICA	Conceptual Narration	Not Applicable	Thematic/Narrative Analysis	The Unisa Cambridge International Conference on Open, Distance and eLearning, 29 September 2013? 02 October 2013, Cape Town, South Africa.

Author (s) /Date	Title of the article	Context	Design/Instrument	Sample/Subjects	Statistical tools used	Journal/ Database
Garrido, Maria, Koepke, Lucas & Andersen, Scott (2016)	An examination of MOOC usage for professional workforce development outcomes in Colombia, the Philippines, & South Africa	SOUTH AFRICA, Philipines & Colombia	Report on Advancing MOOCs for Development Initiative	3,654 citizens 18 years and older of Colombia, Philipines and South Africa	Descriptive stats, Simple percentages.	Seattle Technology & Social Change Group, Washington.Reports
Bhalalusesa, Rogers , Lukwaro, E E & Clemence, Marin (2013)	Challenges of Using E-learning Management Systems faced by the Academic Staff in Distance Based Institutions from Developing Countries: A Case Study of the Open University of Tanzania	TANZANIA	Quantitative	90 Open University tutors	Simple descriptive Statistics frequencies and percentages	Huria Journal of Open University of Tanzania
Muganda, Cornelia K. Samsung, Athuman S. Mallinson, Brenda J.(2016)	Analytical Insights on the Position, Challenges, and Potential for Promoting OER in ODeL Institutions in Africa	TANZANIA	Participatory research Approach(Th rough Workshops questionnaire , focused group discussions, presentations , and panel discussions. (Mixed Method)	29 OER creators	Simple descriptive statistics(Frequencies and Percentages)	International Review of Research in Open and Distance Learning
Peter Ssentume and Province Najjuma Fiona P. Tulinayo (2018)	Digital technologies in resource-constrained higher institutions of learning: a study on students' acceptance and usability	UGANDA	Quantitative, Questionnaire	341 Undergraduate Students Technology Acceptance Model (TAM)	Descriptive Stats, Correlation and Regression Analysis	International Journal of Educational Technology in Higher Education (2018)LearnTech Lib. Fifth International Conference on e-Infrastructure and e-Services for Developing Countries (Africomm 2013)
Van Stam, Gertjan (2013)	eLearning in Africa and the Opportunity for Innovative Credentialing	ZIMBABWE	Conceptual Narration	Not Applicable	Narrative Analysis.	