ASSESSMENT OF SCIENCE AND TECHNOLOGY EDUCATION LECTURERS' PARTICIPATION IN MASSIVE OPEN ONLINE COURSES (MOOC) AT FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA

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Abstract

The study examined the Science and Technology Education lecturers' participation in Massive Open Online Courses (MOOC) at Federal University of Technology, Minna, Niger State. It employed survey research using a 25-item in five sections' questionnaire. From the Population of 56 lecturers, 21 Science and Technology Education (STE) lecturers were conveniently sampled. The questionnaire was validated and found reliable for collection of data with reliability coefficients of 0.9, 0.8, 0.91, 0.70 and 0.86 for sections A to E respectively. The study answered five research questions and tested five hypotheses. The data collected were analyzed using mean, standard deviation, ANOVA and Chi-square at 0.05 significant levels. The result revealed that most of the Science and Technology Education Lecturers are limitedly aware of Massive Online Open Courses (MOOC), and that majority of the STE lecturers have neither participated nor completed any course in MOOC talk more of receiving a certificate for it. It also revealed that lecturers' views are different on extent and reasons for participation in MOOC with respect to their departments. STE lecturers' years of experience and gender does not affect their responses on extent and readiness for participation in MOOC respectively. It was recommended that lecturers should search for more information about MOOC and create time for enrollment and completion of at least one session of MOOC irrespective of their departments, gender or years of experience.

Keywords: Massive Online Open Courses, Science and Technology Education, Professional development, awareness and participation.

Introduction

There is virtually no industry sector that has not experienced a technological paradigm shift from the traditional way of doing things to digitalization; ranging from e-banking to e-health, to e-commerce, to e-governance and then to our own constituency which is education that has e-learning. In recent times, science and technology education has experienced technological advancement which has created novel ways of doing things and has by implication generated new contents for teaching and learning. Many educational institutions are using online tools, virtual learning environment and also incorporating e-learning into their traditional methods of teaching in conventional or distance education as part of the technological revolution in education.

Over the past few years, there is a phenomenon gathering momentum in many educational institutions called Massive Online Open Courses (MOOC). It is the nexus of social networking, the facilitation of an acknowledged expert in a field of study and a collection of freely accessible online resources. MOOCs are open online courses that generally allow anyone to register and follow a course without a fee or at little cost. It is an innovative, novel method of extending access to education to everyone and everywhere through the use of internet technology. MOOC entails the development of course; long-term and short-term, certificated and non-certificated, free and low-cost, online and downloadable.

The role of online courses in higher education cannot be over-emphasized. Digital technologies have exponentially increased the rate at which knowledge is created and distributed and this has propelled the popularity of MOOC. According to Clow (2013), MOOC is interpreted as Massive-Unlimited number of participants. Open- Freely accessible to all at no charge and also open in terms of learning goals, choice of subject and form of participation. Online- could be online teaching only or blended learning. Course- Course-like organization, the emphasis is on "community", "communication", and "collaboration".

The MOOC follow the standard curriculum for known courses. It allows new courses to be developed and exposed to the global audience easily. A course week or unit is typically composed of lecture videos, texts and images, and a range of assessment tools and supported and enhanced by the discussion forum. The interaction platform could be embedded or rely on external social media tools to facilitate interaction in the course. Sometimes, other resources such as textbooks are also recommended to participants to aid their studies. Access is via websites on personal computers and mobile applications on personal digital assistants and mobile devices. The requirement for access is simple and relatively cheap, allowing for low-income earners to have the opportunity of accessing educational courses online. Apart from providing course materials, MOOC provides interactive user forums to support community interactions among students, professors, other lecturers and teaching assistants.

The 2000s saw changes in online, e-learning and distance education, with the increasing online presence and open learning opportunities. Participants are made aware that when registering for MOOCs, they are enrolling for a course only and not the actual university delivering the course. Unlike university courses, they do not have enforced prerequisites for anyone to undertake the courses. It is for everyone; male, female, non-professionals, young professionals and people with many years of experience in their professions. Canada has a distinct and disproportionate advantage in expertise in the burgeoning field of digital openness. Canadian researchers and practitioners in open education are respected as leading international authorities and innovators (McAuley et al. 2010). Universities in the UK and other advanced countries have proved themselves to be flexible, resilient and entrepreneurial by embracing MOOC as an opportunity to develop their education provision and profile.

The term MOOC was coined in 2008 by Dave Cormier of the University of Prince Edward Island in response to a course called Connectivism and Connective Knowledge (also known as CCK08) (Cormier & Siemens, 2015). According to Jobe, Östlund and Svensson, (2014), the structure of the MOOC was based on connectivist notions of knowledge building and the central principles of autonomy, diversity, openness and interactivity. The emergent and self-defined nature of the MOOC capitalizes on the strengths that individuals bring to it in terms of their experiences, knowledge and skills, with a range of collaborative software environments and perhaps most importantly, with the "soft skills" essential for successful negotiation and collaboration. In all these dimensions, successful participation in MOOC parallels and scaffolds successful participation in the larger digital economy (McAuley, Stewart, Siemens, & Cornier, 2010). The rapid development of MOOC is currently generating considerable excitement in the world of higher education (HEFCE, 2014). The number of undergraduates participating in this programme around the world is amazingly increasing day-by-day. MOOC offers a chance for millions of people around the world, whoever they are and wherever they are to follow courses led by distinguished scholars and at the same time connect with a community of like-minded fellows around the globe (Weller, 2011).

The first generation (cMOOCs) started in 2008, focusing on knowledge creation and generation (e.g., CCK08) (Welsh & Dragusin, 2014) Learners' creativity, autonomy, and networking are encouraged; learners are expected to enrich the course's content. The second-generation (xMOOCs) started in 2012, are based on a more traditional format, with fixed structured content, centralized discussion forum support, and automated or peer-graded evaluation (e.g., Coursera and edX); students are required to master what they are taught. Some providers of

Massive Online Open courses are Coursera, Edx, Udemy, Khan Academy, Peer-to-Peer University (P2PU), OpenSAP, FutureLearn, Eduonix, ALISON and +Acumen, Udacity and MITx.

In Nigeria, a survey of awareness and participation in MOOCs in Ogun state revealed a relatively high awareness and low participation among academic librarians (Soyemi & Babalola, 2018). It also revealed that most participants enrolled to gain skill, knowledge or certification, while some enrolled for fun. Another study on the awareness and adoption of MOOCs by Nigeria University students shows that awareness is low among students due to inadequate infrastructure caused by the high cost of hardware and internet facilities (Adebo & Ailobho, 2017). Orolade and Oyewusi (2017) reported in another study that; though there is a prevalence of digital internet-enabled devices among Nigerian postgraduate students, their level of awareness and enrolment towards MOOC is still very low.

Researchers have confirmed that MOOCs have been having significant positive effects on all sectors of life. Students, Lecturers and other professionals around the world are learning so much in their fields through online programmes, and Nigeria should not be left out. However, STE lecturers in Nigeria need to improve on their professional development strategies in other raise their status and that of Nigerian students, for them to be on the same page with their counterparts in other countries. Nigeria as a well-respected country in the world should not be left out of this new development. As Science and Technology is the backbone of the national and economic development of the country, its teaching and learning should be handled by lecturers that are constantly in tune with ongoing technological advancement. It is against this background that the researcher sets out to investigate the participation of Science and Technology Education lecturers in Massive Online Open Courses.

The Objectives of the Study

This study set out to assess the participation of Science and Technology Education (STE) lecturers in Massive Online Open Courses at Federal University of Technology, Minna. It is also to find out if the opinion of the lecturers would be different with respect to their department, years of professional experience or gender.

Research Questions

i. Are Science and Technology Education lecturers aware of MOOC?
ii. What is the extent of participation of Science and Technology Education lecturers in Massive online open courses?
iii. Why do lecturers participate in MOOC programmes?
iv. What are the reasons for non-completion of the sessions by STE lecturers?
v. Are lecturers ready to participate in the in future?

Research Hypotheses

Ho_1 There is no significant difference in the mean responses of the Science Education lecturers and the Technology Education lecturers on Massive Open Online Course awareness.

Ho_2 There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on the extent of participation in MOOC.

Ho_3 There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on reasons for participation in MOOC.

Ho_4 There is no significant difference in the mean responses of the STE lecturers on the extent of participation in MOOC based on years of professional experience.

Ho_5 There is no significant association between STE lecturers' gender and their responses on readiness for participation in MOOC.

Methodology

The study employed a survey research design; the questionnaire was used to collect the

required information because it is considered the most appropriate tool to objectively get the opinion, response and perception from respondents considered to be a representative of the entire population.

The study was conducted among the Science and Technology Education lecturers in Federal University of Technology, Minna, Niger State with a population of 56 lecturers. The sample was made up of 21 lecturers from the School of Science and Technology Education at the University. Using convenience sampling (accidental sampling), the researcher made use of the STE lecturers who were readily available and agreed to participate in the study.

Table 1:
Sample for the Study

Gender	Years of Professional Experience	Departments	
		Science Education	Technology Education
Male	1-5		1
	6-10	1	1
	10 and above	6	8
Female	1-5		1
	6-10	1	
	10 and above	2	
Total		10	11

Research Instruments

The survey instrument that was used to collect data for the study was a researcher-developed questionnaire administered to the STE lecturers. The questionnaire consisted of two parts; the first part is on the characteristics of the respondents (department, gender and year of experience) while the second part was in five sections. Section A focused on the MOOC awareness of the STE lecturers. Section B dealt with the level of MOOC participation by STE lecturers. Section C was on reasons for participation in MOOC. Section D dealt with reasons for non-completion of MOOC sessions by participating lecturers. Section E was used to get their response on readiness for MOOC participation in future. The sections consisted of majorly positive and very few negative statement items with responses as Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The responses were rated 4, 3, 2 and 1 respectively.

The instrument was validated by three experts in the area of Test and Measurement. The reliability coefficients of the sections A, B, C, D and E are 0.92, 0.80, 0.91, 0.70 and 0.86 respectively. 24 copies of the questionnaire were distributed to 24 STE lecturers that agreed to be respondents in the study. 21 copies of the distributed questionnaire were returned and used for data analysis.

Data collected were analyzed in line with the research questions and hypotheses using mean, standard deviation (SD), Analysis of Variance (ANOVA) and chi-square. A mean score of 2.5 was selected as the decision points between agreement and disagreement, ANOVA was used to test the significant differences at 0.05 level, and the significant level of association was established at 0.05.

Results

Research Question One: Are Science and Technology Education lecturers aware of MOOC?

Table 2:
Mean response of Science and Technology Education Lecturers' awareness on MOOC

	Items on MOOC Awareness	N	Mean	SD	Decision
1	I am aware of the Massive Online Open Courses	21	2.90	1.0	Agree
2	I have enough information about MOOC	21	2.57	1.07	Agree
3	Many Lecturers in my department are aware of MOOC	21	2.52	0.6	Agree
4	I am aware of MOOC that offers courses on Professional Development.	21	2.86	0.85	Agree
5	I am aware of MOOC that offers courses on Personal Development.	21	2.71	1.01	Agree
	Grand Mean		**2.71**		**Agree**

Table 2 shows that all the items have a mean of above 2.50 and a grand mean of 2.71, which revealed that majority of the respondents agreed that they are aware of the Massive Online Open Courses for personal and professional development, and also have enough information about it.

Research Question Two: What is the extent of participation of Science and Technology Education lecturers in courses?

Table 3:
Mean response of Science and Technology Education Lecturers on participation in the courses

S/N	Items on MOOC participation	N	Mean	SD	Decision
1	I have ever enrolled in personal development course(s) in MOOC	21	1.62	0.50	Disagree
2	I have ever enrolled in a professional development course(s) in MOOC	21	1.90	0.83	Disagree
3	I have ever completed personal development course(s) in MOOC	21	1.86	0.85	Disagree
4	I have ever completed course(s) in MOOC for professional development	21	2.0	1.04	Disagree
5	I have received a certificate for completion of a course in MOOC	21	1.57	0.51	Disagree
	Grand Mean		**1.79**		**Disagree**

Table 3 shows that all the items have a mean below 2.50 and a grand mean of 1.79. This indicated that respondents disagreed with their participation in MOOC for personal and professional development. It also indicated that they have never participated, completed or received any certificate in Massive Online Open Courses.

Research Question three: Why do lecturers participate in MOOC programmes?

Table 4:
Mean response of lecturers on reasons for their participation in Massive online programmes

S/N	Items on reasons for lecturers' participation	N	Mean	SD	Decision
1	I participate in MOOC to learn new things in my field	21	2.1	0.94	Disagree
2	I participate in MOOC to explore new technology	21	2.1	0.94	Disagree
3	I participate in MOOC to explore new areas	21	1.86	0.73	Disagree
4	I participate in MOOC to connect with my students	21	1.86	0.73	Disagree
5	I participate in MOOC to obtain verifiable certificate	21	1.67	0.66	Disagree
6	I participate in MOOC to get a job in future	21	1.67	0.66	Disagree
7	I participate in MOOC to communicate with other people of the same interest	21	1.95	0.92	Disagree
	Grand Mean		**1.85**		**Disagree**

Table 4 indicates that all the items have a mean below 2.50 with a grand mean of 1.85. This implied that the lecturers disagreed with the researcher's reasons for participation in the courses.

Research Question Four: What are the reasons for non-completion of the sessions by STE lecturers?

Table 5:
Mean response of lecturers on reasons for non-completion of MOOC sessions

S/N	Items on reasons for non-completion of MOOC sessions	N	Mean	SD	Decision
1	I don't have enough time	21	3.05	0.92	Agree
2	I have too much work	21	3.0	0.95	Agree
3	I am not interested in the topics	21	1.81	0.68	Disagree
4	I have problem accessing the lectures for technical reasons	21	2.24	1.0	Disagree
	Grand Mean		**2.5**		

Table 5 shows the mean response of lecturers on reasons for non-completion of MOOC sessions. The respondents agreed with items 18 and 19 and disagreed with items 20 and 21 all having means of 3.05, 3.0, 1.81 and 2.24 respectively and grand mean of 2.5. This revealed that the lecturers agreed that not having enough time and having too much work to do are reasons for not completing MOOC sessions by the participating lecturers which could also be the reason for the non-participation of others. They disagreed with the fact that they are not interested in the topics and courses or having a technical problem accessing the lecturers. This actually shows that their non-participation is a temporal situation.

Research Question five: Are lecturers ready to participate in the MOOC in future?

Table 6:
Mean response of lecturers on readiness for MOOC participation in future

S/N	Items on readiness for future participation in MOOC	N	Mean	SD	Decision
1	I will like to have more information on MOOC for professional development	21	3.5	0.60	Agree
2	I will like to enroll in MOOC for professional development	21	3.2	0.51	Agree
3	I will like to enroll in MOOC for personal development	21	3.3	0.56	Agree
4	I will like to complete (at least) a session in MOOC	21	3.1	0.62	Agree
	Grand Mean		3.3		Agree

Table 6 shows the mean response of lecturers on readiness for future participation in MOOC sessions. The respondents agreed with all the four items in this section with mean responses of 3.5, 3.2, 3.3 and 3.1 respectively and mean responses of 3.3. This is an indication that the STE lecturers are ready for future participation in the sessions. The STE lecturers agreed that they would like to know more about MOOC, enroll in it for personal and professional development and even complete at least a session in future.

Hypothesis One

H_{O1}: There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on Massive Open Online Courses awareness.

Table 7:
ANOVA of mean responses of the Science and the Technology Education lecturers on MOOC awareness

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	50.634	1	50.634	3.610	0.073
Within Groups	266.509	19	14.027		
Total	317.143	20			

NS = not significant at 0.05 level

Table 7 shows the ANOVA comparison of the Science and Education lecturers' responses. The table with $F(1, 19) = 3.610$, $p = 0.073$. This revealed that there is no significant difference in the mean responses of the Science and the Technology Education lecturers on MOOC awareness.

Hypothesis Two

H_{O2}: There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on the extent of participation in Massive Open Online Courses.

Table 8:
ANOVA of mean responses of the Science and the Technology Education lecturers on the extent of participation in MOOC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	58.625	1	58.625	10.096	0.005
Within Groups	110.327	19	5.807		
Total	168.952	20			

* = significant at 0.05 level

Table 8 shows the ANOVA comparison of the Science and Education lecturers' responses. The table with F (1, 19) = 10.096, p = 0.005. This revealed that there is a significant difference in the mean responses of the Science and the Technology Education lecturers on the extent of participation in MOOC.

Hypothesis Three

HO_3: There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on reasons for participation in Massive Open Online Courses.

Table 9:
ANOVA of mean responses of the Science and the Technology Education lecturers on reasons for participation in participation in MOOC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	221.929	1	221.929	21.813	0.000
Within Groups	193.309	19	10.174		
Total	415.238	20			

* = significant at 0.05 level

Table 9 shows the ANOVA comparison of the Science and Education lecturers' responses. The table with F (1, 19) = 21.813, p = 0.000. This revealed that there is a significant difference in the mean responses of the Science and the Technology Education lecturers on reasons for participation in MOOC.

Hypothesis Four

H_{O4}: There is no significant difference in the mean responses of the STE lecturers on the extent of participation in MOOC based on years of professional experience.

Table 10:
ANOVA of mean responses of the STE Lecturers on the extent of participation in MOOC based on years of experience

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.786	2	0.893	0.096	0.909
Within Groups	167.167	18	9.287		
Total	168.952	20			

NS = not significant at 0.05 level

Table 10 shows the ANOVA comparison of the STE Lecturers' responses in sections based on years of experience. The table with F (2, 18) = 0.096, p = 0.909, revealed that there is no

significant difference in the mean responses of the STE lecturers on MOOC based on years of experience.

Hypothesis Five

H_{05}: There is no significant association between STE lecturers' gender and their responses on readiness for participation in MOOC.

Table 11:
Chi-Square analysis of lecturers' gender and their responses on MOOC participation

	Value	Df	P-Value
Pearson Chi-Square	0.297[a]	1	0.586
Likelihood Ratio	0.291	1	0.590
Linear-by-Linear Association	0.283	1	0.595
N of Valid Cases	21		

NS = not significant at 0.05 level

Table 11 reveals that there is no significant association between STE lecturers' gender and their responses on readiness for participation in MOOC, $X(1) = 0.297$, $p = 0.586$.

Discussion of Findings

Findings that emanated from this study revealed that there is limited awareness on Massive Open Online Course among STE lecturers. It also revealed that majority of the STE lecturers have neither participated nor completed any course in MOOC talk more of receiving a certificate for it.

From the findings of the study, the lecturers agreed that having too much work to do and the fact that time is not enough, is responsible for non-completion of MOOC session, which could also be their reasons for low participation. However, most STE lecturers are ready to know more about, participate and complete at least one MOOC session in the near future irrespective of their gender.

Findings that emanated from this study also revealed that though; there is an indication that the Science Education lecturers had a different opinion from the Technology Education lecturers on the extent and reasons for participation in MOOC, their years of experience did not influence their decisions on MOOC participation.

Conclusion

The study has critically examined MOOC and STE lecturers' participation. It was obvious that though most lecturers were aware of Massive Online Open Courses before the study, but very few have participated in MOOC sessions. This implies that they have been missing the rich contents delivered by professional and well-experienced facilitators using the latest technologies from best Universities around the globe. It was also revealed that the non-participation was not because they are not interested in the courses or having technical issues in accessing it, but it is due to their busy schedule. However, with the little enlightenment created by this study through the interactions between the researchers and the respondents, the STE lecturers actually demonstrated a positive attitude to personal and professional development by agreeing to participate and complete at least one MOOC session in the nearest future.

Recommendations

Based on the findings of the study, it was recommended that; irrespective of their gender or years of experience, STE lecturers should search for more information about MOOC. The lecturers should create time and enroll in the MOOC; it is free and could easily be accessed at any time;

either online on websites or through mobile applications. MOOC is with rich contents and could contribute to personal and professional development. They should also try and complete at least one session and even obtain a verifiable certificate either in their field or other areas of interest.

References

Adebo, T. & Ailobhio, T. (2017). Massive open online courses aware and adoption by Nigeria University students (A case study). *International Journal of Computer Engineering and Information Technology, 9*(3), 41 - 46.

Clow, D. (2013). MOOCs and the funnel of participation. In *Proceedings of the Third Conference on Learning Analytics and Knowledge*. Leuven, Belgium: ACM, pp.185-189.

Cormier, D., & Siemens, G. 2015. The open course: Through the open door--open courses as research, learning, and engagement," *Educause Review, 45*(4), 30 - 32

HEFCE (2014). *A briefing on the Impact of the 2012 reforms [Internet]. Higher Education Funding Council for England.* Available from: http://www.hefce.ac.uk/about/intro/abouthighereducationinengland/impact/students/

Jobe, W., Östlund, C. & Svensson, L. (2014). MOOCs for professional teacher development. *Proceedings of Society for Information Technology and Teacher Education Conference 2014.* Chesapeake, VA: AACE

Lane, A. (2013). The potential of MOOCs to widen access and success in higher education study. In *The Open and Flexible Higher Education Conference 2013*: EADTU, Paris: 23-25 October 2013, pp. 189–203. Available at http://oro.open.ac.uk/38881/. Retrieved 25 April 2014.

McAuley, A., Stewart, B., Cormier, D. & Siemens, G. (2010). In the open: The MOOC model for digital practice. SSHRC Application, Knowledge Synthesis for the Digital Economy.

Orolade, K. S. and Oyewusi, L. M. (2017). Massive Open Online Courses Among Nigerian Postgraduate Students: Fad or Reality? European Journal of Education Studies, 3(7) 569-575.

Soyemi, O. D. and Babalola, Y. T. (2018). Awareness and use of massive open online courses among academic librarians in Ogun State, Nigeria. *Journal of Information and Knowledge Management, 9*(1), 1-11.

Weller, M. (2011). *The digital scholar: how technology is transforming the scholarly practice*. New York: Bloomsbury.

Welsh H.B and Dragusin.D (2013*). The new generation of massive open online course (MOOCs) and entrepreneurship education*, The University of North Carolina at Greensboro.Small Business Institute Journal Small Business Institute 2013, Vol. 9, No. 1, 51-65.