EFFECTS OF MOODLE PLATFORM ON LEARNING OUTCOMES IN AGRICULTURAL SCIENCE AMONG UNIVERSITY STUDENTS IN NORTH-CENTRAL, NIGERIA

SOBOWALE, F. M.[1], NSOFOR, C. C.[2], OJO, M. A[3]., & ABDULLAHI, M. B.[4]
[1&2]Department of Educational Technology,
[3]Department of Agricultural Economics
[4]Department of Computer Science
Federal University of Technology, Minna
E-mail: favoursobowale50@gmail.com
Phone No: +234-816-231-6780

Abstract
The study examined the effects of MOODLE Platform on learning outcomes in Agricultural Science among university students in North-Central, Nigeria. The researcher used quasi-experimental design (pretest, posttests, non-randomized, non-equivalent experimental and control groups design). The population of the study was 4,562 students. The sample size for the study comprised 237 students from two Universities in North-Central, Nigeria drawn from the population. The research instrument was developed by the researcher and validated by two experts, from the Department of Educational Technology, Federal University of Technology, Minna. To determine the reliability of Agricultural Science Achievement Test (ASAT), Spearman Brown Coefficient was used to analyse the data that was collected from ASAT administered to the students using SPSS version 20, a reliability coefficient of 0.81 was obtained which is above the bench mark of 0.70. This shows that the instrument was reliable. To determine the reliability of Agricultural Science Satisfaction Questionnaire (ASSQ), Cronbach Alpha was used to analyse the data collected and a reliability coefficient of 0.85 was obtained which shows that the instrument was reliable. To determine the reliability coefficient of Agricultural Science Interest Inventory (ASII), Cronbach Alpha was also used and when analysed, a reliability coefficient of 0.75 was obtained which showed that the instrument is suitable for the categories of students in this study. Three research questions guided the study while the three hypotheses formulated were tested at 0.05 level of significance. Frequency counts, mean($\bar{X}$) and standard deviation (SD) were employed to answer the research questions while t-test was used to test the hypotheses. Findings showed significant difference between the students taught using MOODLE Platform and those taught using lecture method. It was concluded that MOODLE Platform should be employed to teach Agricultural Science. It was also recommended that MOODLE Platform be used in teaching and learning process among others.

Keywords: Agricultural Science, Learning Outcomes, MOODLE

Introduction
Information and Communication Technology (ICT) is regarded as a strong weapon for sustainable development empowering people for global competitiveness (Koehler, 2011). This culminated in the development and propagation of ICT policy in Nigeria and for the Nigerian University system. The impact of ICT on Nigerian universities teaching and learning processes are enormous. As such, the university system has undergone several changes in teaching and learning processes with the introduction of ICT. In using ICT tools for educational purposes, students are able to communicate, interact with colleagues and teachers using technology. This is evident in the learning outcome of students at all level of education which includes primary, secondary and tertiary institutions. For effective teaching and learning, curriculum have been designed to create a balance between pedagogy and content from one side and integrating technology from the other side so that students could be provided and supported by a valuable teaching-learning environment (Koh & Chai, 2011).

In order to create a valuable teaching-learning environment, e-learning environments has been introduced which has increased the need for content and learning management (Sen, 2015). Several content and learning management platforms like Edmodo, Massive Open Online Courses (MOOC) platforms (EdX and Coursera) and cloud file hosting services such as Google Drive and DropBox have become very popular in the past. In the same vein, the number of educational mobile platforms applications such as MOODLE, WizIQ, ATutor, WhatsApp, Facebooks, Adobe Connect, Blackboard, WebCT among others have being on the increase and most of these platforms are widely used for teaching and learning processes especially at higher levels of education. It was observed by Stantchev *et al*., (2014) that using LMS platform has provided students and teachers better approach to teaching and learning processes which is better managed when compared with lecture method.

MOODLE is one of the most popular Learning Management System Platform that is used for teaching and learning process and management of instruction. It is an acronym that stands for Modular Object Oriented Dynamic Learning Environment with an object-directed model that supports active learning environment. It is used to create interaction between learners and teachers and between learners and contents in the process of teaching and learning in the classroom setting or online platform (Sen, 2015). MOODLE is a basis for pedagogical transmission to bring courses and facilities that will enhance students' learning, although this platform is used mostly at higher institutions of learning (Yorkshire & Wistrom, 2010).

Tertiary institution in Nigeria includes Universities, Polytechnics, Monotechnics and Colleges of education (Amaghi, onyeodiwe & Osinubi, 2007). Agricultural science is one of the courses offered at tertiary institutions with different options like Animal Production, Crop Production, Agricultural Economic and Extension depending on the nature of the university. The need to address agricultural training at the university level is in this way two fold; firstly by managing student's enthusiasm and interest from encounters in primary school, secondary school and secondly by proceeding with this mind set by students to tertiary level possibly through technological and innovative lesson presentations so as to comprehend the potentials that agriculture offers.

In order to enhance academic achievement of students in practical subjects like Agricultural Science, various researches on Learning Management Systems and Content Management Systems have shown that teaching and learning is made easier. Learning Management System (LMS) is mostly used in institutions that depend on web-based learning. The nature of MOODLE as an LMS is highly customizable, as such could improve the overall usability of the Virtual Learning Environment (VLE) which is among the chief positive social impacts of adopting this system. It was also discovered by Holbl *et al*. (2011) that MOODLE improves better communication and collaboration between instructors and students thereby enhancing learning outcomes.

Learning outcomes in this study however include: academic achievement, interest and satisfaction. Achievement is really the outcome or result of student in subjects or courses at a given time and it can also be defined as outcome of a conquest, what is attained, what is accomplished, being successful and to gain recognition (Norris, Sporre & Svendsen, 2013). Through MOODLE, learners are able to get course materials like notes, power point slides, videos, journal articles and hand-outs which aid learners in self-directed learning. This was evident in a study carried out by Zhu (2012), it was indicated that online collaboration enhances students' achievement and invariably increase the interest level of the students. Interest is an excitement or feeling accompanied by special attention to do something (Gimba, 2013). Mangal (2010) observed that appropriate learning environment and methods, functional teaching material and a motivating teacher have positive effect on students' interest in learning which could increase level of satisfaction of students and meaningful learning.

Satisfaction can be defined as fulfilling expectations, needs, wishes or pleasure derived from an event. It can then be seen as level of fulfillment from teaching and learning process for better academic achievement. Lo (2010) emphasized that strong satisfaction activates students' systematic intellectual capabilities and ability to learn effectively. The survey by Berg and Lu (2014) indicated that the student satisfaction with MOODLE was mainly in the ease in searching for course information on the system as well as downloading and uploading assignments with ease and convenience on the system. The theory upon which the learning platforms were developed was socio-constructivist theory. This is because socio-constructivist pedagogy has as one of the goals of providing and setting up tools that supports inquiry and discovery based approaches for on-line teaching and learning process. It helps to create environment which enables collaboration and interaction among students especially when used in a classroom setting to determine its effectiveness.

The effectiveness of MOODLE-based Blended Learning was carried out by Sun (2014) on learning outcome of College English students using 90 non-English majors. Blended Learning model was used on the experimental group where 45 students received instruction while traditional grammar translation method was used for the control group with 45 students. It was observed that MOODLE-based Blended Learning improved the language learners' interest and initiative, promoted English comprehensive competence and encouraged team spirit and cooperative learning better than traditional classroom face-to-face learning model. Also, Kerzic, Tomazevic and Aristovnik (2015) analysed how introduction of the e-learning system MOODLE as part of the teaching process is related with students' performance and examination on the relationship among different groups of students (based on selected individual socio-demographic factors). The data show that the greatest improvement is seen among students with lower high school grades. The results can serve as important guidelines for university management when further investigating how to enhance students' performance on different levels when employing modern ICT solutions in the teaching process. This can be seen to be similar to the present study in the students used which were undergraduates but the subject area and location of study differs.

A study was carried out by Wathanti and Chaithongsri (2015) using Electronic Learning Management system (MOODLE) in developing good outcome for learning and achievement and to also determine the level of satisfaction of the students. The students undergoing Business Administration Programmer in Computer Information System were used for the study at Rajamangala University of Technology Isan Sakon Nakhon Campus in India. It was found out after the data analysis that the scores of the students was higher after learning than before learning which represented better achievement. It was also found out that the satisfaction levels of respondents was higher after learning than before learning. Similarly, Umek, Aristovnik, Tomazevic, Kerzic, (2015) carried out a study using member institution of the University of Ljubljana which provided programmers in public administration. The study was carried out on the relationships that exist between the amount of implemented courses on MOODLE e-learning platform and the achievement of students and how their implemented courses on MOODLE e-learning platform affect their level of satisfaction. The result revealed that correlation exists for both elements which were a positive correlation. It was also observed that MOODLE e-learning platform enhances their level of satisfaction. In a study also carried out by Firat (2016), the effects of undergraduate students' LMS learning behaviors on their academic achievements was investigated. Learning analytics was used for 14 weeks on the 71 undergraduate students that participated in the study and after the analysis, it was revealed that the students used LMSs as a support to face-to-face education more intensively on course days (at the beginning of the related lessons and at nights on course days) and that they activated the content elements the most. Lastly, almost all the students agreed that LMSs helped increase their academic achievement only when LMSs included such features as effectiveness, interaction, reinforcement, attractive design, social media support, and accessibility.

In a study also carried out by Damola, Adebimbo and Alaba (2016) on how MOODLE could be used to enhance learning outcome in Basic Science and Technology in Nigeria. A quazi-experimental research design was used as the research design for the study. Four junior secondary schools were selected for the study with a sample size of 120 male and female students. After data collection and analysed it was observed that MOODLE was an effective learning platform compared to lecture method in teaching Basic Science and Technology for teaching junior secondary school in Oyo state. It was also found out that students developed better interest towards Basic Science and Technology when taught using MOODLE than lecture method. A study carried out by Dwivedi, Khurana, and Saxena (2012) investigated the factors that may influence students' web-based learning satisfaction. The study aimed at analyzing the e-learning system quality, usefulness, and its impact on satisfaction level and effective-learning outcomes among students. This study was conducted at ICFAI Business School - Gurgaon, Haryana, India with MOODLE E-learning system. The stratified random sampling technique was used to select 174 samples out of 1100 population to administrate the questionnaire. This is exploratory empirical study based on primary data through administration of questionnaire with twenty=one statements and five statements for background information and the responses are close ended with 4 point Likert scale. The findings indicated that the satisfaction level of students depends on effective-learning enabled by e-learning system. The results also indicate effective-learning is dependent on system usefulness and system quality. The findings of this study will help the educational institute to design the e-learning system with its best features and implement them in such a way that the end user gets the maximum benefit out of it. This study predicts that system quality, interactive sessions, flexibility, ease of use, enhanced learning curves, need of learning, accomplishments, self-esteem of learners, social influence have impact on satisfaction level of learners.

In a related study carried out by Topal (2016) to determine both the relationship between e-course satisfaction and online learning readiness by ascertaining student levels, and the effect of the materials used in e-learning on student satisfaction. A general screening model was used in this study to determine the characteristics of a group and to clarify the existing situation in their own conditions. The study was conducted during the 2014-2015 academic year at Kocaeli University. The E-Course Satisfaction Scale (ECSS), consisting of 35 five-point Likert-type items, and the Online Learning Readiness Scale (OLRS) consisting of 18 five -point Likert-type items, were applied to 352 university students. The data were analyzed by methods of descriptive statistics, independent t-test and regression analysis in the SPSS program. Student satisfaction was high when the number of materials used in courses was 7 and over, that is, as the number of materials increased, so did the satisfaction level.

It is on the above assertion that the theoretical framework for this study hedges on socio-constructivist theory which allows the students take responsibilities for individualistic approach of learning. In self-regulated learning, students are motivated, independent, and become meta-cognitively active learners in their own learning. It can therefore be said that outstanding outcome of students in their studies and being contented with level of exposure in terms of experience brings satisfaction. Therefore, this study attempts to investigate the effectiveness of MOODLE approach on learning outcomes in Agricultural Science among undergraduates in North-Central, Nigeria.

Statement of the Problem

The achievement of undergraduate students especially in Agricultural science has being a source of concern to university management at all levels of Nigerian universities. It was observed by Bada, Adekomi and Ojo (2012) that some problems that added to poor academic achievement of students in Agricultural Science are attributed to the fact that some universities in the nation are short-staffed. This situation sometime, necessitated a teacher accommodating larger classes thereby frequently bringing about lack of engagement of students in the classroom, poor

readiness and inadequate strategy for teaching embraced by the teachers and poor funding of school system which could be responsible for the non-operation of the practical farms in universities.

It was observed that most of the science lecturers do not have the essential information required for action-based-learning, as such the medium for instruction has been the lecture method and the mode of course management has being note taking in lecture halls. Lecturers do all the talking while students listen and either copy notes or make photocopies of instructional materials, in other words lecturers-centred approach dominate the system (Akpoghol, Ezeudu, Adzape & Otor, 2016). However, to make learning to be students-centered, MOODLE as an online learning platform has been observed to enable educators to design online courses in which the students can access anytime like a virtual classroom (Chukwuemeka, Edori &Bakare, 2015). Despite the advantages of MOODLE, it is not yet fully adopted for teaching and learning in most of the universities in Nigeria especially in science courses. Students may be intellectually and physically capable to learn but may never learn until their interest is aroused through an attractive approach of teaching. When the student's interest is aroused using a good teaching approach, sustaining his attention may be guaranteed and could equally promote effective learning (Ben, 2013).It was noted by Naaj, Nachouki and Ankit (2012) that the satisfaction of learners under virtual learning environment is the baseline requirement for a successful implementation of planned lessons that could improve students' achievement. Consequent upon this, the need to create an avenue for effective course management, hence the need to compare the effectiveness and suitability of these approach that is MOODLE approaching enhancing teaching and learning of some agricultural concepts among undergraduates in North-Central, Nigeria.

Aim and Objectives of the Study

The aim of this study is to determine the effects of MOODLE Platform on learning outcomes in Agricultural Science among university students in North-Central, Nigeria. The objectives guiding this study are to:

(i). examine the effectiveness of using MOODLE Platform and lecture method on academic achievement of undergraduate Agricultural Science students in North-Central, Nigeria.

(ii). determine the effect of MOODLE Platform and lecture method on the interest of undergraduate students towards Agricultural Science in North-Central, Nigeria.

(iii). examine the level of satisfaction among undergraduate students after using MOODLE and Lecture Method in learning of Agricultural Science in North-Central.

Research Questions

The following questions were asked in order to achieve the above stated objectives.

(i). How effective is the use of MOODLE Platform on academic achievement of undergraduate Agricultural Science students in North-Central, Nigeria?

(ii). What is the influence of MOODLE Platform on the interest of undergraduate students towards Agricultural Science in North-Central, Nigeria?

(iii). What is the level of satisfaction among undergraduate students after using MOODLE Platform in learning Agricultural Science in North-Central, Nigeria?

Research Hypotheses

The following null hypotheses were formulated and will be tested at 0.05 alpha levels.

HO_1: There is no significant difference in the Mean $(\bar{X})$achievement scores of undergraduate students taught Agricultural Science in North-Central, Nigeria using MOODLE Platform and those taught using lecture method.

HO_2: There is no significant difference in the Mean $(\bar{X})$interest scores of undergraduate students taught Agricultural Science in North-Central, Nigeria using MOODLE Platform and those taught using lecture method.

HO_3: There is no significant difference in the level of satisfaction of undergraduate students after learning Agricultural Science in North-Central, Nigeria through MOODLE Platform and lecture method.

Research Methodology

The study will adopt a quasi-experimental research design. The population of this study comprised of 4,562Agricultural Science students in all the Universities in North-Central. The sample size for this study was237 students from the two universities selected for this study. A multistage sampling technique was adopted in this study. Two universities were randomly selected from the seven conventional universities in North-Central that will be used for this study. The universities are Kwara State University, Malete, (135) and Ibrahim Babangida Badamasi University, Lapai (102). The topic to be taught is in the curriculum of 200 level students which inform the choice of the level.

Four instruments were developed by the researcher for this study.

Treatment Instruments: MOODLE Platform (MP); Test Instruments: Agricultural Science Achievement Test (ASAT); Satisfaction Questionnaire: Agricultural Science Satisfaction Questionnaire (ASSQ); Interest Inventory: Agricultural Science Interest Inventory (ASII).

MOODLE Platform was validated by Educational Technology experts and Computer Science Experts all from Federal University of Technology, Minna and two Agricultural Science Lecturers from the Department of Animal Production, School of Agriculture and Agricultural Technology, Federal University of Technology, Minna in order to determine the appropriateness of the learning platform as well as the suitability for the level of the students. The comment from the expert was that the instrument was technically sufficient enough to impact knowledge on Anatomy and Physiology of Farm Animals. The Agricultural Science Achievement Test was also validated by two lecturers from the Department of Animal Production, School of Agriculture and Agricultural Technology, Federal University of Technology, Minna. The Interest Inventory was validated by a lecturer that specializes in Guidance and Counselling in the department of Science Education, Federal University of Technology, Minna. The instrument ASSQ was validated by a lecturer from the Department of Educational Technology that have background in Guidance and Counselling to determine the appropriateness of the instrument.

The researcher visited the universities to be used in this study and take permission from the school management through the departmental heads to have contact with the students that was used for this study at the commencement of the study. Each of the two randomly selected schools were assigned to experimental and control groups. The students were trained on the procedure for carrying out the experiment in one week. During the third week before the commencement of the experiment; the ASAT, ASII and ASSQ was administered on the students in all the selected schools as pretest. The main objective of administering the pretest was to ascertain the academic equivalent of the students in Agricultural Science before the commencement of the experiment. Treatment was followed thereafter and lasted for six weeks based on universities academic calendar and scheme of work. The study lasted for Fourteen weeks.

The research questions one to three were answered using descriptive statistics of mean and standard deviation. t-test statistics was used to analyze the data collected for the pretest. 0.05 level of significance was adopted for all analyses as the criterion for significance which will be used to determine if the hypotheses was rejected or accepted. SPSS statistic version 20 was used for the analyses.

Results

Research Question One: How effective is the use of MOODLE Platform on academic achievement of undergraduate Agricultural Science students in North-Central, Nigeria?

Table 1: Mean and standard deviation of pretest and posttest Mean Achievement scores of students taught Agricultural Science with MOODLE Platform

Group	Pretest			Posttest		
	N	Mean $(\bar{X})$	SD	Mean $(\bar{X})$	SD	Mean Gain
Experimental (MOODLE Approach)	135	38.98	8.118	67.24	9.916	28.26
Control (Lecture Method)	102	36.61	8.395	60.43	11.256	23.82

Table 1 shows that the students who were taught Agricultural Science using MOODLE had mean achievement score of 67.24 with a standard deviation of 9.92 at the post-test against their pre-test mean achievement score of 38.98 and standard deviation of 8.12 while those who were taught using lecture method had mean score of 60.43 with a standard deviation of 11.26 while the pretest mean score was 36.61 with standard deviation 8.39. There was aMean $(\bar{X})$gain scores of 28.26 and 23.82 for experimental and control groups. This shows that the students who were exposed to MOODLE had higher mean achievement score than those taught using lecture method.

Research Question Two: What is the effect of MOODLE Platform on the interest of undergraduate students towards Agricultural Science in North-Central, Nigeria?

Table 2: Mean and standard deviation of pretest and posttest Mean Interest scores of students taught Agricultural Science with MOODLE Platform

Group	Pretest			Posttest		
	N	Mean $(\bar{X})$	SD	Mean $(\bar{X})$	SD	Mean Gain
Experimental (MOODLE Approach)	135	48.31	4.27	58.45	4.19	10.14
Control (Lecture Method)	102	56.45	5.89	56.66	5.98	0.21

Table 2 shows that the students who were taught Agricultural Science using MOODLE had mean interest scores of 58.45 with a standard deviation of 4.19 at the post-test against their pre-test mean interest score of 48.31 and standard deviation of 4.27 while those who were taught using lecture method had mean score of 56.66 with a standard deviation of 5.98 while the pretest mean score was 56.45 with standard deviation 5.89. There were mean gain scores of 10.14 and 0.21 for the two groups. This shows that the students who were exposed to MOODLE had higher mean interest score than those taught using lecture method.

Research Question Three: What is the level of satisfaction among undergraduate students after using MOODLE Platform in learning Agricultural Science in North-Central, Nigeria?

Table 3: Mean and standard deviation of pretest and posttest Mean Satisfaction Scores of students taught Agricultural Science with MOODLE Platform

Group	Pretest			Posttest		
	N	Mean ($\bar{X}$)	SD	Mean ($\bar{X}$)	SD	Mean Gain
Experimental (MOODLE Approach)	135	46.63	5.39	60.71	5.36	14.08
Control (Lecture Method)	102	60.70	8.34	61.28	8.26	0.58

Table 3 shows that the students who were taught Agricultural Science using MOODLE had mean satisfaction scores of 60.71 with a standard deviation of 5.36 at the post-test against their pre-test mean satisfaction score of 46.63 and standard deviation of 5.39 while those who were taught using lecture method had mean score of 61.28with a standard deviation of 8.26 while the pretest mean score was 60.70with standard deviation 8.34. There were mean gain scores of 14.08 and 0.58 for the two groups. This shows that the students who were exposed to Lecture Method had higher mean satisfaction scores than those taught with MOODLE Platform.

Hypotheses Testing

HO_1: There is no significant difference in the mean achievement scores of undergraduate students taught Agricultural Science in North-Central, Nigeria using MOODLE Platform.

Table 4: Summary of t-test Analysis of Achievement Scores of undergraduate students taught Agricultural Science in North-Central, Nigeria using MOODLE Platform

Group	N	df	$\bar{X}$	SD	t-value	P-value
Experimental (MOODLE Approach)	135		67.24	9.92		
		235			0.136	0.000
Control (Lecture Method)	102		60.43	11.25		

Significance at 0.05**.**

Table 4 shows the t-value was 0.136 the P-value was 0.000 which is P<0.05. This means it was significant as such hypothesis one was rejected. The mean achievement score of students taught Agricultural Science using MOODLE Platform was 67.24 with standard deviation of 9.92 while the mean score of students taught lecture method was 60.43 with standard deviation of 11.25. This implies that MOODLE Platform enhanced academic achievement better than lecture method with a significant difference. From the mean score, it is obvious that the students learnt better with MOODLE Platform.

HO_2: There is no significant difference in the mean interest scores of undergraduate students taught Agricultural Science in North-Central, Nigeria using MOODLE Platform

Table 5: Summary of t-test Analysis of Interest Level of undergraduate students taught Agricultural Science in North-Central, Nigeria using MOODLE Platform

Group	N	df	$\bar{X}$	SD	t-value	P-value
Experimental (MOODLE Approach)	135		58.45	4.19		
		235			0.000	0.007
Control (Lecture Method)	102		56.66	5.98		

Significance at 0.05.

Table 5 shows the t-value was 0.000 the P-value was 0.000 which is P<0.05. This means it was significant as such hypothesis two was rejected. The mean interest scores of students taught Agricultural Science using MOODLE Platform was 58.45 with standard deviation of 4.19 while the mean score of students taught lecture method was 56.66 with standard deviation of 5.98. This implies that MOODLE Platform increased interest better than lecture method with a significant difference. From the mean score, it is obvious that the students have better interest in Agricultural Science when MOODLE Platform is used for teaching compared to when lecture method is used.

HO_3: There is no significant difference in the level of satisfaction of undergraduate students after learning Agricultural Science in North-Central, Nigeria through MOODLE Platform

Table 6: Summary of t-test Analysis of Level of Satisfaction of undergraduate students taught Agricultural Science in North-Central, Nigeria using MOODLE Platform

Group	N	df	$\bar{X}$	SD	t-value	P-value
Experimental (MOODLE Approach)	135		60.71	5.38		
		235			0.68	0.52
Control (Lecture Method)	102		61.28	8.26		

Significance at 0.05

Table 6 shows the t-value was 0.68 the P-value was 0.52 which is P>0.05. This means it was not significant as such hypothesis three was accepted. The mean satisfaction scores of students taught Agricultural Science using MOODLE Platform was 60.71 with standard deviation of 5.38 while the mean score of students taught lecture method was 61.28 with standard deviation of 8.26. This implies that MOODLE Platform gave the same level of satisfaction to students taught Agricultural Science as lecture method. From the mean score, it is obvious that there is no difference in their levels of satisfaction when taught Agricultural Science with both MOODLE Platform and lecture method.

Discussion of Findings

Finding showed that MOODLE Platform enhanced academic achievement better than lecture method with a significant difference. This agrees with Sun (2014) who observed that MOODLE-based Blended Learning improved the language learners' interest and initiative, promoted English comprehensive competence and encouraged team spirit and cooperative learning better than traditional classroom face-to-face learning model. In the same vein, it agrees with the finding of Kerzic, Tomazevic and Aristovnik (2015) who found out that there was a significant improvement in performance of students at the different levels after introducing the MOODLE e-learning platform. It also corroborates the study of Damola, Adebimbo and Alaba (2016) who discovered that MOODLE enhanced learning outcome in Basic Science and Technology in Nigeria because students developed better interest towards Basic Science and Technology when taught using MOODLE than lecture method.In a related development, the finding of Topal (2016) corroborates this finding, it was revealed that satisfaction was high in the instructor-student interaction and environment design sub-dimensions while it was moderate in the course content and teaching process, materials used and communication tools, and attitude towards e-learning sub-dimensions. When interaction and communication tools such as a virtual classroom, forum, chat, e-mail, web pages, animation, video, graphics and images as content tools, and questionnaire as assessment tool were used there was a difference in student satisfaction, and satisfaction was higher in these courses. Student satisfaction was high when the number of materials used in courses was higher, that is, as the number of materials increased, so did the satisfaction level.

Finding revealed that MOODLE platform increased interest better than lecture method with a significant difference. This was supported by EL-Hajjar (2015) who observed MOODLE sustained and improved student's learning in higher institutions and also enhanced their interest. The results obtained confirmed that using MOODLE system enabled the students to promote understanding and greater respect for digital technology.

Finding revealed that MOODLE platform gave the same level of satisfaction to students taught Agricultural Science as lecture method. This finding agrees with Wathanti and Chaithongsri (2015) who observed that Electronic Learning Management system (MOODLE) developed good outcome in achievement and enhanced satisfaction level of the students. It was also found out that the satisfaction levels of respondents was higher after learning than before learning. It also agrees with Umek, Aristovnik, Tomazevic, Kerzic, (2015) who observed that MOODLE e-learning platform enhanced their level of satisfaction. The result revealed that correlation exists for both elements which was a positive correlation. Also, Dwivedi, Khurana, and Saxena (2012) supported the finding in the sense that system quality, interactive sessions, flexibility, ease of use, enhanced learning curves, need of learning, accomplishments, self-esteem of learners, social influence have impact on satisfaction level of learners when MOODLE E-learning system was used.

Conclusion

Based on the findings from this study, it can be concluded that MOODLE Platform enhanced undergraduate students' academic achievement in Agricultural Science in North-Central, Nigeria especially in the institution used for this study. It could be as a result of the flexibility that the platform offers where resources can be easily shared among students and learning facilitators. Also, the interest level of the undergraduate students was increased after MOODLE Platform was used in teaching Anatomy and Physiology of Farm Animals in Agricultural Science.

Recommendations

(i). It is recommended that MOODLE Platform be incorporated in higher institutions of learning to enhance better academic performance.

(ii). Also, the management boards in the various higher institutions in Nigeria should help in making provisions for funds to help the incorporation of Learning Management System in the various institutions.

References

Akpoghol, T. V., Ezeudu, F. O., Adzape, J. N., & Otor, E. E. (2016).Relative Effect of Lecture Method Supplemented with Music and Computer Animation on Senior Secondary School Students' Retention in Electrochemistry. *Journal of Education and Practice*, 7(4), 87-95.

Amaghionyeodiwe, L. A., & Osinubi, T. S. (2007). Do higher levels of schooling lead to higher returns to education in Nigeria? *Applied Econometrics and International Development,* 7(1), 157-164.

Bada, T. A. A., Adekomi, B., & Ojo, O. A. (2012). Effects of animated agricultural science instructional package on attitude and performance of Junior secondary school students in South West Area, Nigeria. *Mediterranean Journal of Social Sciences*, 3(1), 425-435.

Ben, J. F. (2013). *Philosophy of education.* Lagos: Akinwumi Printing Press.

Berg, D. R., & Lu, Y. (2014).*Student attitudes towards using Moodle as a course management system*. New York. Retrieved 17th February, 2015 from www.ryanberg.info.

Chukwuemeka, E. J., Edori, P., & Bakare, O. (2015). Graduate students' opinions on learning management systems: The MOODLE LMS a case study of Eastern Mediterranean University, Turkey. *The International Journal of Science and Technoledge*, 3(7), 163-170.

Damola, O., Adebimbo, A., & Alaba, S. O. (2016). Enhancing students performance in basic science and technology in Nigeria Using MOODLE LMS. *World Academic of Science, Engineering and Technology International Journal of Educational and Pedagogical Sciences,* 5(10), 1657-1660.

Dwivedi, R., Khurana, V., & Saxena, A. (2012). Empirical study on predictors of student learning satisfaction from web based learning systems. *International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 1(10),* 245-258.

EL-Hajjar, S. T. (2015). A statistical approach describing the impact of using MOODLE at higher institutions. *International Conference on Computer Science and Information Systems* (ICCSIS-15) April 24-25, 2015 Pattaya (Thailand)http://dx.doi.org/10.15242/IAE.IAE0415012

Firat, M. (2016). Determining the effects of LMS learning behaviors on academic achievement in a learning analytic perspective. *Journal of Information Technology Education: Research, 15,* 75-87. Retrieved from http://www.jite.org/documents/Vol15/JITEv15ResearchP075-087Firat1928.pdf

Gimba, R. W. (2013). Effect of computer-assisted instructional strategy on achievement, retention and interest in set theory among senior secondary school students in Niger State. Unpublished Ph.D. Thesis: Nsukka: University of Nigeria Nsukka.

Holbl, M., Welzer, T., Nemec, L., & Sevcnikar, A. (2011). Student feedback experience and opinion on using Moodle. EAEEIE Annual Conference (EAEEIE).

Kerzic, l. U., Tomazevic, N., & Aristovnik, A. (2015). Moodle e-learning system and students' Performance in higher education: The case of public administration programmes. *International Conference e-learning*, 1(1), 97-104.

Koehler, M. (2011). Pedagogical content knowledge. Posted in Core 13th May 2011 http://mkoehler.educ.msu.edu/tpack/cate gory/core/

Koh, J., & Chai, C. (2011). Modelling pre-service teachers technological pedagogical content knowledge (TPACK) perceptions: The influence of demographic factors and TPACK constructs. In G. Williams, P. Statham, N. Brown, B. Cleland (Eds.), *Changing Demands, Changing Directions*. Proceedings Ascilite Hobart 2011, 735-746.

Lo, C. C. (2010). How student satisfaction factors affect perceived learning. *Journal of the Scholarship of Teaching and Learning,* 10(1), 47-54.

Mangal, S. K. (2010).*Essentials of educational Psychology*. New Delhi. PHI Learning Private Limited. 351-359.

Naaj, M. A., Nachouki, M., & Ajman, A. A. (2012).Evaluating student satisfaction with blended learning in a gender segregated environment. *Journal of Information Technology Education, University of Science and Technology, Ajman, United Arab Emirates*. 11 (1), 20-31.

Norris, L., Sporre, L., & Svendsen, D. (2013). The use of Moodle at CASS Business School: A student perspective. 2nd Moodle Research Conference, Sousse, Tunisia. Retrieved on 16/02/2015 from www.research.moodle.net.

Sen, D. (2015). Positive and negative of using a system like Moodle. International Conference on Computer Science and Information Systems (ICCSIS-15) April 24-25, 2015 Pattaya (Thailand) http://dx.doi.org/10.15242/IAE.IAE041501234.

Stantchev, V., Colomo-Palacios, R., Soto-Acosta, P., & Misra, S. (2014). Learning management systems and cloud file hosting services: A study on students' acceptance. *Computers in Human Behavior*, *31*, 612-619.

Sun, L. (2014).Investigating the effectiveness of Moodle-based Blended Learning in College English course. *International Journal of Information Management*, 13(1), DOI: http://dx.doi.org/10.1504/IJITM.2014.059152.

Topal, A. D. (2016).Examination of university students' level of satisfaction and readiness for e-courses and the relationship between them. *European Journal of Contemporary Education*, 15(1), 7-23.

Umek, L., Aristovnik, A., Tomazevic, N., & Kerzic, D. (2015). Analysis of selected aspects of students' performance and satisfaction in a Moodle-based e-learning system environment. *EURASIA Journal of Mathematics, Science & Technology Education*, 11(6), 1495-1505.

Wathanti, S., & Chaithongsri, A. (2015). The use of electronic learning management system to enhance learning and achievement case study: Course analysis and design students of the program Department of Computer Information Systems. *The Twelfth International Conference on eLearning for Knowledge-Based Society, 11-12 December 2015, Thailand.*

Yorkshire, T., & Wistrom, E. (2010). *Moodle: Effective or flawed learning system*? Bright Hub: Online Classes. 2010, www.brighthub.com

Zhu, C. (2012). Student satisfaction, performance, and knowledge construction in online collaborative learning. *Educational Technology & Society*, 15(1), 127–136.