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Comparative Effects of Demonstration Method and Blending Learning on Academic Achievement and Interest of Agricultural Science Students in Nsukka Education Zone of Nigeria

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ABSTRACT

The study focused on the comparative effects of demonstration method and blended learning on the achievement and interest of Agricultural Secondary School Student in Nsukka. Two research questions guided the study while two hypotheses were formulated and tested at 0.05 level of significance. Quasi experimental design, specifically pre-test and post-test group was adopted. The sample for the study was 80 SSII Students comprised of males and females from intact class. The two classes were randomly assigned experimental group I and II. The experimental group one was taught with demonstration method while experimental group II were taught with blended learning and. The treatment lasted for four weeks. The instruments for data collection were Agricultural Achievement Test (AAT) comprising thirty questions and Interest Inventory. The two instruments used for data collection were validated by three experts all from Department of Agricultural Education. The reliability of the instruments was established using Cronbach alpha for AAT and Kudder-Richardson 20 for AII. AAT and AII yielded a coefficient of 0.74 and 0.77 respectively. Mean, standard deviation and Analysis of covariance (ANCOVA) were used to analyze the data collected for the study. Findings of the study revealed that blended learning enhanced students' achievement and interest in Agricultural science more than demonstration method. Furthermore, the tested hypotheses revealed that there was significant different between the effects of demonstration and blended learning on students' interest in Agricultural science. Hence, the study recommended amongst others that; that the federal ministry of education should provide internet facilities in secondary schools to ensure blended learning is incorporated as to improve achievement and interest of students and also state government should organize workshops, in-service training programme for teachers so that they would be conversant in the use of blended learning.

Keywords: Demonstration method, Blended learning, Academic achievement, Interest.

1. INTRODUCTION

Agriculture is the corner stone upon which any nation can depend to attain self-reliance and sustainable development. Agriculture is the most comprehensive word used to denote the many ways in which crops, plants and domestic animals sustain the global human population by providing food and other products (Haris & Fuller, 2014). It involves the growing of crops and rearing of animals for the sustenance and enhancement of human life (Achor, 2010). According to Nwakile, Nwakile, Alleh and Osinem (2020), agriculture not only provides food and raw material but also employment opportunities to a very large proportion of the population. In other words, Agriculture is of immense benefits to humanity due to global food supplies, hunger alleviation, economic development and provision of employment (Abbey, 2011). Therefore, agriculture can be considered to be a pillar for human survival and hence necessitates the importance of agriculture being taught at the senior secondary school levels. Due to the importance of agriculture, it became important to study it in schools and the study of agriculture in schools is known as agricultural science (Nwakile, Onogu, Okon, Odoh, & Ogbonna, 2020).

Agricultural science according to Olaniyan and Austin (2010) is the application of the basic knowledge of science subjects to the growing of crops and rearing of animals and processing them for the use of man in his environment. Agricultural science is an integral part of the economic system and by means of direct and indirect links, has an important influence on the economic and social activities in general, especially with respect to the industrial sector (Anyanwu & Anyanwu, 2011). Agricultural science is an applied science with emphasis on the acquisition of knowledge and skills associated content (West Africa Examination Council (WAEC), 2019). Agricultural science is therefore designed for inculcation of the necessary skills for

the practice of agriculture for effective citizenship and contribution to food security for national sustainability. Agricultural science in secondary schools aims to achieve certain objectives. The objectives agricultural science at the secondary school level according to WAEC (2013) includes to: stimulate and sustain student's interest in agriculture, and enable students acquire basic knowledge skills to prepare them for further studies and occupation in agriculture. According to Nwachukwu, Onah, Obijiofor, Nwankwo and Nwakile (2020), agricultural science at the secondary school level is taught to prepare and expose students to occupation and opportunities in the field of agriculture, to promote student's adjustment to their immediate environment, to produce prospective future farmers, and to impart students with the latest innovation methodologies needed by agricultural science teachers. Ensuring that these objectives are achieved depends to a large extent on the ability of the teachers of agriculture to help students understand the concepts of the agricultural science curriculum.

Surprisingly, many agricultural science students in the senior secondary schools today are still known to have difficulty in understanding some agricultural science concepts thus leading to students' poor performance in such areas especially in prescribed external examination like West Africa Senior Secondary School Certificate Examination (WASSCE) and National Examination Council (NECO) (Egun, 2009 as cited in Nwachukwu et al, 2020). This could be as a result of teaching methods employed by the teachers. According to Isiugo-Abanihe, Ifeoma and Tandi (2010), the poor achievement of students in Agricultural science in external examination could be linked to the use of lecture method in teaching secondary school agricultural science. The lecture teaching methods often used by teachers in teaching Agricultural science stress more on the transmission of knowledge in a manner that emphasizes memorization hence they have been characterized by some educators (Ibe & Nwosu, 2010; Sawa, 2012) as a poor method of teaching agricultural science and other science subjects. The lecture teaching methods involves unidirectional flow of information or knowledge from teacher to the students and does not encourage process skill acquisition needed for proper understanding of agricultural principles, concepts and facts. Guisti (2008) cited in Aniaku (2012) referred to lecture teaching methods as teacher-centered approaches to learning in the sense that the teacher and those up in the educational hierarchy are considered as the possessor of knowledge to be transferred to the students, and as such decides how the knowledge transfer takes place. The unidirectional flow of information in the lecture teaching method makes students passive and unable to construct meaningful knowledge in the teaching and learning of Agricultural science. The shortcomings of these lecture teaching methods resulted to the persistent search for an effective method of teaching and learning agriculture. This culminated to the discovery and suggestions by Little (2017) innovative teaching methods such as blended learning method should be utilized.

The blended method is considered an effective teaching method that can improve on students' achievement and interest in Agricultural science. In the blended method, the teacher is often described as a partner and a facilitator in the teaching and learning process and not the possessor of knowledge hence the blended method is referred to as student-centered approach to learning (Horton, 2010). Furthermore, Cawston, (2011) indicated that blended learning method is an effective method for teaching agriculture because it has much academic gains; it increases students 'understanding of science concepts, principles and facts, enhances student's achievement and interest and encourages active participation of students in the teaching and learning process. Apart from blended learning, demonstration method is considered another innovative teaching method that could influence students 'achievement and interest in Agricultural science (Nwakile et al., 2020).

Demonstration method is a teaching method that involves the teacher showing students a process involved in a learning concept. Demonstration method is thus defined by Andrusgzyn (1990) as cited Chingombe (2013) as teaching method that involves the teacher showing pupils how to do something while they observe pupils practice based on the teachers' demonstrations. Chikuni (2003) as cited Chingombe (2013) stated that demonstration is where the teacher shows how something is done by actually doing it. During demonstration, Gwarinda (2013) recommends the use of educational aids where necessary. For example, a photographic media can be used to show the appearance of a completed item. This may be essential for instilling an idea of what the thought process leads to. In a traditional agriculture classroom, differences in the teaching method utilized by the teacher can influence to a great extent students' achievement and interest in agricultural science.

Achievement is an important academic factor that has been identified to be influenced by teaching methods. Hence academic achievement refers to the accomplishment of academic goals, the educational outcomes of students or rather the extent to which a student, a teacher or an instructor has achieved the stated educational objectives. Previous Studies; Ibe (2014); Nwachukwu et al., (2020) indicated that teaching method influences students 'achievement in Agriculture. Similarly, Jensen (2008) and Onan (2012) noted that blended learning method increases students 'achievement and interest in Agricultural science. This study therefore intends to compare the effects of two teaching methods (blended learning and demonstration method) have on students academic achievement and interest in agricultural science.

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Interest is an education concept that determines some aspects of students 'affective domain which is very important in the teaching and learning process. In education, interest is characterized by increased attention and concentration in classroom and academic activities. It is a motivational variable and emotionally oriented trait which determines the vigor of the learner in tackling educational activities. Okoro (2011) stated that interest reflects a central feature in the knowledge value system of a learner, meaning that learners 'interests are influenced by the value they have for an activity or knowledge. Interest guides and encourages students to think critically and to keep trying until success is achieved. Interest and achievement correlate in teaching and learning process and have intra influence on each other; high interest improves students 'achievement while high achievement promotes interest on the other hand low interest retards learning and results to poor achievement. Besides, Okoro (2011) identified lack of interest and the use of traditional teaching methods such as lecture method as the major causes of students 'poor achievement whereas innovative teaching methods enhance achievement and promote students' interest in Agriculture. Although studies have found that innovative method teaching methods improve academic achievement and interest, no previous study has been carried out in Nsukka education zone where there has been poor performance of students in agricultural science to ascertain effects of blended learning and demonstration method on academic achievement and interest of Agricultural science students.

Nsukka educational zone consists of three local government areas: Nsukka, Igbo-Etiti and Uzo-Uwani. The choice of Nsukka Educational is because available record indicates that students 'achievement in agricultural science is poor. The poor achievement of students in Agricultural science has been associated with the use of poor methods of teaching and lack of interest (Ezeugwu, 2013). Furthermore, the statistical reports of the West Africa senior school certificate Examination from 2018-2019 illustrated the student's low performance in Agricultural science in five randomly selected five schools in Nsukka education for five consecutive years. In the five randomly selected schools in 2018, 70 candidates scored D and below while 32 failed out of 124 that sat for the exam. In 2019,162 candidates sat for the exam, 41 failed while 90 scored D and below (Source: post primary school management Board, Enugu). This could be attributed to the use of lecture method. Researchers (Ibe, 2014., Nwachukwu et al., 2020) have educated for the use of better innovative teaching methods like demonstration and blended learning. However, no previous study has ascertained which of the methods of teaching agricultural science in senior secondary school is better. Hence, this study seeks to find out the comparative effects of innovative teaching methods like blended learning and demonstration method on academic achievement and interest of agricultural science students in Nsukka education zone.

2. PURPOSE OF THE STUDY

The general purpose of the study was to determine the comparative effect of blended learning and demonstration method on academic achievement and interest of agricultural science students in senior secondary schools in Nsukka Education Zone. Specifically, the study determined;

1. Achievement scores of students taught using demonstration and those taught using blended learning.
2. Interest scores of students taught using demonstration and those taught using blended learning.

3. RESEARCH QUESTIONS

The following research questions guided the study;

1. What are the differences in the achievement scores of students taught using demonstration and those taught using blended learning?
2. What are the differences in the interest scores of students taught using demonstration and those taught using blended learning?

4. RESEARCH HYPOTHESES

The following hypotheses were tested at 0.05 level of significance:

Ho $_{1.}$ There is no significant difference between the mean achievement scores of students taught using demonstration and those taught using blended learning

HO 2. There is no significant difference between interest scores of students taught using demonstration and those taught using blended learning.

5. METHODOLOGY

The study adopted a Quasi-experimental design and was carried out in two co-educational secondary schools out of the thirty co-educational secondary schools in Nsukka. The population for the study was all the students in public secondary school s in the area. Due to the large size of the population, multistage sampling technique was utilized in the study. Firstly, out of thirty-two secondary schools in Nsukka, fifteen schools were purposely selected. The fifteen schools were purposively selected on the

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basis of gender as these fifteen schools were mixed schools. Furthermore, out of the fifteen schools, two were randomly selected. One intact class of 40 Agricultural science of SSII were randomly selected from each of the schools sampled making a total of two intact classes of 80 SSII Agricultural science students from the two schools. The two instruments used to gather data for the study are the Agricultural Achievement Test (AAT) and Agricultural Interest Inventory (AII) which were validated by three experts, all from the Department of Agricultural Education, University of Nigeria, Nsukka. The inputs, corrections and comments by the experts guided the researcher in modifying the final copy of the instrument. The reliability of the instruments was established using Cronbach alpha for AAT and Kudder-Richardson 20 for AII. AAT and AII yielded a coefficient of 0.74 and 0.77 respectively.

A one week intensive training was given to the research assistants who were the regular class teachers from the sampled schools teaching Agricultural Science in SS II. The research assistants were given detailed explanations on what the teaching method they would be utilizing entailed, utilizing the teaching method in the lesson plan, how to incorporate the techniques into the lesson and the general requirements of the research. By the end of the training, the researcher organized a micro teaching session for the participating teachers to ensure that they had mastered the instructional technique expected of them. The study lasted for four weeks using the normal period allocated for Agricultural Science in the sampled schools to avoid altering the school timetable. The researcher, with the aid of two research assistants (class teachers) subjected the two randomly selected groups to a pre-test on AAT and AII. Thereafter, the two groups were subjected to their respective treatments. After the treatment, the post AAT as well as AII were administered to the two groups. The scripts were collected, marked and scored. Each of the 30 questions on the AAT was scored 1 mark, giving a total of 30 marks. For the AII, each of the items has 4 options; positive items were scored as follows; SA-4 points, A-3 points, D-2 points and SD-1 point. The scores were reversed for negative items. A pupil's score was obtained by summing their score for all the items. The data was finally analyzed based on the scores using mean to answer the research questions. If the mean of the post test is greater than the pretest, then it has a positive effect but if the mean of the post test is less than the pre-test, then it has a negative effect. Then the mean gain of the two groups was calculated. The one with the higher mean gain was considered the better teaching method to be utilized for teaching agricultural science at the senior secondary level in the area and vice versa. ANCOVA was used to test the hypotheses to control initial differences in the subject. If the p-value < 0.05, reject Ho and if p-value is ≥ 0.05, accept Ho.

6. RESULTS

Research Question 1: What are the differences in the Achievement scores of students taught using demonstration method and those taught using blended learning?

Table 1: Mean and Deviation of Students' Achievement Scores taught Using Demonstration and those taught using Blended Learning

Method	N	Pre Test		Post Test		Mean gain
		$\overline{X}$	SD	$\overline{X}$	SD	
Demonstration	40	17.05	3.52	23.47	1.86	6.42
Blended Learning	40	17.94	4.46	26.55	2.81	8.61
Mean Difference		0.89		3.08		2.19

Key: $\overline{X}$ = Mean; SD = Standard Deviation; N = Population = 80

Result in Table 1 indicated that the pre-test mean achievement scores of students taught with demonstration method was 17.05 with standard deviation of 3.52 while the pre-test mean achievement score of students taught with blended learning was 17.94 with a standard deviation of 1.86. On the other hand, the post-test mean achievement scores of students taught with demonstration was 23.47 with standard deviation of 4.46 while the post-test mean achievement score of students taught with blended learning was 26.55 with a standard deviation of 2.81. The mean difference of the pretest scores in demonstration and blended learning was 0.89 indicating that the students were at relatively the same cognitive level before treatment. For the post-test, the achievement gain score for those taught with blended learning was 8.61 while the achievement gains of those taught with demonstration was 6.42. This indicated that both methods improved the academic achievement of students but blended learning with a mean difference of 2.19 enhanced the mean achievement of students in Agricultural science more than the demonstration method.

Ho $_1$: There is no significant difference between the mean achievement scores of students taught using demonstration and those taught using blended learning

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Table 2: Analysis of Covariance (ANCOVA) for the Effects of Demonstration and Blended Learning Methods on Students' Mean Achievement Scores

Source	Type III Sum of Squares	Df	Mean Square	F	Sig
Corrected Model	372.626[a]	2	186.313	26.387	.000
Intercept	1636.664	1	1636.664	206.771	.000
Pretest	10.476	1	10.476	1.380	.244
Group	462.099	1	462.099	54.753	.000
Error	640.524	77	8.318		
Total	18636.00	80			
Corrected Total	1112.800	79			

a. R Squared = .424 (Adjusted R Squared = .409)

Data analyzed in Table 2 shows that the probability value associated with the calculated value of F (54.753) for the effect of method on the achievement of students is 0.000. Since the value is less than the 0.05 level of significance, the null hypothesis is rejected. Hence, there is a significant difference in the mean achievement scores of students taught agricultural science using demonstration and those taught using blended learning in favour of the group taught using blended learning. The result indicates that blended learning is superior to demonstration method in enhancing students' achievement in agricultural science.

Research Question 2: What is the difference in interest scores of students taught Agricultural Science using demonstration method and those taught using blended learning method?

Table 3: Mean Interest Scores of Students Taught Agricultural science with Demonstration Method and Blended Learning Method

Method	**N**	**Pre Test**		**Post Test**		**Mean gain**
		$\overline{X}$	SD	$\overline{X}$	SD	
Demonstration	40	2.32	0.77	2.48	0.86	0.16
Blended Learning	40	2.62	0.54	3.63	0.64	1.01
Mean Difference		0.30		1.15		0.85

Result in Table 3 indicated that the pre-test mean interest scores of students taught with demonstration method was 2.32 with standard deviation of 0.77 while the pre-test mean achievement score of students taught with blended learning method was 2.62 with a standard deviation of 0.54. The mean difference of the pretest interest scores in demonstration and blended learning method was 0.30 indicating that the students had relatively the same interest before treatment. However, the post-test mean interest score of the students taught with demonstration method was 2.48 with standard deviation of 0.86 while the post-test mean achievement score of those taught with blended learning method was 3.53 with a standard deviation of 0.64. The interest gain score for those taught with blended learning method was 1.01 while the interest gain of those taught with demonstration was 0.09. This indicated that blended learning method enhanced the mean interest of students in Agricultural science more than demonstration method.

Ho $_2$: There is no significant difference between interest scores of students taught using demonstration and those taught using blended learning.

Table 4: Analysis of Covariance (ANCOVA) for the for the Effects of Demonstration and Blended Learning Methods on Students' Mean Interest Scores

Source	**Type III Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig**
Corrected Model	.348[a]	2	174	21.142	.003
Intercept	189.607	1	189.607	27.121	.000
Interestpre	.223	1	.223	1.694	.195
Group	.156	1	462.099	9.789	.002
Error	181.524	77	2.357		
Total	18636.00	80			

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Corrected Total	181.634	79

. R Squared = .476 (Adjusted R Squared = .460)

Data analyzed in Table 4 shows that the value associated with probability value of F (9.789) for the effect of method on students' interest is 0.002. Since the value is less than 0.05 level of probability, the null hypothesis of no significant difference is rejected. Hence, there is a significant difference in the mean interest scores of students taught agricultural science using demonstration and those taught using blended learning in favour of the group taught using blended learning.. This result indicates that blended improves student' interest in agricultural science more than demonstration method.

7. DISCUSSION

Findings of the study on effects of demonstration and blended learning methods on achievement of students indicated that the students taught using blended learning performed better than students taught using demonstration method. The performance difference can be attributed to the method of presenting instructions to the learners. The findings also indicated that there is significant difference in mean achievement scores of students taught using demonstration method and those taught using blended learning. In this study, the students taught using blended learning achieve higher than those taught with demonstration method which could be because the latter did not appear to stimulate or awaken the student's active participation in the topic they were taught compared to blended learning which provided a basis for the improvement of learner's achievement in agricultural science. This finding is in conformity with the finding of Hasan (2012), which revealed that blended learning model contributed more to the student's achievement than traditional teaching method. The findings also agree with Isukpa (2014) that there is a significant difference in the mean achievement scores of students taught using demonstration method and blended learning.

The findings of the study on effects of demonstration and blended learning methods on interest of students indicated that blended learning increased student interest more than demonstration method. The findings on the tested hypotheses indicated that there is significant difference in interest scores of students taught using demonstration method and blended learning. The results of the study are in line with Ezeoba (2008) who found out that the activity-based technique stimulate and sustain student's interest and promote factual learning. These findings agree with the Ibe (2004) who found that there is no difference in mean interest and gender on the acquisition of science process skills. These findings agreed with the findings of Amosa (2017). He stated that the performance of undergraduate was enhanced when they are exposed to blended learning model of instruction.

8. CONCLUSION

Based on the aforementioned findings of this study, it can be concluded that achievement and interest of students is influenced by the method of teaching employed since both variables improved with the two methods of teaching employed. However, blended learning improved students' interest and achievement in agricultural science by significantly increasing learners' participations in the classroom compared to demonstration method. Hence, blended learning should be adopted for teaching students agricultural science in the area.

RECOMMENDATIONS

1. The federal ministry of education should ensure that internet facilities are provided in secondary schools to ensure blended learning is incorporated as a teaching method so as to improve achievement and interest of students.
2. State governments should organize workshops, in-service training programme for teachers so that they would be conversant in the use of blended learning.
3. The curriculum planners should plan the Nation's agricultural Science Curriculum to accommodate innovative methods, such as blended learning for the students so as to improve their achievement and interest in agricultural science.

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