



Effectiveness of Demonstration-Brainstorming on Student's Performance in Agricultural Science

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Abstract

This study examined the comparative effects of demonstration and brainstorming methods on students' performance in agricultural science in Zamfara State, Nigeria. Pre-test post-test quasi experimental design was adopted for the study. The population of the study consisted of 12770 SSII agricultural science students during 2017/2018 academic session in Zamfara State. A sample of 80 students (40 males and 40 females) was used as an intact class. Data was collected using a multiple-choice test consisting of 30-items developed by the researchers. Data collected was analysed using descriptive statistics in form of mean and standard deviation while the null hypotheses were tested using t-test analysis. The study results indicated that, there is no significant difference in the academic performance of male and female agricultural science students using demonstration method. But male students performed significantly better than their female counterparts in brainstorming method. Yet, both groups of the students significantly did better in demonstration method than in brainstorming method. The study recommends among others that, agricultural science teachers should always make use of demonstration in teaching agricultural science while governments through ministries of education should provide schools with necessary facilities needed for effective demonstration.

INTRODUCTION

Education is considered the first step for every human activity as it plays a vital role in the development of human capital as well as an individual's well-being and opportunities for better living. Education is the process of developing the capacities and potentials of the individual so as to prepare that individual to be successful in a specific society or culture (Centre for Educational Research and Innovation (OECD), 2016). Quality education is judge by academic performance which has become the key factor for personal progress. No wonder parents and other stakeholders in education desire that students climb the highest level of academic attainment.

This desire for high level of performance puts a lot of pressure on students, teachers, parents, schools and in general the education system itself (Adekoya and Olatoye, 2011). In fact, it appears as if the whole system of education revolves round the academic performance of students, though various other outcomes are also expected from the system (Umar, *et al.*, 2015). Thus, a lot of time and effort of the schools are used for helping students to achieve better in their scholastic endeavours which has raised important questions for educational researchers (Lamas, 2015).

Academic performance is a major issue to teachers, students, parents and guardians as well as other stakeholders in the education industry. This concern cuts across all school subjects and all levels in the education system including primary, secondary and tertiary. A high academic performance for any class of students is an indication of teaching/learning effectiveness, while poor academic achievement on the other hand, is an indication that the teaching/learning process is less effective (Cavilla, 2017). There is, therefore, the need to discover factors that can affect the academic achievement of students in generally and in particular those in agricultural science.

One of the factors considered having effects on students' academic performance in agricultural science according to Adekoya and Olatoye (2011) is the use of instructional methods by teachers. Among such instructional methods are the demonstration and brainstorming methods.

Demonstration method implies how to do something. It entails the use of actual tools, machines and materials. The demonstration method allows students to see what is being taught, often in a step-by-step approach. It promotes peer learning, creates synergy and

critical thinking (Daluba, 2013). Brainstorming method on the other hand is a method that involves group creativity by which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members (AlMutairi, 2015). In other words, brainstorming is a situation where a group of people meet to generate new ideas and solutions around a specific domain of interest by removing inhibitions. In this method, students are able to think more freely and suggest many spontaneous new ideas as possible. All the ideas are noted down and after brainstorming session the ideas are then evaluated.

Quite remarkably however, irregular academic performance among students is fundamentally linked to gender differences due to the application of ineffective teaching methods by teachers (Ali, 2013) Substantial research on the effectiveness of teaching methods indicates that the quality of teaching is often reflected by the achievements of learners using a number of teaching methods (Jacob, *et al.*, 2016). This study intends to examine the effects of demonstration and brainstorming methods on the academic performance of male and female students in agricultural science.

Poor academic performance among secondary school students especially in agricultural science has become worrisome. Gender issue and academic performance has become a major topic among educators and researchers in number of forums. Although the literacy rate is more among the boys than girls, it is quite interesting to observe that girls are securing better ranks than boys in almost all competitive examinations (Bilal, 2012).

The problem of students' under-performance in secondary schools in Nigeria has been a much-discussed educational issue. In solving any problem however, it is pertinent to understand the causes of such problems. Many causes or agents have been studied as the etiological starting point for investigating the phenomena of school failure or success. These causes are looked into from several perspectives including the role of the students, teachers, parents or family, school environment, society and government. Notable works on methodology adopted by teachers include that of Ochogba *et al.* (2019) who studied the effect of demonstration method on students' academic performance in basic technology in secondary schools in Rivers State, Nigeria, who concluded that students taught with demonstration method performed better than

those taught with the conventional lecture method. Yunus and Veli (2021) agreed that brainstorming technique provides suitable premises for creative learning, which, in turn, has an impact on academic achievement as well. This study is set out to determine the academic performance of male and female students in agricultural science using demonstration and brainstorming methods.

The major objective of this study is to assess the academic performance of male and female students in agricultural science students in demonstration and brainstorming methods in a randomly selected senior secondary school in Zamfara State. The specific objectives of this study include to: a. Determine the difference in the academic performance of male and female students in agricultural science students taught using demonstration method. b. Determine the difference in the academic performance of male and female students in agricultural science taught using brainstorming method. c. Compare the academic performance of students in agricultural science taught using demonstration and brainstorming methods.

In line with each specific objective the following research questions were asked and answered. a. What is the difference in the academic performance of male and female students in agricultural science taught using demonstration method? b. What is the difference in the academic performance of male and female students in agricultural science taught using brainstorming method? c. What is the difference in the academic performance of students in agricultural science in demonstration and brainstorming Methods?

The following null hypotheses were formulated and tested at 5% level of significance. a. There is no significant difference between the academic performance of male and female students in agricultural science taught using demonstration method. b. There is no significant difference between the academic performance of male and female students in agricultural science taught using brainstorming method. c. There is no significant difference in the Academic performance of students in agricultural science in Demonstration and Brainstorming Methods.

METHOD

Pre-test post-test quasi experimental design was adopted for the study. This design was suitable for this research as it allows the researchers to collect relevant data on students'

academic performance using an intact classes. The population of the study consisted of SSII agricultural science students in the 2017/2018 academic session in Zamfara State. A sample size of an intact class of an agricultural science class of 80 students was used into two intact classes. These students were divided into two groups (A and B). Group A comprised of 40 students who were taught using demonstration method and also group B comprised of 40 students who were taught using brainstorming method.

The students were taught crop classification and distribution for a period of four weeks. Data was collected using a multiple-choice test questions consisting of 30-items developed by the researchers which was validated by senior colleagues in the field of agriculture and measurement and evaluation. Pre-test was given to the students prior the commencement of the experiment to test their initial equivalence. After the treatment was given, post-test was administered to the students in the last week of the exercise. Data was analysed using descriptive statistics in the form of mean and standard deviation while, t-test analysis was employed to test the null hypotheses stated for the study at 5% level of significance. A hypothesis was rejected when t -calculated was greater or equals to t -critical (t -cal \geq t -crit.) but accepted when t -calculated was less than the t -critical (t -cal $<$ t -crit.).

RESULT AND DISCUSSION

Study result in Table 1 indicated that, male students performed better when taught using demonstration method with a mean score of 76.00 than their female counterparts who were also taught using demonstration with a score of 70.00. However, both male and female students had an average score grades of A representing a distinction level of academic performance according to the Nigerian secondary school grading system.

Table 1. Mean distribution of male and female students' academic performance in agricultural science taught using demonstration method

Group	Gender	N	X	SD
Demonstration	Male	20	76.00	5.3
Demonstration	Female	20	70.00	4.6

Yet, result of t-test analysis in Table 2 showed that, there is no significant difference in the academic performance of male and female students in demonstration method. This is

because the t-calculated (1.80) was less than t-critical (2.00) at 5% level of significant. The null hypothesis which states that, there is no significant difference in the academic performance of Male and Female Agricultural Science students taught using Demonstration method was accepted.

Table 2. t-test analysis showing difference in the academic performance of male and female students in agricultural science taught using demonstration method

Group	Gender	N	X	SD	DF	t-cal.	t-crit.	Sig
Demonstration	Male	20	76.00	5.3	38	1.80	2.00	0.00
Demonstration	Female	20	70.00	4.6				

The study results presented on the specific objective one above is in line with the work of Adekoya and Olatoye (2011) who found that, there is no significant difference between the academic performance of male and female students in demonstration method. Elvis (2013) also reported that, the academic performance of male and female agricultural science students in questioning method was statistically the same. This is to say that teaching agricultural science in secondary schools using demonstration method is not gender biased, hence can be used to improve the psychomotor skills of all category of students.

The study result on specific objective two indicated that, male students performed better than female students when taught using brainstorming method with an average score of 69.00 while their female counterparts scored an average of 60.00 (Table 3).

Table 3. Mean distribution of male and female students' academic performance in agricultural science taught using brainstorming method

Group	Gender	N	Mean	SD
Brainstorming	Male	20	69.00	4.8
Brainstorming	Female	20	60.00	4.3

Similarly, result in Table 4 indicated that, male students performed significantly better than their female counterparts when taught using brainstorming method. This was revealed by the t-test analysis in which the t-calculated was 2.10 being greater than the t-critical (2.00) (Table 4), hence, the null hypothesis was rejected. The findings above agree with that of Ali (2013) who stated that, male students outperformed their female counterparts in discovery method.

Table 4. t-test analysis showing difference in the academic performance of male and female students in agricultural science taught using brainstorming method

Group	Gender	N	X	SD	DF	t-cal.	t-crit.	Sig
Brainstorming	Male	20	69.00	4.8	38	2.10	1.96	0.001
Brainstorming	Female	20	60.00	4.3				

Results in Table 5 and 6 were used to achieve specific objective three which showed that, students taught using demonstration method performed better than those taught using brainstorming method. This was revealed by the average scores of the students in demonstration

(73.00) and Brainstorming (65.00) groups with an average grade of A B respectively.

Table 5. Mean distribution of students' academic performance in agricultural science taught using demonstration and brainstorming methods

Group	N	Mean	SD
Demonstration	40	73.00	5.8
Brainstorming	40	65.00	5.4

Also, Table 6 presents t-test analysis of the difference in the academic performance of agricultural science students in demonstration and brainstorming methods. The study result

confirmed that, agricultural science students performed significantly better taught using demonstration method than using brainstorming method. This is because; t-calculated (2.08) was greater than t-critical (2.00) at 5% level of significance. The null hypothesis which states that, there is no significant difference in the academic performance of agricultural science students in demonstration and brainstorming methods was rejected.

Table 6. t-test analysis showing difference in students' Academic performance in agricultural science taught using demonstration and brainstorming methods

Group	N	X	SD	DF	t-cal.	t-crit.	Sig
Demonstration	40	73.00	5.8	78	2.08	2.00	0.002
Brainstorming	40	65.00	5.4				

The finding above is in line with the finding of Abdullahi, (2017) who reported that, agricultural science students performed better in demonstration method than in discussion method when taught agricultural science in secondary schools. Jacob, Linus and Murna (2016) further found that, agricultural science students performed significantly better in demonstration than peer-tutoring and discovery methods.

CONCLUSION

Two methods (demonstration and brainstorming) positively enhanced students' academic performance in agricultural science, however, demonstration method is a symbolic representation of students' processes to organize knowledge, skills into cognitive, affective and psychomotor domains of learning agricultural science. This is because demonstration method proved a better technique to help students' understanding concepts, how they interconnect learning processes, and develop skills. Thus, can serve as potential to awaken and sustains students' interest in practical and application skills for active participation in agricultural production.

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