

## Effect of Project Method on the Performance of Students in Agricultural Science in Junior Secondary Schools in Bauchi State, Nigeria

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### ABSTRACT

The study examined the effect of project method on the performance of students in Agricultural Science in junior secondary school in Bauchi State, Nigeria. The study also carried out with the following objectives to; determine the difference between the performances of students taught Agricultural project method and those taught with conventional method in junior secondary schools in Bauchi State ; examine the extent to which gender difference affect the performance of students taught Agricultural Science using project method in junior secondary school in Bauchi State and compare the performance of students taught Agricultural Science using project method in rural and urban junior secondary school in Bauchi State. Three research question and three null hypotheses had been postulated in line with the stated objectives. The study was conducted using quasi-experimental research design. The study used approximately a target population of 12,380 JSSII students from Bauchi education zone in Bauchi State. As the total of fifty-two (52) students was sampled as experimental group, while sixty-five (65) students would also be sampled for control group making the total of one hundred and seventeen (117) students, that was comprising of seventy-two (72) male and forty-five (45) female students. Data for the study would be collected through the pre-test treatment and post-test using teacher made instrument (Test), which was consist of 30 objective test items and a treatment package. Data collected was analyzed statistically through the use of the describe (mean and standard deviation) and inferential statistics of independent sample t-test. At the end. The study found out the significant difference in the performances of students taught Agricultural Science using project method and those taught with conventional method in junior secondary school in Bauchi State among other findings. Based on that, recommendations would be made to that project method should be incorporated into the teaching of Agricultural Science at the secondary school level since it would stimulate students to effectively learn and retain concept presented to them. Researcher would also advocate Teachers to ensure they plan their lessons with equal learning opportunity for both male and female students in junior secondary school in Bauchi State.

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### INTRODUCTION

Agriculture and its importance to the nations cannot be over emphasis, creation of jobs

opportunities, feeding the local with raw materials generating revenues through local and international market as well as feeding pupils as observed the studies due to the importance of

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agriculture, the federal ministry, recently at inauguration of the national council on privatization steering committee on the restricting and re-capitalization of the Bank of agriculture and the project delivery team whose aim is to make sure that “we embark on these major projects so that agriculture will continue to be all-year round activity that we too can continue to provide fresh food to our people.

The study observed that appropriate teaching method holds a successfully key for lesson delivery teachers, there are serial teaching, such as lecture or conventional method guided inquiring Discussion, Demonstration, Project, Discovery, field trips, the researcher observed that conventional method of teaching (lecture method) is mostly used by agriculture teachers, other methods such as project method, laboratory method, discovery method, field trip methods that could enhance the skills of reflective thinking, critical analysis or concept use in agriculture is neglected. The researcher is of agricultural students both at eternal and external examinations, is in view this that the researcher is motivated explore other method of teaching such as project method and discovery method to the hope that this two method of teaching could enhance the understanding of student thereby enhancing their performances.

Project method refer to a wider variety of educational programs learning experiences, institutional institution and academic support strategies that are intended to address the distinct learning needs interest, aspiration or cultural background of individual students and groups of students to accomplish this goal school teachers, guidance and counselors and other educational specialist they employ wide variety of education method from modifying assessments and instructional strategies in the classroom to entirely redesi gning the ‘Sway in which students are grouped and taught in a school (Abell, 2019).

The study observed that the project method actively creates skills in the students which help them in the learning process for effective mastery of the subjects’ matter and promotion of a positive attitude towards the subject. As noted by the ministry of education in

its National Report on the Development of Education in Nigeria, presented at the international Conference on Education in September, 2009, teaching instructions adopted should make learning more learner-centred in order to promote imaginative, critical and creative skills in students resulting in better achievement of instructional objective (Williams and McClure, 2010). In a project method class, student take a participative role by leading discussion and teachers become facilitators in this regard, teachers facilitate students’ discussion and interject only when necessary, allowing students to put the language to use and explore aesthetics of learning materials (Ahmed and Aziz, 2019).

The study observed that the students will best learn if they realize how concepts are directly applied to their future lives (Shinn et al, 2013). Specifically, it is believed that contextualized learning holds promise for improving students’ ability to synthesize information from disparate sources, for furthering understanding of new and sometimes contradictory data, for assisting in making meaning and ultimately, for enhancing one’s ability to think critically and transfer learning to future life experience. If the instructor aspires to helps students build analytical and skills apply concepts, learn to solve problems, developed mature judgment, enhance communication skills, apply concept and retain information, then an appropriate method of instruction should use (Allen et al., n.d).

Iwena in peter, Ayorinde and Okeh (2016), defined agriculture as a deliberate effort made by man to till be soil, cultivate crops and rear animals for food and other purposes. Agricultural education is concerned with the teaching of agricultural science and related discipline within the school system as well as the design and implementation of meaningful teacher training programme for the provision and maintenance of pre-requisite manpower levels for manning these agricultural related disciplines. The importance of agriculture to the nation cannot be overstressed, the provision of feed to the people, promoting of good management of natural resources, generation of employment, help in the provision of

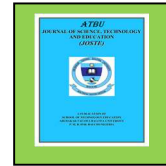
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food to the populace for the wellbeing of the Nigerian society.

The researcher observed that this important subjects has being relegated to the background, so much that many schools today do not offer this my important subjects where this subject as well as students and parents concerning the subject is an issue of concern to the general public, this is also ascribe to the fact that, he recent results released by two National examination bodies, both shows performance of students in this subject the recent results released by NECO 2016/2017 shows that less, 43% students that sat on the examination, score below average, most of the observed from NECO examination Chief Report shows that student lack understanding of concept used in the subject poor teaching strategies as well as techniques negative attitudes of students toward the subject, poor lesson delivery, lack of good teaching instruction among others.

### Objectives of the Study

The researcher objectives of the study will be as follows:

1. To determine the difference between the performance of students taught Agricultural science using project method and those taught with conventional method in junior secondary schools in Bauchi State.
2. To examine the extent to which gender difference affect the performance of students taught Agricultural science using project method in junior secondary schools in Bauchi state.
3. To compare the performance of student taught Agricultural science using project method in rural and urban junior secondary schools in Bauchi state.

### Research Questions

Based on the aforementioned objectives, the following research questions were formulated to guide the study:

1. What is the difference between the performance of students taught Agricultural science using project method and those taught

with conventional method in junior secondary schools in Bauchi State?

2. To what extent gender difference affect the performance of students taught Agricultural science using project method in junior secondary schools in Bauchi state?
3. What is the performance of student taught Agricultural science using project method in rural and urban junior secondary schools in Bauchi state?

### METHODOLOGY

The study employed the use of quasi-experimental design. This design was used to investigate the effect of project method instrument on agricultural science in academic performance of junior secondary schools in Bauchi state Nigeria. The research adopted quasi-experimental design based on the recommendation of school field (2006) that, quasi-experimental design can be used in research when its involves selection of groups upon which a variable is tested, without any random pre-selection process as well as with a variable being. The study utilized the design because of its suitability to the demands of comparing two teaching method; project method and traditional method. The study used approximately a target population of 12,380 JSSII students from Bauchi education zone in Bauchi State.

As the total of fifty-two (52) students was sampled as experimental group, while sixty-five (65) students would also be sampled for control group making the total of one hundred and seventeen (117) students, that was comprising of seventy-two (72) male and forty-five (45) female students. Data for the study would be collected through the pre-test treatment and post-test using teacher made instrument (Test), which was consist of 30 objective test items and a treatment package. Data collected was analyzed statistically through the use of the describe (mean and standard deviation) and inferential statistics of independent sample t-test.

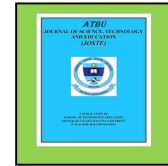
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**Table 1:** Performance of Students taught Agricultural Science Using Project Method in Rural and Urban Junior Secondary Schools

Parameters	Diets						SEM	P-value
	T1 CSC	T2 FA	T3 CSC/MO	T4 FA/MO	T5 CSC/WO	T6 FA/WO		
SFI (g/d)	300	300	300	300	300	300	0.00	-
BFI (g/d)	643.94	678.14	722.30	765.39	707.46	685.79	38.55	0.3386
DFI (g/d)	943.94	978.14	1022.34	1065.39	1007.46	985.79	38.55	0.3386
DMI (g/d)	574.76 <sup>b</sup>	600.09 <sup>b</sup>	615.96 <sup>b</sup>	628.60 <sup>b</sup>	608.34 <sup>b</sup>	756.09 <sup>a</sup>	25.18	0.3677
IBW (KG)	18.20	17.48	19.52	19.66	17.08	16.30	1.00	-
FBW (KG)	20.69 <sup>b</sup>	22.79 <sup>ab</sup>	23.17 <sup>a</sup>	22.11 <sup>ab</sup>	21.83 <sup>ab</sup>	22.03 <sup>ab</sup>	0.66	0.5192
DWG (g)	35.64 <sup>b</sup>	75.81 <sup>a</sup>	52.24 <sup>ab</sup>	35.02 <sup>b</sup>	67.95 <sup>ab</sup>	81.19 <sup>a</sup>	10.54	0.3012
TWG (KG) DMI	2.49 <sup>b</sup>	5.31 <sup>a</sup>	3.65 <sup>ab</sup>	2.45 <sup>b</sup>	4.75 <sup>ab</sup>	5.73 <sup>a</sup>	0.73	0.001
%BW	2.79 <sup>b</sup>	2.65 <sup>b</sup>	2.65 <sup>b</sup>	2.83 <sup>b</sup>	2.78 <sup>b</sup>	3.44 <sup>a</sup>	0.11	0.5192
FCR	16.13 <sup>e</sup>	7.92 <sup>a</sup>	11.79 <sup>d</sup>	17.95 <sup>f</sup>	8.95 <sup>b</sup>	9.31 <sup>c</sup>	2.13	<.0001

T1 = Cotton Seed Cake alone; T2 FA = *Faidherbia albida* meal alone; T3 = Cottonseed Cake + Maize Offal; T4 = *Faidherbia albida* meal

+ Maize Offal; T5 = Cotton Seed Cake + Wheat Offal; T6 = *Faidherbia albida* meal + Wheat Offal; SEM = Standard Error of Means; LS = Level of Significance; BFI = Basal Feed Intake; DFI = Daily Feed Intake; DMI = Dry Matter Intake; IBW = Initial Body Weight; FBW = Final Body Weight; TWG = Total Weight Gain; DWG = Daily Weight Gain, FCR = Feed Conversion Ratio.

Total weight gain also was significantly ( $p < 0.05$ ) different across the treatments. Sheeps fed diet 6 (5.73kg) and 2 (5.31kg), recorded the highest means, while the sheeps on diet 1 and 4 recorded the least (2.49kg) and (2.45kg), respectively. There was significant ( $p < 0.05$ ) difference observed in the feed conversion ratio among the diets. Sheeps fed diet 2 (7.92) and 5 (8.95) recorded the best FCR values followed by sheeps fed diet 6 (9.31).

**Table 2:** Performance of Students taught Agricultural Science using Project Method and those taught using Conventional method in Junior Secondary Schools

PARAMETERS	DIETS					
	T1 CSC	T2 FA	T3 CSC/MO	T4 FA/MO	T5 CSC/WO	T6 FA/WO
Total Weight Gain (Kg)	2.49	3.28	3.65	2.45	4.76	5.68
Total Feed Intake (kg)	2.29	3.93	2.55	3.76	2.20	2.88
Total Cost of Feed (₦)	273.50	153.50	253.50	168.50	278.50	203.50
Cost of Feed/Kg/WG /₦	109.83	46.79	66.71	68.77	58.50	35.82

*a, b, c, d, e = Means with the same superscripts are statistically the same; WG (₦) = Cost of Feed per Kilogram per Weight Gain in Naira. T1 = Cottonseed Cake alone; T2 = Faidherbia albida meal alone; T3 = Cottonseed Cake + Maize Offal; T4 = Faidherbia albida meal + Maize Offal; T5 = Cottonseed Cake + Wheat Offal; T6 = Faidherbia albida meal + Wheat Offal.*

The economy of supplementation of millet chaff based diets with different supplementary diets is shown in Table 4. Total weight gain in kg was significantly ( $p < 0.05$ )

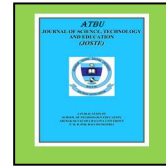
different among the treatments, which ranged from (2.45 – 5.68kg). Treatment 6 (5.68kg) recorded highest value while treatment 4 (2.45kg) had lowest. Total feed intake was significantly

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( $p < 0.05$ ) different among the treatments, highest value was recorded in treatment 4 (3.76 Kg) and lowest value of 2.20 Kg was recorded in treatment 5. The total cost of feed was significantly ( $p < 0.05$ ) different among the treatment groups throughout the experimental period which ranged from ₦ 153.50 to ₦ 278.50 observed in treatment 2, and treatment 5 as lowest and highest values respectively. Similarly, cost of feed in naira per kilogram live body weight gain were significantly ( $p < 0.05$ ) different among the treatment groups. ₦ 35.82 was recorded in treatment 6 as the lowest value, while the highest value of ₦ 109.83 was recorded in T1.

### FINDINGS OF THE STUDY

Based on the analysis, the following findings were revealed in the study;

1. Student taught Agricultural science using project method are likely to achieve higher than peers taught with traditional or other teaching methods.
2. Gender differences does not affect the performance of students taught Agricultural science using project method in junior secondary schools in Bauchi state.
3. The use of project method does not affect the performance of students in both the rural and urban junior secondary schools in Bauchi state.

### DISCUSSION OF FINDINGS

The Project teaching method which has evolved from the philosophy of pragmatism and experience centered strategy related to life-situation, was employed to impart tomato nursery practice skills on students. Katz and Chard, (2000) observed that project-based learning like the Project method of teaching have triggered many studies to focus on the justification of participant based learning in achieving learning objectives. Students were assigned task of undertaking all the activities involved in nursery practices from nursery bed/box preparation to transplanting of seedlings. They were provided with all the necessary materials, tools and equipment to enable them undertake nursery practice by themselves, either in groups or individually. To

scientifically examine the effectiveness of this intervention on students' nursery skills acquisition, data on students' prior knowledge and skills on nursery practices were gathered and analysed. All students who participated in this study have gone through nursery practices in their general agricultural science course. As such it was proper to examine their knowledge and skills level before they were assigned the project work of raising tomato seedlings.

Students' knowledge on nursery practices were measured on a four-point Likert scale of 0 – 3. The general agricultural science textbook for SHSs listed fourteen (14) nursery practices (GES, 2010). If a student is able to recall a practice, he/she is scored 1, if not 0. If a student recalls a practice and correctly explained it, he/she is given a score of 2. If such a student also demonstrates how the practice is undertaken, he/she is given the maximum score of 3 for that practice. An index (referred to here as knowledge index) was developed to measure students' average score of all the fourteen nursery practices. A student score for each of the fourteen practices was divided by 3 (maximum score) and sum up. The sum was divided by 14 to obtain the average knowledge score for such a student and this represent the student's knowledge index. Students whose knowledge index was less than 0.25 were classified as having poor knowledge of tomato nursery practice, while those whose index were between 0.25 – 0.5 and above 0.5 were classified as having average knowledge and above average respectively. Figure 1 presents results of students' prior knowledge score on all the fourteen nursery practices. And that of table 1 presents distribution of students' knowledge classification prior to the intervention.

As shown in the figure 1, respondents generally could recall most of the fourteen activities involved in nursery practices. About 80 percent, 73 percent and 71 percent could recall site selection, preparing nursery bed/box respectively. Also 80 percent, 79 percent and 80 percent could respectively recall seed sowing, weed control and watering of seedling. However, few of them could recalled shading of seedlings in nursery bed (43 percent), picking out (41 percent),

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stirring of soil (32 percent), pest and disease control (31 percent) and hardening off of seedlings (32 percent). Students were also required to explain these nursery practices by highlighting what they are and their relevant. As shown in the figure 1, close to two-third (61 percent) of the students could explain site selection, while 52 percent could explain preparation of nursery beds and 75 percent could explain sowing of seeds in nursery bed. However, very few students could explain picking out (33 percent), pest and disease control (26 percent) and hardening off (23 percent).

However, students generally were found wanting when asked to demonstrate these nursery practices. The results as shown in the figure illustrates that with the exception of site selection, preparation of nursery bed, sowing of seeds and watering of seedling where 52 percent, 46 percent, 54 percent and 52 percent respectively could correctly demonstrate how to do it, only few students could demonstrate how to perform the other activities. For instance, as shown in the Figure 1, only 30 percent could demonstrate shading of seeding in nursery beds, 23 percent could demonstrate stirring of soil, and 26 percent and 23 percent could respectively demonstrate pest and disease control and hardening off of uproot seedlings.

In general, just about a third (37 percent) have their knowledge index being above 0.5 and as such classified as having above average knowledge before the intervention of project teaching method was implemented (see table 1). Also 41 percent have their knowledge index being less than 0.25 and as such classified as having poor knowledge.

As shown in the table about a quarter (22 percent) scored a knowledge index of 0.25 - 0.5 and were classified as having average knowledge of tomatoes nursery practices. Many of the students (41 percent) inspite of have been studied nursery practices in their general agricultural science demonstrate poor knowledge in nursery practices. With some of them not being able to recall the practices and explain them. Majority of them were unable to demonstrate how to perform the tasks involved in nursery practices.

It can therefore be argued that the current way in which the teaching and learning of agriculture is done in the school need to be reviewed. It is obvious that lecture and classroom demonstration method of teaching agricultural practices are failing in imparting the requisite knowledge and understanding on students. Similarly, observations were made in Alkali, (2010), Darko et al., (2016), Darko et al., (2015) and Olaiyam and Ojo, (2008).

A four-point Likert type scale was developed to measure students' level of skills in undertaking nursery practices. Students' skills were assessed by their ability to describe the tasks, mention the materials and tools require accomplishing the task and actual performance of the task. The bar graph shown in the figure 2 present frequency distribution of number of students who were able to describe the task, mention what is require to perform the task and actual performance of the task for each of the nursery practices. As shown in the figure, student performed fairly well in describing the tasks involved in each of the nursery practices.

As shown in the figure 2, about half (49 percent) of the students' participants could describe the task involved in site selection, 43 percent could describe the tasks involved in preparing nursery beds, 51 percent and 49 percent could describe the activities involved in the performance of seed sowing and watering of seedlings respectively. However, for some tasks such as shading seedling in nursery beds (27 percent), picking out (20 percent), pest and disease control (23 percent) and hardening off of uprooted seedlings before transplanting (20 percent) only very few students were able to describe the tasks involving in performing them. Similarly, with regard to students' ability to identify the tools and materials require in performing nursery practice, students performed fairly well for some activities and very poorly for others.

About 44 percent of students could identify tools and material required to assist in selecting site for nursery, 38 percent could identify the material and tools for preparing nursery beds and 45 percent could mention the tools and materials required for sowing. However, only 30

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percent, 27 percent, 17 percent and 15 percent could mention the tools and materials required in undertaking fertilizer application, watering after planting, hardening off and pest and disease control respectively. Regarding actual performance of the various tasks, the results as shown in the figure 2 indicates that only 40 percent could correctly undertake site selection activities, while 30 percent and 41 percent could correctly execute nursery bed preparation and sowing respectively. Similarly, only 22 percent could correctly practice shading seedlings in nursery beds, while 17 percent and 27 percent could actually practice stirring of soil in nursery beds and fertilization respectively. In addition, only 14 percent could practice pest and disease control while 30 percent and 22 percent could practice transplanting and watering after transplanting respectively. It was surprising to discover that some students could not correctly handle watering cane and demonstrate watering of tomato seedlings on nursery beds.

For each of the nursery practices students were asked to describe the activities involved in undertaking the task. If a student describes accurately activities involved in the performance of a task, he/she scores '1' otherwise '0'. If a student in addition to describing activities involved the task accurately, mention materials and tools require in accomplishing the said task he/she scores 2. After which students were offered the opportunity to under the activities. Students who were able to correctly undertake the activities involved in the performance of nursery practices were assigned a score of 3. To standardized the score, student score for each of the nursery practices was divided by 3 (the maximum score) and the average score representing students' skills index was calculated for all the students. Students with skills index less than 0.25 were classified as 'Not yet competent', those with skills index of 0.25 – 0.5 were classified as 'averagely competent' and those with index of above 0.5 as 'very competent'. Frequency distribution of students' skills level is shown in the table 2. As shown in the table 2 about two –third (61 percent) of the students were not yet competent in undertaking nursery practices while

19 percent and 20 percent could be described as averagely competent and very competent respectively.

## CONCLUSION

Project method of teaching is found to be effective in contribution to improvement of students' knowledge on nursery practices. There was significant improvement of students' knowledge after they undertook their projects. Similarly, the project also contributed significantly in improving students' skills acquisition of nursery practice. There was significant improvement in students' competency in undertaking tomato nursery after going through their projects. The study found out the significant difference in the performances of students taught Agricultural Science using project method and those taught with conventional method in junior secondary school in Bauchi State among other results. It was found that project method is effective in imparting knowledge and skills on students. It was finally concluded that project method is effective in imparting agricultural knowledge, skills and practice on students.

## RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made;

1. That project method should be incorporated into the teaching of Agricultural Science at the secondary school level since it would stimulate students to effectively learn and retain concept presented to them.
2. The study advocate teachers to ensure they plan their lessons with equal learning opportunity for both male and female students in junior secondary school in Bauchi State.
3. That project method of teaching should be employed in in teaching agricultural skills.

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