



# **Attitude and Academic Success in Practical Agriculture: Evidence from Public Single-Sex High School Students in Ibadan, Nigeria**

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## **Authors' contributions**

*This work was carried out in collaboration among the authors. Author OAO designed the study and managed the literature searches. Author LOO supervised and revised the manuscript for important intellectual content. Author OAO managed the analyses of the study. All authors read and approved the final manuscript,*

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## **ABSTRACT**

This study examined the attitude and academic performance of public single-sex (Boys' and Girls' only) high school students in the teaching and learning of Agricultural Science in the aspect of practical knowledge of Agriculture. We investigated whether there were significant differences in the mean achievement test scores of students in practical Agriculture in the selected schools. We also examined the relationship between their academic performance in practical agriculture and their attitude to the subject. The study was a descriptive survey design carried out at Ibadan Metropolis, Nigeria. Six public single-sex (Boys' and Girls' only) schools were randomly selected from three Local Government Areas (LGAs) within Ibadan Zone comprising eleven LGAs in 2018. Sixty-nine Senior Secondary School (SSS III) students were randomly selected in Boys' only (3) schools while ninety-seven students were randomly selected in Girls' only (3) schools giving a total

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of 166 students that participated in this study. Practical Agricultural Science Students' Achievement Test (PASSAT) and Students' Attitude towards Practical Agriculture Questionnaire (SATPAGQ) were used for data collection. The data collected were analyzed using descriptive statistics, One-way Analysis of Variance (ANOVA), Multiple Comparison techniques and t-test for equality of means. The ANOVA test was significant ( $p = .00$ ). Post Hoc (Tukey HSD) test, a multiple comparison technique on the ANOVA showed that PASSAT mean scores obtained by one Girls' only school was significantly different from one Boys' only schools another two Girls' only schools' mean scores at 5% significant level. It was found that availability of school farm, use of instructional materials were not enough to bring about significant boost in academic success in PASSAT especially in three of the schools with less than average mean scores of 34.51, 40.23 and 44.07. The study therefore recommended that government and relevant stakeholders (Parents-Teachers Association, Old Boys' and Girls' Association among others) should provide human resources and needed infrastructural facilities for effective teaching and learning of Agricultural Science in both single-sex and Co-educational schools for better academic performance.

**Keywords:** *Practical agricultural knowledge; academic performance; single-sex schools; students' attitude; students' mean scores.*

## 1. INTRODUCTION

In Nigeria, agriculture remained a major sector of the economy, providing food for her teeming population, provision of foreign exchange earnings, income for smallholder and commercial farmers and employment opportunities for about 70 percent of the population. Agricultural sector has started regaining its lost glory in recent time through a viable economic plan referred to as Economic Recovery and Growth Plan (ERGP) in which Agriculture is one of the major sectors of the economy considered in the ERGP to help solve ravaging incidence of food insecurity, reduce unemployment, improve foreign exchange earnings and resuscitate industrialization [1,2,3]. Since the steady reduction in the revenue accruable from crude oil from the international market, educational and economic experts have been devoting a lot of attention to how best to bring agriculture back to its lost enviable position [2]. This led to the formulation of various policies. One of these policies from the educational standpoint is the inclusion of Agriculture as a pre-vocational subject at the primary and junior secondary schools and as a vocational subject in the senior secondary school level [4]. With the recent Educational Policy, Agricultural Science in Junior Secondary Schools is at present taught in combination with Home Economics and now tagged Pre-Vocational Studies while Agricultural Science in Senior Secondary School (JSS) is an elective subject for the students and some branches or aspects of the subject are now offered as subjects like Fisheries Management and Animal Husbandry.

However, Agricultural Science acquiring the status of a vocational subject and other subjects like Animal Husbandry and Fisheries Management are part of the elective subjects students can choose at the Senior Secondary School (SSS) levels in Nigeria.

This is mainly to enable interested students to acquire practical agricultural skills that would make them self-reliant in future. Moreover, this would boost Nigeria's food productivity and closer to attaining food sufficiency status as a nation. The specific objectives of introducing Agricultural Science in secondary schools as listed in [5] and cited in [6] and [2] are as follows:

(a) to stimulate and sustain students' interest in agriculture; (b) to provide students the interest to advance in farming; c) to advance food production through improvement of agricultural production techniques in students; (d) to provide occupational entry level skills in agriculture to the interested students;(e) to prepare students adequately for producing and marketing farm commodities efficiently and profitably; and, (f) to enable students to acquire basic knowledge and practical skills required for future studies in agricultural field.

In spite of all these policies and programmes of the Federal Government of Nigeria through the educational sector, examination records of the West African Examination Council (WAEC), a major examination body in the West African sub-region and National Examination body called National Examination Council (NECO) revealed that Agricultural Science examination results are

**Table 1. Summary statistics of May/June SSCE agricultural science (practical paper) results (2008-2013)**

Year	Total no of students	Raw mean score	Standard deviation
2008	1,050,591	31	10.20
2009	1,059,609	32	7.48
2010	1,041,167	23	10.34
2011	1,192,571	21	10.63
2013	1,305,194	33	10.39

WAEC Chief Examiners' Report, 2015

**Table 2. Summary statistics of May/June SSCE agricultural science (essay) results (2008-2014)**

Year	Total no of students	Raw mean score	Standard deviation
2008	1,050,591	33	14.56
2009	1,059,609	28	13.48
2010	1,041,167	29	15.03
2011	1,192,571	29	14.73
2013	1,305,194	37	15.17
2014	952,983	38	16.63

WAEC Chief Examiners' Report, 2015

generally poor in Nigeria. According to WAEC [7] as shown in Table 1, summary statistics of results of Agricultural Science students in WAEC May/June Senior Secondary School Examinations from 2008-2013 (2012 and 2014 not reported) for Paper III (Practical). Table 2 shows summary statistics of results of Agricultural Science students in WAEC May/June Senior Secondary School Examinations from 2008-2014 (2012 not reported) for Paper II (Essay).

Chukwudum [8] emphasised that the two most critical and effective teaching-learning environments for instilling practical knowledge of agriculture to students are the school farm (crop and livestock farms) and the agricultural science laboratory. One of the key issues in this paper is on the effective utilization of the school farm (garden) in developing students' (both boys and girls) interest in practical agriculture. According to FAO [9] which emphasised the benefits of school garden (school farm) in students learning and gave the following objectives of school gardens: (i) Increasing the relevance and quality of education for rural and urban school children (students) through active learning and introduction of agriculture and nutrition knowledge and skills including life skills into the curriculum; (ii) Providing students with practical experience in food production and natural resource management, which serve as a source of innovation they can take home to their families and apply in their own household gardens and farms; (iii) Improving students' nutrition by

supplementing school feeding programmes with variety of fresh micro nutrients and protein rich products and increasing their knowledge of nutrition to the benefit of the whole family. Also, the role and contributions of women in agricultural development in the developing economies cannot be overemphasised [10]. In previous studies, [11], identified some key variables related to academic performance of students and classified them as ; (i) school-related variables (time spent studying, time spent in the library, interest in the subject, distance of home from school among others); (ii) home background-related variables (educational level of the parents, family income, access to land by family); and (iii) individual student-related variables (age, sex, personal interest in the subject, number of years living away from parents).

Poor academic performance of students (both male and female students) in Agricultural Science indicates that students are not showing interest in acquiring agricultural skills and lack of motivation in the school which can help them in becoming self-reliant and contribute meaningfully to the economy of the nation. However, Agricultural science students, after completing their Senior Secondary School examinations still lack required practical skills/knowledge needed to be able to venture into basic agricultural practices and as this makes it difficult to successfully engage themselves in agriculture enterprises [12,13,14,15].

Previous studies have shown that female and male students have exhibited contrasting interests and attitudes towards studying science and science related courses including agricultural science.

Moreover, it is important to note that more female students enrol in post-secondary institutions of higher learning than that of their male counterparts and earn good grades in science and engineering courses. Although, significant number of male students prefer to study pure science courses or engineering while female students naturally prefer courses like Home Economics, Food science and Technology among others [12]. It is important to note that gender plays an important role in determining the interest of students in a chosen course of study. Gender may be referred to as the range of physical, biological, mental and behavioural characteristics pertaining to and differentiating between the feminine and masculine (female and male) population [16]. The aspect of considering academic performance in relation to gender is hinged basically on the socio-cultural differences between girls and boys. Previous empirical studies have shown that some career paths (vocations and professions) have been regarded as male dominated such as engineering, sciences and science related courses including agriculture science among others while others like food science and technology, typing, nursing, home economics, etc are favourite of the female counterpart [17,16].

In this study, we therefore examined the attitudes of the students (Boys' and Girls' only schools) to the study of practical agriculture in Ibadan, Oyo State. We also examined whether there were significant differences in the mean scores obtained by students in PASAT in the six single sex schools. Furthermore, we investigated whether there was any relationship between the mean scores obtained by the students in PASAT and their attitudes to practical agriculture.

### 1.1 Statement of the Problem

Poor academic performance of high school students (both in single-sex and Co-educational) in agricultural science examinations (both theory and practical agriculture) have generated a lot of concerns for decision makers and all stakeholders in the Agricultural/vocational education sector. The low level academic performance has been linked to several factors. These included students' loss of interest and

carefree attitude to the subject (practical agriculture), inadequate innovative and relevant teaching techniques, inadequate funding and nonexistent teaching farms for practical agriculture. It is quite disheartening that thousands of fresh graduates (post-secondary) are churned out from our higher institutions of learning hoping to secure white collar jobs which is actually nonexistent while larger percentage of them are unemployable because of lack of practical knowledge and skills required to excel in such field. Agricultural science is one of the subjects that can give students an edge in acquiring these practical skills that can make them self-employed and self-reliant after leaving the school. The teaching and learning of Practical Agriculture at pre-tertiary levels leaves much to be desired. According to Onwumere et al. [18] and Otekunrin et al. [14], Agriculture Education in Nigeria at the pre-tertiary level is bedeviled with so much problems hindering achievement of its goals. There exist low interest in both teachers and students. This low interest could be attributed to the usual approach to teaching the practical oriented subject (mainly by teaching method which is commonly by writing notes in class with little or no periods for practical agriculture on the school farm/garden) which is no longer interesting and endearing to boost the required interest. The best way the students in schools can be taught agricultural science is by both theoretical aspect and practical work (physical activities) by "doing" in the practical sense of it and 'brains - on' activities (mental activities) inside and outside the laboratory and school farms [2,19,20].

Moreover, [21] emphasised the fact that practical lessons in science help to generate students' motivation in science and enhance their understanding of scientific concepts and events in their world. Deegan et al. [22], also opined that blended learning with emphasis on students taking charge of their own learning environment is effective in inculcating practical skills in agricultural science on students. Some recent studies for instance, [15] investigated the challenges involved in deploying project methods of teaching practical agriculture among Co-educational high school students in Ghana while [2] also revealed the challenges and attitudes of high schools students towards the teaching and learning of agricultural science in Nigeria (theoretical aspects alone). Baliyan and Nenty [25] studied the students attitudinal factors that predicted their willingness to enroll in agriculture with no correlation with their academic

performance in that subject while [18] examined the level of influence of teachers' attitude to school farm on the teaching of agricultural science in the study area. This study seeks to investigate the attitude and academic performance of high school students in practical agriculture in single-sex schools (Boys' and Girls' only) different from other studies that were carried out in the Co-educational schools. It seeks to examine whether there is a relationship between the attitudes of the single-sex high school students and their academic performance in practical agriculture.

This study therefore shed more light on these salient issues in single sex schools in Ibadan metropolis, in order to obtain concrete evidence for highly impactful policy interventions.

## 1.2 Research Questions

1. What are the students' attitudes towards practical agriculture in both Boys' and Girls' only schools in the study area?
2. Are there any significant difference in the mean scores obtained by students in PASAT among the six schools in the study area?
3. Is there any relationship between academic performance of students in the two categories of schools (Girls' and Boys' only) in practical agriculture and their attitudes to the subject?

Specifically, our hypotheses are:

- $H_0$  : There are no significant differences in the mean scores obtained by the students in the two categories of schools (Boys' and Girls' only).
- $H_1$  : There are significant differences in the mean scores obtained by the students in the two categories of schools (Boys' and Girls' only).

Practical agriculture is basically the involvement in farming activities (crops and livestock) while agricultural education is the acquisition of needed skills and knowledge in agricultural science with the aim of imparting these knowledge and skills into prospective agricultural science students at all educational levels (primary, secondary and tertiary levels) to become self-reliant and agripreneurs and contribute meaningfully to the government drive of attaining food security status as a nation [14], [15]. [23], concluded that attitudes are seen as cognitive and affective orientations or

dispositions towards an object, idea, person and situation, among others.

According to [24] who stated that attitude is considered one major determinant of a person's intention to perform a particular behaviour. Also, the *theory of attitude formation and change* by [24] and cited by [25] posited that some key variables which include; students, parents, personal experiences, observations, knowledge and value concerning agriculture significantly affect students' attitude about agriculture and in turn influence their belief, intentions and decision to participate actively. This will go a long way in affecting their attitude towards agriculture and their interest in pursuing a career in agriculture related courses in future.

However, some researchers have also observed some positive attitudes among students towards agriculture. These include the studies of [2,12], [26,27] and [28] who found out that students exhibited positive attitudes towards agricultural science but the teachers should encourage them by providing the enabling environment for effective teaching and learning of both the practical and the theoretical aspect of the subject in both Junior and Senior Secondary Schools. [29], opined that College of Agriculture fresh students viewed agriculture as being both scientific and technical and that they have more positive attitudes toward agricultural programmes and agriculture as a career pathway than the students of non-agriculture programmes.

According to [30], school farm is a selected plot of land in the school environment where students carry out practical agriculture both in the aspect crop production and animal husbandry. [18], pointed out that majority of school farms are faced with inadequate basic farm tools, equipment among others. Inadequate or unavailability of improved seeds, feeds, fertilizers (inorganic) and other operating supplies, inadequate (technical know-how) training for teachers to use the farm for instructional purposes. In addition, inadequate staff personnel to run the farm were one of the most serious problems facing the school farm.

In another vein, considering the aspect of students interest in the study of agricultural science (both practical and essay), [2,31,32] and [33] opined that students' background, students' negative attitude towards Agriculture, poor teaching techniques (mainly without appropriate instructional materials) among others were

causes of poor performance in the subject. [11], also found out that out of eleven predictor variables using home and school variables, only two (students' overall grade and science grade) were significant on agriculture students' academic performance. [34,35] revealed that only Grade Point Average (GPA) was positively correlated to students' academic performance in practical skills in agricultural science when considering their interest in agriculture, socioeconomic status among other variables. According to studies by [34] and [36], they found significant difference between male and female students' academic performance revealed through t-test. Their findings revealed that female students had better scores than the male students but the works of [17] refuted that findings and revealed that male students apparently performed better in Agricultural science than female students and also in certain subject areas especially the science related ones.

## 2. RESEARCH METHODOLOGY

The descriptive survey design was adopted for the study. Simple random sampling technique was used to select three Local Government Areas (LGAs) among the LGAs in Ibadan out of eleven LGAs present in Ibadan Zone. A total of nine (6) public secondary schools (comprising three (3) Boys' only and three (3) Girls' only) were randomly selected from the three LGAs which include; Ibadan North (1 schools), Ibadan North East (2 schools) and Ibadan South West (3 schools). Public single-sex schools are not as common as Co-educational schools. Sixty-nine (69) Senior Secondary School (SSSIII) students were selected in Boys' only schools, ninety-seven (97) students were selected in Girls' only schools resulting in a total of 166 sampled students and all of them are in Senior Secondary School (SSS III) classes preparing for their final internal and external examinations.

### 2.1 Research Instruments

Two research instruments were used for data collection. They were;

#### 2.1.1 Practical Agricultural Science Achievement Test (PASAT)

PASAT was used to measure the students' Academic Achievement in Practical Agricultural Science. The test is composed of 9-specimen (specimens A-I). The specimens were selected to test students' knowledge in the area of general agriculture, crop and livestock production. The

practical test comprised three (3) questions, 9 specimens with 50 minutes duration. The questions and specimens were selected using item analysis technique. The PASAT was administered on 184 (both boys and girls) SSS III Agricultural Science students in three categories of schools (nine schools) who were preparing for their forth coming external exterminations like West African Senior Secondary School Certificate Examinations (WASSCE) and National Examination Council (NECO) Examinations but only 166 were useful for the purpose of the study and giving about 90% response rate. The performance of the students in the PASAT was categorised after marking of the scripts using the standards in subjects' format of the West African Examinations Council (WAEC). This is represented in Table 3.

**Table 3. Standards used for PASAT**

Score (%)	Grade	Interpretation
80% - 100%	Grade A <sub>1</sub>	Excellent
70 % - 79%	Grade B <sub>2</sub>	Very Good
65% - 69%	Grade B <sub>3</sub>	Good
60% - 64%	Grade C <sub>4</sub>	Credit
55% - 59%	Grade C <sub>5</sub>	Credit
50% - 54%	Grade C <sub>6</sub>	Credit
45% - 49%	Grade D <sub>7</sub>	Pass
40% - 44%	Grade D <sub>8</sub>	Pass
0 % - 39%	Grade F <sub>9</sub>	Fail

[www.mywaectimetable.com](http://www.mywaectimetable.com)

#### 2.1.2 Students' Attitude towards Practical Agriculture Questionnaire (SATPAGQ)

SATPAGQ was a structured questionnaire designed to assess agricultural science students' attitudes towards practical agriculture. It contained items placed on a four-point Likert-type Scale of Strongly Agree (4), Agree (3), Strongly Disagree (2) and Disagree (1). The content and face validity of the questionnaire was established by two experts on Agricultural Science Education and Educational Management. The instrument was pretested in a school that was not part of the schools eventually used for the study and necessary changes were made to the instrument before it was administered on the 166 students. The Reliability Index obtained using Cronbach's Alpha was 0.71.

### 2.2 Method of Statistical Data Analysis

Data collected were analyzed using frequency counts and percentages. Also, relevant

hypothesis was formulated. One-way Analysis of Variance (ANOVA) was used to test for significant differences in mean scores of students from the all the six schools and also among the two categories of schools (three (3) Boys' only, three (3) Girls' only).

### 3. RESULTS AND DISCUSSION

#### 3.1 Results

The results of the study are presented in the order of the research questions:

##### 3.1.1 Research question 1

What are the students' attitudes towards practical agriculture in both Boys' and Girls' only schools in the study area?

Table 3 shows the responses (perception) of students' attitudes to the study of agricultural science as a subject and particularly the aspect of practical agriculture. The students' responses to some attitudinal variables focused on agricultural science practical in the two categories of schools. From the responses, majority of the students in Boys' only schools, ninety-seven percent (97%) were of the opinion that practical agriculture is interesting and fascinating while ninety-five percent (95%) of students in Girls' only schools also agreed to that assertion by the male students. Fifty-four percent (54%) of the male students (Boys' only schools) believed that their parents would likely want them to take up agriculture as a career but eighty-five percent (85%) of the female students did not agree to such statement. Also, it was evident that

both male and female students believed that agricultural science subject is not to be offered by boys alone as ninety-percent (90%) of the male students and ninety-two percent (92%) female students disagreed with that statement. It is worthy of note that fifty-two percent (52%) of both male and female student were of the opinion that there is inadequate funding to properly manage practical oriented agricultural science in their schools.

##### 3.1.2 Research question 2

Are there any significant differences in the mean scores obtained by students in PASAT in the six schools (Girls' and Boys' only) in the study area?

The results of the one-way ANOVA test (Table 5) to determine if there are significant differences in the mean scores of the students in PASAT for the six schools (Boys' and Girls' only). Since  $P = .000$  is less than  $\alpha = .05$ , we conclude that there are significant differences in the mean scores of students in PASAT among the six schools. Table 6 showed the distribution of scores of students in the two categories of single sex schools while Post Hoc (Tukey HSD) analysis (Post Hoc analysis is a multivariate comparison test employed when there is a significant difference between two or more variables revealed by ANOVA) in Table 7 showed the schools with mean scores that are significantly different from each other at 5% significant level. Figure 1 showed the mean plots of the PASAT scores of students in the six schools (Boys' and Girls' only) and Figures. 2 and 3 showed the distribution of PASAT scores of students in the six (two categories) schools.

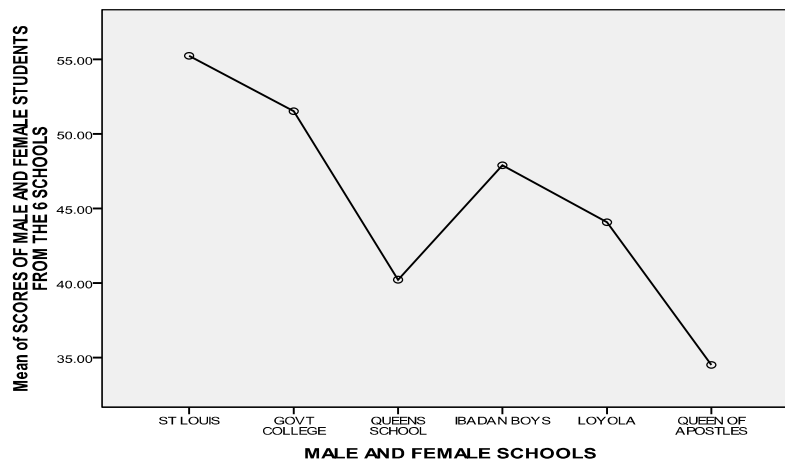


Figure 1. Mean plots of the scores of students in PASAT for the six (two categories) schools

**Table 4. Students' responses to SATPAGQ**

S/No	Items	Strongly agree (%)		Agree (%)		Strongly disagree (%)		Disagree (%)	
		Male	Female	Male	Female	Male	Female	Male	Female
1	Number of students that take agricultural science as a subject is very few	14.49 (10)	34.02 (33)	42.03 (29)	26.80 (26)	11.59 (8)	11.34 (11)	31.88 (22)	27.84 (27)
2	Practical in agricultural science is interesting and fascinating	49.23 (34)	25.77 (25)	47.83 (33)	69.07 (67)	2.90 (2)	2.06 (2)	-	3.09 (3)
3	Students' interest in agricultural science are sustained throughout the lesson period	15.94 (11)	9.28 (9)	56.52 (39)	49.49 (48)	2.90(2)	10.31 (10)	24.64 (17)	30.93 (30)
4	Agricultural Science is not a major subject required for gaining admission into higher institutions	11.59 (8)	7.22 (7)	21.74 (15)	31.96 (31)	33.33 (23)	20.62 (20)	33.33 (23)	40.21 (39)
5	My parents would want me to take up agriculture as a career	18.84 (13)	5.16 (5)	34.78 (24)	19.59 (19)	7.25 (5)	23.71 (23)	39.13 (27)	51.55 (50)
6	My parents react negatively to my study of agricultural science	2.90 (2)	5.16 (5)	11.59 (8)	8.25 (8)	42.03 (29)	24.74 (24)	43.48 (30)	61.86 (60)
7	Parents see agricultural science as the subject for children from poor parents	4.35 (3)	2.06 (2)	14.49 (10)	10.31 (10)	37.68 (26)	41.24 (40)	43.48 (30)	46.39 (45)
8	Agricultural science is a subject for boys alone	1.45 (1)	2.06 (2)	8.70 (6)	6.19 (6)	42.03 (29)	48.45 (47)	47.83 (33)	43.30 (42)
9	Boys want to study core science than agricultural science	5.80 (4)	15.46 (15)	56.52 (39)	45.36 (44)	4.35 (3)	12.37 (12)	33.33 (23)	26.80 (26)
10	The school farm is available for agricultural science practical	30.44 (21)	34.02 (33)	60.87 (42)	46.39 (45)	1.45 (1)	10.31 (10)	7.25 (5)	9.28 (9)



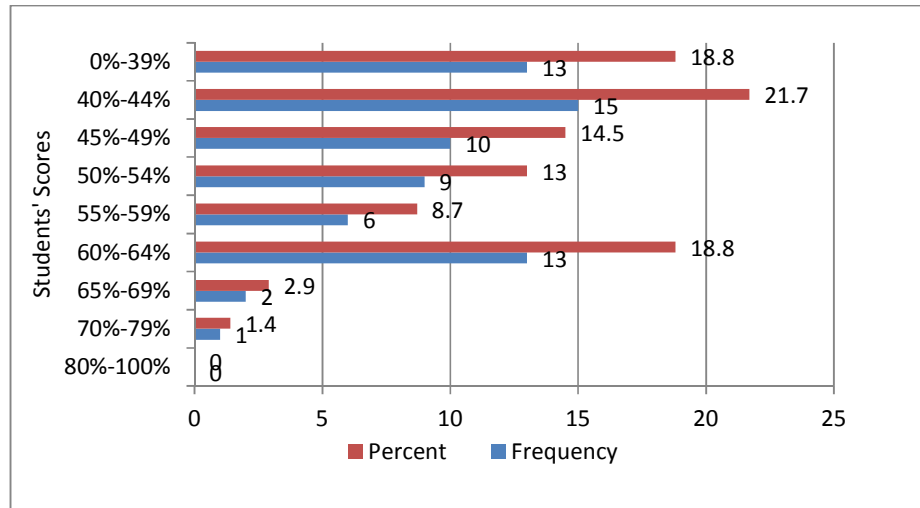
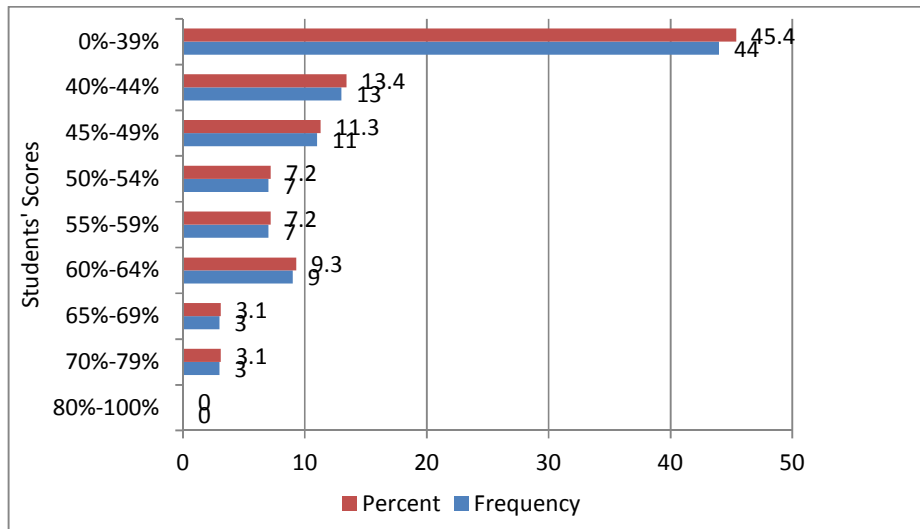
11	The teacher is always punctual for agricultural science lesson	52.17 (36)	35.05 (34)	40.58 (28)	55.67 (54)	1.45 (1)	4.12 (4)	5.80 (4)	5.15 (5)
12	The teacher uses relevant instructional materials for teaching	28.99 (20)	22.68 (22)	63.77 (44)	47.42 (46)	1.45(1)	7.22 (7)	5.80(4)	22.68 (22)
13	The teacher gives too much note to during lesson	13.04 (9)	20.62 (20)	28.99 (20)	43.30 (42)	10.15 (7)	6.19 (6)	47.83 (33)	29.90 (29)
14	The time allotted for the subject on the time table is too small	4.35 (3)	5.16 (5)	31.88 (22)	28.89 (28)	10.15 (7)	17.53 (17)	53.62 (37)	48.45 (47)
15	Students participate actively during the practical class in the laboratory or on the school farm	28.99 (20)	20.62 (20)	57.97 (40)	61.86 (60)	4.35(3)	6.19 (6)	8.70 (6)	11.34 (11)
16	The teacher uses relevant instructional materials during practical agriculture lessons	52.17 (36)	11.34 (11)	46.58 (28)	56.70 (55)	1.45 (1)	8.25 (8)	5.80 (4)	23.71 (23)
17	The time allotted to practical agriculture on the time table is small	13.04 (9)	8.25(8)	5.80 (4)	30.93 (30)	43.48 (30)	17.53 (17)	37.68 (26)	43.30 (42)
18	Students have opportunity of making use of agricultural science laboratory for practical	14.49 (10)	17.53 (17)	56.52 (39)	51.55 (50)	4.35 (3)	11.34 (11)	24.64 (17)	19.59 (19)
19	The teacher does not know how to teach practical agriculture very well	1.45 (1)	4.12(4)	1.45 (1)	9.28 (9)	53.62 (37)	30.93 (30)	43.48 (30)	55.67 (54)
20	there is inadequate fund to manage practical oriented agriculture science	5.80 (4)	16.49 (16)	46.38 (32)	35.05 (34)	8.70 (6)	17.53 (17)	39.13 (27)	30.92 (30)

Field Survey data, 2018; Note: No of Male students (Boys only) =69, No of Female students (Girls' only) = 97. The values in parentheses are the number of students (frequencies)

**Table 5. ANOVA test on the six schools (Boys' and Girls' only)**

Source of variation	Sum of squares	Df	Mean square	F	Sig.
Between Groups	8879.898	5	1775.980	14.395	.000
Within Groups	19739.298	160	123.371		
Total	28619.195	165			

Field Survey data, 2018

**Fig. 2. Distribution of PASAT scores of students in Boys' only schools****Figure 3. Distribution of PASAT scores of students in Girls' only schools**

### 3.1.3 Research question 3

Is there any relationship between academic performance of students in the two categories of schools (Girls' and Boys' only) in practical agriculture and their attitudes to the subject?

The distribution of scores obtained by the students in single sex schools (Boys' and Girls' only) in PASAT is presented in Table 5. Thirteen (13) agricultural science students in Boys' only schools obtained scores below 40% while quite a large number of students (forty-four (44)) in

**Table 6. Distribution of PASAT raw scores in the two categories of schools**

<b>Categories of schools</b>	<b>0%-39%</b>	<b>40%-44%</b>	<b>45%-49%</b>	<b>50%-54%</b>	<b>55%-59%</b>	<b>60%-64%</b>	<b>65%-69%</b>	<b>70%-79%</b>	<b>Total</b>
Girls' only schools	44	13	11	7	7	9	3	3	97
Boys' only schools	13	15	10	9	6	13	2	1	69
Total	57	28	21	16	13	22	5	4	166

*Field Survey data, 2018*

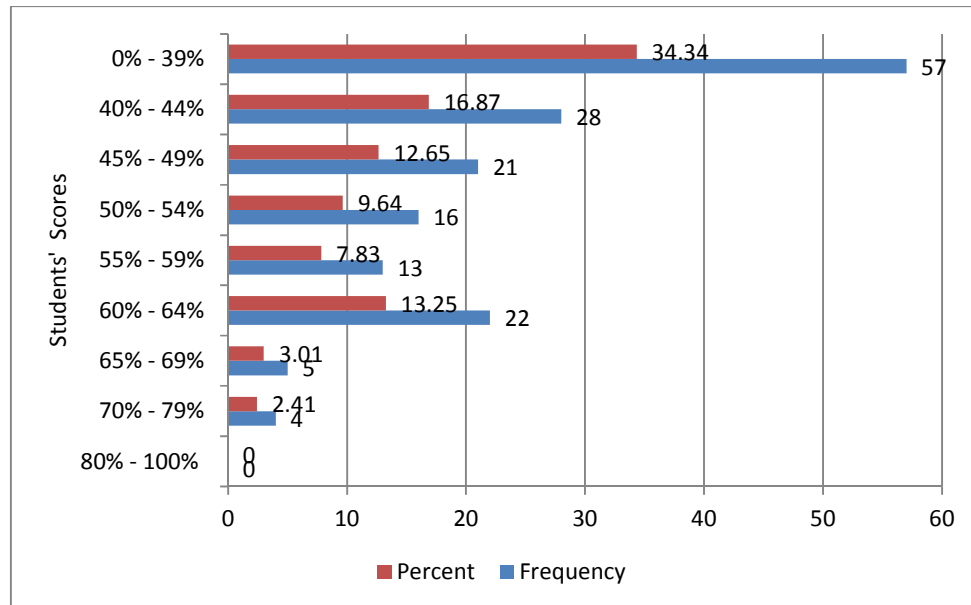


Figure 4. Distribution of PASAT scores of students in the six single sex schools

Table 7. Multiple Comparisons – Post-Hoc (Tukey HSD) Analysis

(I) Schools	(J) Schools	Mean difference (I-J)	Standard error	Sig.
St. Louis Grammar School	Queens' School	15.020*	2.808	.000
	Loyola College	11.176*	3.065	.005
	Queen of Apostles	20.738*	2.808	.000
Government College	Queens' School	11.293*	2.863	.002
	Queen of Apostles	17.011*	2.863	.000
Queens' School	Government College	-11.293*	2.863	.002
	St. Louis Grammar School	-15.020*	2.808	.000
Ibadan Boys' High	Queen of Apostles	13.390*	3.238	.001
Loyola College	St. Louis Grammar School	-11.176*	3.065	.005
	Queen of Apostles	9.563*	2.961	.019
Queen of Apostles	St. Louis Grammar School	-20.738*	2.808	.000
	Government College	-17.011*	2.863	.000
	Ibadan Boys' High	-13.390*	3.238	.001
	Loyola College	-9.5625*	2.961	.019

Field Survey data, 2018; \*The mean difference is significant at the 0.05 level

Table 8. Mean scores of students in PASAT from the two categories of schools

Category of schools	Number of students	Mean	Standard deviation	Standard error mean	Minimum score	Maximum score
Girls' only schools (3)	97	42.72	13.63	1.38	20.00	73.33
Boys' only schools (3)	69	48.00	11.92	1.43	15.56	71.11

Field Survey data, 2018

**Table 9. Mean scores of students (Girls' only Schools) in PASAT**

<b>Girls' only Schools</b>	<b>No of students (N = 97)</b>	<b>Mean score (%)</b>	<b>Standard deviation</b>	<b>Standard error</b>	<b>Minimum</b>	<b>Maximum</b>
Queens' School	34	40.23	10.94	1.88	20.00	60.00
St. Louis Grammar School	29	55.25	13.01	2.42	24.44	73.33
Queen of Apostles	34	34.51	7.98	1.37	20.00	48.98

*Field Survey data, 2018***Table 10. Mean scores of students (Boys' only Schools) in PASAT**

<b>Boys' only Schools</b>	<b>No of students (N = 69)</b>	<b>Mean score (%)</b>	<b>Standard deviation</b>	<b>Standard error</b>	<b>Minimum score</b>	<b>Maximum score</b>
Ibadan Boys High School	18	47.90	13.10	3.09	15.56	64.44
Government College	27	51.52	10.19	1.96	33.33	71.11
Loyola College	24	44.07	12.04	2.46	20.00	62.22

*Field Survey data, 2018*

Girls' only schools had scores below 40%. Meanwhile, fifteen (15) students in Boys' only schools had between 40% and 44% but thirteen (13) students in Girls' only schools had the same score. Thirteen (13) students in Boys' only and nine (9) students in Girls' only schools scored between 60% and 64%. Only one (1) students in Boys' only schools scored 71% while three (3) students in Girls' only schools scored between 70% and 79%. No student scored 80% and above among the six single sex schools. Table 7 and 8 showed the mean scores distribution of the six single sex schools' performance in PASAT. In relation to the students mean scores in PASAT and their attitudinal variables (Table 4) considered in this study, it revealed that ninety-one percent (91%) of male students (Boys' only) and eighty percent (80%) of female students (Girls' only) agreed that school farm is always available for use during practical agriculture. Also, majority of male students, eighty-seven percent (87%) and eighty-three percent (83%) of female students were of the opinion that students participate actively during practical class in the agricultural science laboratory or on the school farm. Even though, agricultural science students in all the single sex schools used for this study responded positively to some major attitudinal variables as mentioned earlier and reflected in Table 3, it has not significantly boost the students' academic performance in practical agriculture.

Moreover, the result of test of hypothesis (Table 11) revealed that since 0.011 is less than 0.05

(alpha value), we reject the null hypothesis of equality of means of the PASAT scores of students in the two categories of the single-sex schools (Boys' only and Girls' only) and conclude that there are significant differences in the means scores of students in the two categories of single sex schools. The male students had higher mean scores (48.00) than the female students with mean score of 42.72.

### 3.2 Discussion

From the findings of this research, ninety-seven percent (97%) of the male students (Boys' only) and ninety-five percent (95%) of the female students (Girls only) were of the opinion that practical agriculture (agricultural practical lesson) makes learning more interesting and enjoyable. Moreover, fifty-four percent (54%) of the male students perceived that their parents would like them to take up agriculture as a career in the future but eighty-five percent (85%) of the female students refuted such statement. These results agreed with the findings of [6,22,2] who reported that students enjoyed learning experiences when taken through practical oriented agricultural science lessons and also reiterated blended learning which placed emphasis on students taking control of their own learning environment which is capable of imparting needed agricultural skills on them.

Filgona and Sababa [16] opined that some vocations and professions have been regarded as those separated for male (men) alone such as

**Table 11. t-test for equality of means in PASAT (Boys' and Girls' only schools)**

<b>Scores of students (male and female) from the six schools</b>	<b>T</b>	<b>df</b>	<b>Sig. (2-Tailed)</b>	<b>Mean diff</b>	<b>Std. error diff</b>	<b>95% Conf. Interval of the difference</b>	
	2.585	164	.011	5.271	2.040	1.245	9.298

*Field Survey data, 2018*

Agricultural Science, Engineering, arts and crafts among others while others like Catering, Nursing among others are regarded as the juicy choice of the female student. Furthermore, ninety percent (90%) of the male student respondents disagreed to the statement that the subject (Agricultural Science) is for boys alone while ninety-two percent (92%) of female student respondents also supported that the subject is not to be offered by male students alone. This finding was supported by many researchers [2,6,12,28] that revealed in their findings that gender had no significant influence on students' attitude towards the learning of agricultural science.

Ninety percent (90%) of the male students and ninety-two percent (92%) female student respondents affirmed that school farms are available for practical agriculture while seventy-one percent (71%) male students and sixty-nine percent (69%) female students confirmed that they have opportunity of making use of the agricultural science laboratory for their practical lessons. These findings were in line with the works of [18,20,37] who suggested adequate practical exposure of students to the practice of farming within the provision of available technology in the school.

In Table 6 (Post-Hoc analysis), there exist significant differences in the PASAT mean scores obtained by St. Louis (Girls' only) when compared with the mean scores of Queens' school (Girls' only), Loyola College (Boys' only) and Queen of Apostles (Girls' only) at 5 percent significant level. Meanwhile, no significant differences exist in the PASAT mean scores obtained by St. Louis when compared with that of Ibadan Boys and Government College (Boys' only) at 5 percent significant level. From this result, it showed that St. Louis had the best scores in PASAT among the Girls only schools with mean score of 55.25 and the highest among the six single sex schools used for this study.

Considering the mean scores obtained in PASAT by the two categories of schools used for this study and t- test Equality of means in PASSAT (Table 7 and 9 ), Boys' only schools had better mean score (even though lower than average score) 48.00 while Girls' only schools had 42.72. It was revealed from Figure 2 that only (sixty students) thirty-six percent (36%) of all the six single sex schools scored 50% and above while (one hundred and six students) sixty-four percent (64%) had scores below the average score. It

was evident from this results that larger number of the students (male and female) had poor performance in PASAT. This result corroborated the findings of [17] who revealed that male students apparently performed better in Agricultural science than female students and also in certain subject areas especially the science related ones.

Moreover, the relationship between students' PASAT scores and their attitudinal variables in this study, it was found out that availability of school farms, use of relevant instructional materials among other variables as confirmed by the students were not enough to bring about better performance in PASAT especially in schools like Queen of Apostles, Queens' school and Loyola College with below average mean scores of 34.51, 40.23 and 44.07 respectively. This result agreed with the works of [2] and [6] that there was no association between students' scores in Agricultural Science Achievement Test (ASAT) and teachers' use of relevant instructional materials. Furthermore, these results corroborated the works of [15,20,38] and [39] which opined that other factors like high cognitive ability of the students, quality of the school, teacher's teaching methods, home background, influence of old students (Old Boys and Old Girls) association (Alumni association), psychosocial environment of agricultural science classroom among others may necessarily influence the needed boost in the students' academic performance in the subject and ultimately instill in them the required skills and competencies in basic agricultural practices which can make them self-reliant in near future.

#### 4. CONCLUSION AND RECOMMENDATIONS

In this study, significant differences exist in the mean scores obtained by students in PASAT among the six single sex schools. Also, there existed significant differences in the PASAT mean scores obtained by students of St. Louis (Girls' only) when compared with the mean scores of Queens' school (Girls' only), Loyola College (Boys' only) and Queen of Apostles (Girls' only) students at 5 percent significant level. Meanwhile, no significant differences exist in the PASAT mean scores obtained by St. Louis when compared with that of Ibadan Boys and Government College (Boys' only). It showed that St. Louis had the best scores in PASAT among the Girls only schools with mean score of 55.25

and the highest among the six single sex schools used for this study.

The result of the hypothesis of equality of means concluded that there are significant differences in the mean scores of the students in PASAT in the two categories of single sex schools used for this study. Considering the relationship between students' PASAT scores and their attitudinal variables in this study, the availability of school farms, use of relevant instructional materials among other variables as pointed out by the students were not enough to bring about better performance in PASAT especially in schools like Queen of Apostles, Queens' school and Loyola College with below average mean scores of 34.51, 40.23 and 44.07 respectively. This may be due to factors like; students' cognitive ability, home background, quality of the schools (mostly public schools established by the missionaries), government funding, presence of established and functional Old Student Associations, and educational background of the parents.

The findings also revealed that both male and female students found practical agriculture interesting and fascinating (enjoyable). Therefore, we recommend that students (male and female) should be exposed practical agriculture and not limited to the theoretical aspects taught in classrooms alone. Inadequate fund to manage practical oriented agricultural science was one of the important challenges identified. therefore, government and relevant stakeholders ( like Parent Teachers Association (PTAs), school alumni association among others) should provide adequate human resources and needed infrastructural facilities for effective teaching and learning of agricultural science in both single sex and co-educational secondary schools in order to achieve better academic performance in the subject.

## COMPETING INTERESTS

Authors have declared that no competing interest exists

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