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

9  
10 *Keywords:* Practical Agricultural Knowledge; Academic Performance; Single-Sex Schools;  
11 Students' Attitude; Students' Mean Scores

12  
13 **1. INTRODUCTION**

14 In Nigeria, agriculture remained a major sector of the economy, providing food for her  
15 teeming population, provision of foreign exchange earnings, income for smallholder and  
16 commercial farmers and employment opportunities for about 70 percent of the population.

17 Agricultural sector has started regaining its lost glory in recent time through a viable  
 18 economic plan referred to as Economic Recovery and Growth Plan (ERGP) in which  
 19 Agriculture is one of the major sectors of the economy considered in the ERGP to help solve  
 20 ravaging incidence of food insecurity, reduce unemployment, improve foreign exchange  
 21 earnings and resuscitate industrialization [1] [2] [3]. Since the steady reduction in the  
 22 revenue accruable from crude oil from the international market, educational and economic  
 23 experts have been devoting a lot of attention to how best to bring agriculture back to its lost  
 24 enviable position [2]. This led to the formulation of various policies. One of these policies  
 25 from the educational standpoint is the inclusion of Agriculture as a pre-vocational subject at  
 26 the primary and junior secondary schools and as a vocational subject in the senior  
 27 secondary school level [4]. With the recent Educational Policy, Agricultural Science in Junior  
 28 Secondary Schools is at present taught in combination with Home Economics and now  
 29 tagged Pre-Vocational Studies while Agricultural Science in Senior Secondary School (JSS)  
 30 is an elective subject for the students and some branches or aspects of the subject are now  
 31 offered as subjects like Fisheries Management and Animal Husbandry.  
 32 However, Agricultural Science acquiring the status of a vocational subject and other subjects  
 33 like Animal Husbandry and Fisheries Management are part of the elective subjects students  
 34 can choose at the Senior Secondary School (SSS) levels in Nigeria.  
 35 This is mainly to enable interested students to acquire practical agricultural skills that would  
 36 make them self-reliant in future. Moreover, this would boost Nigeria's food productivity and  
 37 closer to attaining food sufficiency status as a nation. The specific objectives of introducing  
 38 Agricultural Science in secondary schools as listed in [5] and cited in [6] and [2] are as  
 39 follows:

- 40  
 41 (a) to stimulate and sustain students' interest in agriculture; (b) to provide students the  
 42 interest to advance in farming; c) to advance food production through improvement of  
 43 agricultural production techniques in students; (d) to provide occupational entry level skills in  
 44 agriculture to the interested students;(e) to prepare students adequately for producing and  
 45 marketing farm commodities efficiently and profitably; and, (f) to enable students to acquire  
 46 basic knowledge and practical skills required for future studies in agricultural field.

47 In spite of all these policies and programmes of the Federal Government of Nigeria through  
 48 the educational sector, examination records of the West African Examination Council  
 49 (WAEC), a major examination body in the West African sub-region and National Examination  
 50 body called National Examination Council (NECO) revealed that Agricultural Science  
 51 examination results are generally poor in Nigeria. According to [7] as shown in Table 1,  
 52 summary statistics of results of Agricultural Science students in WAEC May/June Senior  
 53 Secondary School Examinations from 2008-2013 (2012 and 2014 not reported) for Paper III  
 54 (Practical). Table 2 shows summary statistics of results of Agricultural Science students in  
 55 WAEC May/June Senior Secondary School Examinations from 2008-2014 (2012 not  
 56 reported) for Paper II (Essay).

57  
 58 **Table 1: Summary statistics of May/June SSCE Agricultural Science (Practical paper)**  
 59 **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

60 *WAEC Chief Examiners' Report, 2015*  
 61

62 **Table 2: Summary statistics of May/June SSCE Agricultural Science (Essay) results**  
 63 **(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

64 *WAEC Chief Examiners' Report, 2015*

65  
 66 [8] emphasised that the two most critical and effective teaching-learning environments for  
 67 instilling practical knowledge of agriculture to students are the school farm (crop and  
 68 livestock farms) and the agricultural science laboratory. One of the key issues in this paper is  
 69 on the effective utilization of the school farm (garden) in developing students' (both boys and  
 70 girls) interest in practical agriculture. According to [9] which emphasised the benefits of  
 71 school garden (school farm) in students learning and gave the following objectives of school  
 72 gardens: (i) Increasing the relevance and quality of education for rural and urban school  
 73 children (students) through active learning and introduction of agriculture and nutrition  
 74 knowledge and skills including life skills into the curriculum; (ii) Providing students with  
 75 practical experience in food production and natural resource management, which serve as a  
 76 source of innovation they can take home to their families and apply in their own household  
 77 gardens and farms; (iii) Improving students' nutrition by supplementing school feeding  
 78 programmes with variety of fresh micro nutrients and protein rich products and increasing  
 79 their knowledge of nutrition to the benefit of the whole family. Also, the role and contributions  
 80 of women in agricultural development in the developing economies cannot be  
 81 overemphasised [10]. In previous studies, [11], identified some key variables related to  
 82 academic performance of students and classified them as ; (i) school-related variables (time  
 83 spent studying, time spent in the library, interest in the subject, distance of home from school  
 84 among others); (ii) home background-related variables (educational level of the parents,  
 85 family income, access to land by family); and (iii) individual student-related variables (age,  
 86 sex, personal interest in the subject, number of years living away from parents).

87  
 88 Poor academic performance of students (both male and female students) in Agricultural  
 89 Science indicates that students are not showing interest in acquiring agricultural skills and  
 90 lack of motivation in the school which can help them in becoming self-reliant and contribute  
 91 meaningfully to the economy of the nation. However, Agricultural science students, after  
 92 completing their Senior Secondary School examinations still lack required practical  
 93 skills/knowledge needed to be able to venture into basic agricultural practices and as this  
 94 makes it difficult to successfully engage themselves in agriculture enterprises [12] [13], [14],  
 95 [15].

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

99 Moreover, it is important to note that more female students enrol in post-secondary  
 100 institutions of higher learning than that of their male counterparts and earn good grades in  
 101 science and engineering courses. Although, significant number of male students prefer to  
 102 study pure science courses or engineering while female students naturally prefer courses  
 103 like Home Economics, Food science and Technology among others [12]. **It is important to  
 104 note that gender plays an important role in determining the interest of students in a chosen  
 105 course of study.** Gender may be referred to as the range of physical, biological, mental and  
 106 behavioural characteristics pertaining to and differentiating between the feminine and

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107 masculine (female and male) population [16]. The aspect of considering academic  
108 performance in relation to gender is hinged basically on the socio-cultural differences  
109 between girls and boys. Previous empirical studies have shown that some career paths  
110 (vocations and professions) have been regarded as male dominated such as engineering,  
111 sciences and science related courses including agriculture science among others while  
112 others like food science and technology, typing, nursing, home economics, etc are favourite  
113 of the female counterpart [17], [16].

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

#### 120 1.1 Statement of the Problem

121 Poor academic performance of high school students (both in single-sex and Co-educational)  
122 in agricultural science examinations (both theory and practical agriculture) have generated a  
123 lot of concerns for decision makers and all stakeholders in the Agricultural/vocational  
124 education sector. The low level academic performance has been linked to several factors.  
125 These included students' loss of interest and carefree attitude to the subject (practical  
126 agriculture), inadequate innovative and relevant teaching techniques, inadequate funding  
127 and nonexistent teaching farms for practical agriculture. It is quite disheartening that  
128 thousands of fresh graduates (post-secondary) are churned out from our higher institutions  
129 of learning hoping to secure white collar jobs which is actually nonexistent while larger  
130 percentage of them are unemployable because of lack of practical knowledge and skills  
131 required to excel in such field. Agricultural science is one of the subjects that can give  
132 students an edge in acquiring these practical skills that can make them self-employed and  
133 self-reliant after leaving the school. The teaching and learning of Practical Agriculture at pre-  
134 tertiary levels leaves much to be desired. According to [18] and [14], Agriculture Education in  
135 Nigeria at the pre-tertiary level is bedeviled with so much problems hindering achievement of  
136 its goals. There exist low interest in both teachers and students. This low interest could be  
137 attributed to the usual approach to teaching the practical oriented subject (mainly by  
138 teaching method which is commonly by writing notes in class with little or no periods for  
139 practical agriculture on the school farm/garden) which is no longer interesting and endearing  
140 to boost the required interest. The best way the students in schools can be taught  
141 agricultural science is by both theoretical aspect and practical work (physical activities) by  
142 "doing" in the practical sense of it and 'brains - on' activities (mental activities) inside and  
143 outside the laboratory and school farms. [19], [2], [20].

144 Moreover, [21] emphasised the fact that practical lessons in science help to generate  
145 students' motivation in science and enhance their understanding of scientific concepts and  
146 events in their world. [22], also opined that blended learning with emphasis on students  
147 taking charge of their own learning environment is effective in inculcating practical skills in  
148 agricultural science on students. Some recent studies for instance, [15] investigated the  
149 challenges involved in deploying project methods of teaching practical agriculture among  
150 Co-educational high school students in Ghana while [2] also revealed the challenges and  
151 attitudes of high schools students towards the teaching and learning of agricultural science  
152 in Nigeria (theoretical aspects alone). [25] studied the students attitudinal factors that  
153 predicted their willingness to enroll in agriculture with no correlation with their academic  
154 performance in that subject while [18] examined the level of influence of teachers' attitude to  
155 school farm on the teaching of agricultural science in the study area This study seeks to  
156 investigate the attitude and academic performance of high school students in practical  
157 agriculture in single-sex schools (Boys' and Girls' only) different from other studies that were  
158 carried out in the Co-educational schools. It seeks examine whether there is relationship

159 between the attitudes of the single-sex high school students and their academic  
160 performance in practical agriculture

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

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## 164 1.2 Research Questions

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

167 2. Are there any significant difference in the mean scores obtained by students in PASAT  
168 among the six schools in the study area?

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

172 Specifically, our hypotheses are:

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174 H<sub>0</sub>: There are no significant differences in the mean scores obtained by the students in the  
175 two categories of schools (Boys' and Girls' only).

176 H<sub>1</sub>: There are significant differences in the mean scores obtained by the students in the two  
177 categories of schools (Boys' and Girls' only).

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

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

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

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

211 In another vein, considering the aspect of students interest in the study of agricultural  
 212 science (both practical and essay), [31], [2], [32] and [33] opined that students' background,  
 213 students' negative attitude towards Agriculture, poor teaching techniques (mainly without  
 214 appropriate instructional materials) among others were causes of poor performance in the  
 215 subject. [11], also found out that out of eleven predictor variables using home and school  
 216 variables, only two (students' overall grade and science grade) were significant on  
 217 agriculture students' academic performance. [34], [35] revealed that only Grade Point  
 218 Average (GPA) was positively correlated to students' academic performance in practical  
 219 skills in agricultural science when considering their interest in agriculture, socioeconomic  
 220 status among other variables. According to studies by [34] and [36], they found significant  
 221 difference between male and female students' academic performance revealed through t-  
 222 test. Their findings revealed that female students had better scores than the male students  
 223 but the works of [17] refuted that findings and revealed that male students apparently  
 224 performed better in Agricultural science than female students and also in certain subject  
 225 areas especially the science related ones.

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## 230 **2. Research Methodology**

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

### 241 **2.1 Research Instruments**

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

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#### 244 **2.1.1 PRACTICAL AGRICULTURAL SCIENCE ACHIEVEMENT TEST (PASAT)**

245 PASAT was used to measure the students' Academic Achievement in Practical Agricultural  
 246 Science. The test is composed of 9-specimen (specimens A-I). The specimens were  
 247 selected to test students' knowledge in the area of general agriculture, crop and livestock  
 248 production. The practical test comprised three (3) questions, 9 specimens with 50 minutes  
 249 duration. The questions and specimens were selected using item analysis technique. **The**  
 250 **PASAT was administered on 184 (both boys and girls) SSS III Agricultural Science students**  
 251 **in three categories of schools (nine schools) who were preparing for their forth coming**  
 252 **external exterminations like West African Senior Secondary School Certificate Examinations**  
 253 **(WASSCE) and National Examination Council (NECO) Examinations but only 166 were**  
 254 **useful for the purpose of the study and giving about 90% response rate.** The performance of  
 255 the students in the PASAT was categorised after marking of the scripts using the standards  
 256 in subjects' format of the West African Examinations Council (WAEC). This is represented in  
 257 Table3.

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**Table3: 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

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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

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### **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.

**Table 4 Students responses to SATPAGQ**

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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)

307 Field Survey data, 2018.

308 Note: No of Male students (Boys only) =69, No of Female students (Girls' only) = 97. The

309 values in parentheses are the number of students (frequencies

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311 **4.1.2 Research Question 2**

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

315 The results of the one-way ANOVA test (Table 5) to determine if there are significant  
316 differences in the mean scores of the students in PASAT for the six schools (Boys' and Girls'  
317 only). Since  $P = .000$  is less than  $\alpha = .05$ , we conclude that there are significant differences  
318 in the mean scores of students in PASAT among the six schools. Table 6 showed the  
319 distribution of scores of students in the two categories of single sex schools while Post Hoc  
320 (Tukey HSD) analysis (Post Hoc analysis is a multivariate comparison test employed when  
321 there is a significant difference between two or more variables revealed by ANOVA) in Table  
322 7 showed the schools with mean scores that are significantly different from each other at 5%  
323 significant level. Figure 1 showed the mean plots of the PASAT scores of students in the six  
324 schools (Boys' and Girls' only) and Figure 2 and 3 showed the distribution of PASAT scores  
325 of students in the six (two categories) schools.

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

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Source of Variation	Sum of Squares	Df	Mean Square	F	Significance
Between Groups	8879.898	5	1775.980	14.395	.000
Within Groups	19739.298	160	123.371		
Total	28619.195	165			

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339 d Survey data, 2018.

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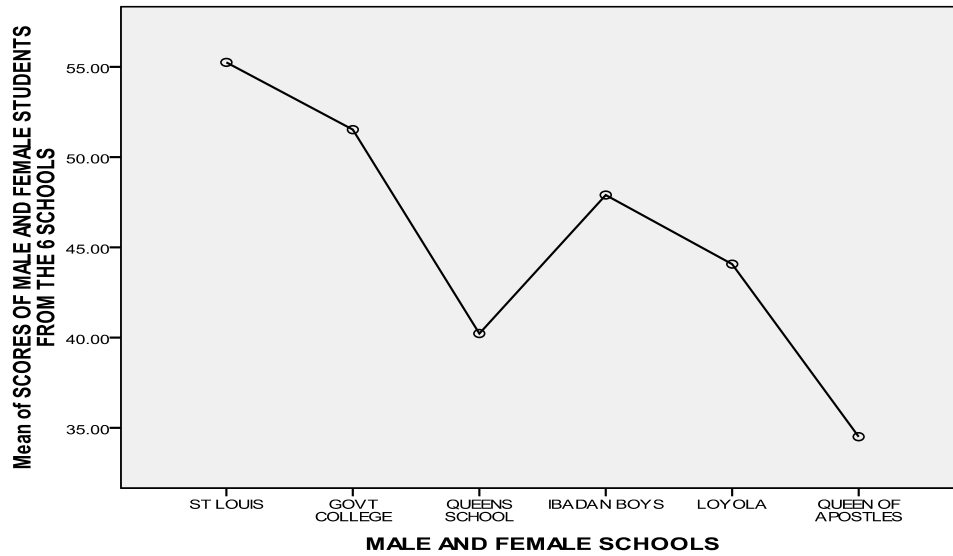
342 **Table 6: Distribution of PASAT raw scores in the two categories of schools**

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Categories of Schools	0%-39%	40%-44%	45%-49%	50%-54%	55%-59%	60%-64%	65%-69%	70%-79%	Total
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

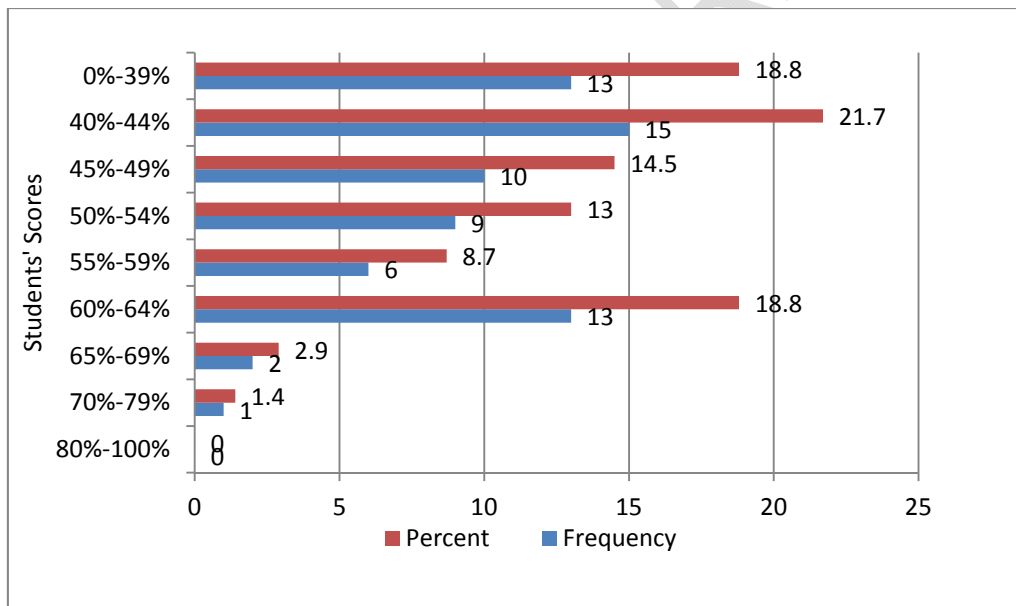
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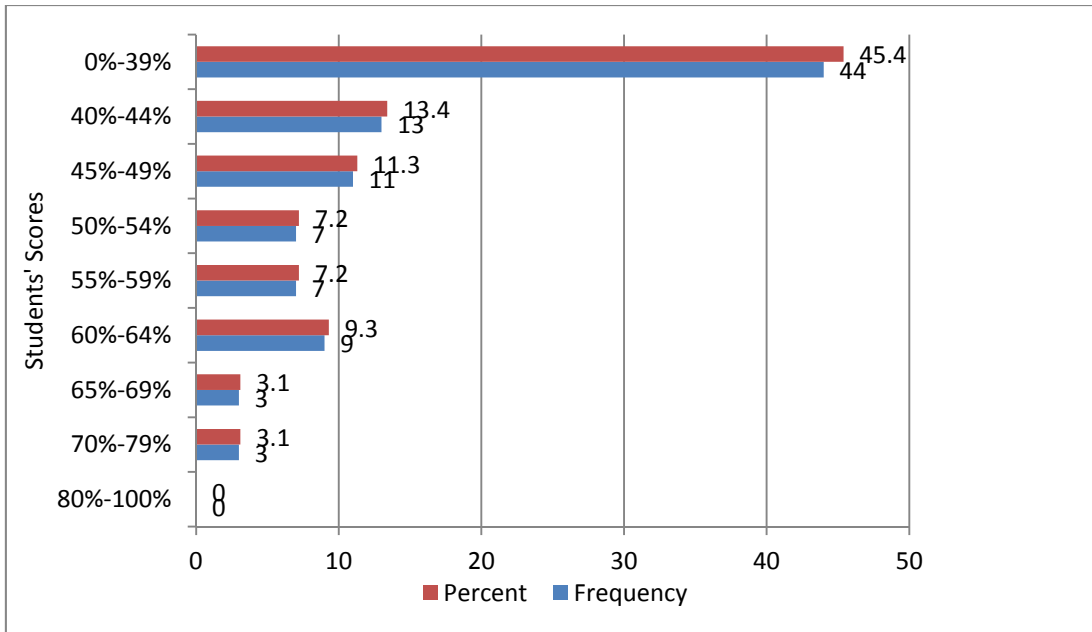
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Figure 1: Mean plots of the scores of students in PASAT for the six (two categories) schools



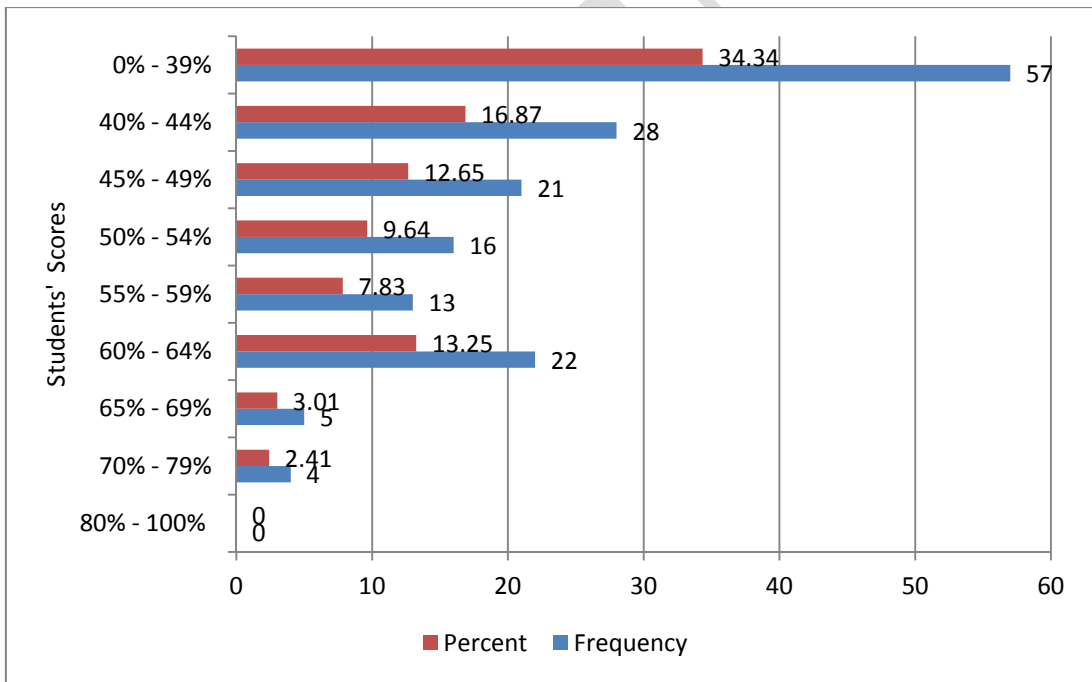
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Figure2: Distribution of PASAT scores of students in Boys' only Schools



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**Figure 3: Distribution of PASAT scores of students in Girls' only Schools**



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

\* E-mail address: xyz@abc.com.

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**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

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

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**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

376 Field Survey data, 2018

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### **4.1.3 Research Question 3**

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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?

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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 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

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\* E-mail address: xyz@abc.com.

388 schools scored between 60% and 64%. Only one (1) students in Boys' only schools scored  
 389 71% while three (3) students in Girls' only schools scored between 70% and 79%. No  
 390 student scored 80% and above among the six single sex schools. Table 7 and 8 showed the  
 391 mean scores distribution of the six single sex schools' performance in PASAT. In relation to  
 392 the students mean scores in PASAT and their attitudinal variables (Table 4) considered in  
 393 this study, it revealed that ninety-one percent (91%) of male students (Boys' only) and eighty  
 394 percent (80%) of female students (Girls' only) agreed that school farm is always available for  
 395 use during practical agriculture. Also, majority of male students, eighty-seven percent (87%)  
 396 and eighty-three percent (83%) of female students were of the opinion that students  
 397 participate actively during practical class in the agricultural science laboratory or on the  
 398 school farm. Even though, agricultural science students in all the single sex schools used  
 399 for this study responded positively to some major attitudinal variables as mentioned earlier  
 400 and reflected in Table 3, it has not significantly boost the students' academic performance in  
 401 practical agriculture.

402 Moreover, the result of test of hypothesis (Table 11) revealed that since 0.011 is less than  
 403 0.05 (alpha value), we reject the null hypothesis of equality of means of the PASAT scores of  
 404 students in the two categories of the single-sex schools (Boys' only and Girls' only) and  
 405 conclude that there are significant differences in the means scores of students in the two  
 406 categories of single sex schools. The male students had higher mean scores (48.00) than  
 407 the female students with mean score of 42.72.

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**Table 9: Mean Scores of Students (Girls' only schools) in PASAT**

Girls' only Schools	No of Students (N = 97)	Mean Score (%)	Standard Deviation	Standard Error	Minimum	Maximum
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

410 Field Survey data, 2018

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**Table 10: Mean Scores of Students (Boys' only schools) in PASAT**

Boys' only Schools	No of Students (N = 69)	Mean Score (%)	Standard Deviation	Standard Error	Minimum Score	Maximum Score
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

414 Field Survey data, 2018

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**Table 11: t-test for Equality of Means in PASAT (Boys' and Girls' only schools)**

Scores of students (male and female) from the six schools	T	df	Sig. (2-Tailed)	Mean Diff	Std. Error Diff	95% Conf. Interval of the Difference	
	2.585	164	.011	5.271	2.040	1.245	9.298

422 Field Survey data, 2018

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## 424 4.2 Discussion

425

426 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] and [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.

436 [16] opined that some vocations and professions have been regarded as those separated for male (men) alone such as 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 [28], [6], [12] and [2] that revealed in their findings that gender had no significant influence on students' attitude towards the learning of agricultural science.

445

446 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 [37], [18] and [20] who suggested adequate practical exposure of students to the practice of farming within the provision of available technology in the school.

453

454 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.

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463 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

466 had 42.72. It was revealed from Figure 2c that only (sixty students) thirty-six percent (36%)  
467 of all the six single sex schools scored 50% and above while (one hundred and six students)  
468 sixty-four percent (64%) had scores below the average score. It was evident from this results  
469 that larger number of the students (male and female) had poor performance in PASAT. This  
470 result corroborated the findings of [17] who revealed that male students apparently  
471 performed better in Agricultural science than female students and also in certain subject  
472 areas especially the science related ones.

473 Moreover, the relationship between students' PASAT scores and their attitudinal variables in  
474 this study, it was found out that availability of school farms, use of relevant instructional  
475 materials among other variables as confirmed by the students were not enough to bring  
476 about better performance in PASAT especially in schools like Queen of Apostles, Queens'  
477 school and Loyola College with below average mean scores of 34.51, 40.23 and 44.07  
478 respectively. This result agreed with the works of [6] and [2] that there was no association  
479 between students' scores in Agricultural Science Achievement Test (ASAT) and teachers'  
480 use of relevant instructional materials. Furthermore, these results corroborated the works of  
481 [38], [39], [15] and [20] which opined that other factors like high cognitive ability of the  
482 students, quality of the school, teacher's teaching methods, home background, influence of  
483 old students (Old Boys and Old Girls) association (Alumni association), psychosocial  
484 environment of agricultural science classroom among others may necessarily influence the  
485 needed boost in the students' academic performance in the subject and ultimately instill in  
486 them the required skills and competencies in basic agricultural practices which can make  
487 them self-reliant in near future.

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#### 492 **4. CONCLUSION AND RECOMMENDATIONS**

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

503 The result of the hypothesis of equality of means concluded that there are significant  
504 differences in the mean scores of the students in PASAT in the two categories of single sex  
505 schools used for this study. Considering the relationship between students' PASAT scores  
506 and their attitudinal variables in this study, the availability of school farms, use of relevant  
507 instructional materials among other variables as pointed out by the students were not  
508 enough to bring about better performance in PASAT especially in schools like Queen of  
509 Apostles, Queens' school and Loyola College with below average mean scores of 34.51,  
510 40.23 and 44.07 respectively. This may be due to factors like; students' cognitive ability,  
511 home background, quality of the schools (mostly public schools established by the  
512 missionaries), government funding, presence of established and functional Old Student  
513 Associations, and educational background of the parents.

514 The findings also revealed that both male and female students found practical agriculture  
515 interesting and fascinating (enjoyable). Therefore, we recommend that students (male and  
516 female) should be exposed practical agriculture and not limited to the theoretical aspects  
517 taught in classrooms alone.  
518 Inadequate fund to manage practical oriented agricultural science was one of the important



519 challenges identified. therefore, government and relevant stakeholders ( like Parent  
520 Teachers Association (PTAs), school alumni association among others) should provide  
521 adequate human resources and needed infrastructural facilities for effective teaching and  
522 learning of agricultural science in both single sex and co-educational secondary schools in  
523 order to achieve better academic performance in the subject.  
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### 528 **COMPETING INTERESTS**

529 Authors have declared that no competing interest exists  
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