AGRICULTURAL SCIENCE AS A COMPONENT OF THE CURRICULUM OF SENIOR HIGH SCHOOL INTEGRATED SCIENCE IN GHANA. – ITS EFFECTS AND THE WAY FORWARD

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ABSTRACT

The study sought to examine Agricultural Science as a component of the curriculum of Senior High School Integrated Science – its effects and the way forward within selected schools in the Greater Accra Region. The study adopted the descriptive survey research design. The research population was 150 students and 14 Integrated Science teachers. The disproportional, and census sampling techniques were used in selecting the participants for the study. Questionnaire made up of open and close-ended questions were used to collect data. The findings of the study revealed the students' knowledge level in Agriculture was low. Moreover, the teaching and learning of Integrated Science in the Senior High Schools was found to be bedeviled by challenges such as inadequate training for Integrated Science teachers, inadequate Integrated Science textbooks in the schools' library, insufficient time allocation among others. Based on the findings of the study, it is recommended among others that the government, Parents Teachers Association (PTA) and other stakeholders should help in providing the needed resources and instruments needed that are needed for the effective teaching and learning of Agricultural Science and Integrated Science as a whole.

Keywords: Agriculture, Education, Ghana, Learning, Science, Teaching,

Introduction

Worldwide, science and technology have been identified as important and the foundation of modernization and socio-economic development. The realization of such facts gives reasons for which science has been incorporated in the educational curriculum from basic to the tertiary levels of Ghana. The formulated educational reforms re-echo the need to strengthen science education in the country (Baskwil et al., 2009). Ghana recognizes the role that science and technology education play in the development of her environment, social life and the economy as a whole. This is why the first post-independent government committed considerable resources to the development of science and technology in the country by introducing science and technology in primary and secondary schools in the 1960s, establishing the University of Science and Technology (now KNUST) and the University College of Science Education (now the University of Cape Coast) to train scientists, engineers and science teachers.

Despite these investments, including spending about 35% of the total government recurrent budget on education, Ghana's economy continues to rely heavily on traditional agrarian practices, extractive industries and tourism after more than five decades of self-rule. The National Development Planning Commission (NDPC) noted in one of its reports that "majority of farmer's still use traditional methods of agriculture, hence the very slow improvement in crop yields over the years" (NDPC, 1994). The country continues to be a net exporter of raw materials for factories overseas.

It is observed that the level of scientific literacy among the youth who constitute about 44 percent of the total population in the country is very low; that of the adult population is even much lower. Available estimate indicates that less than 15% of Ghanaians aged 15 years and above are scientifically literate (Government of Ghana, 2003). Science and technology thus do not seem to have any influence on the lives of the majority of people (Anamuah-Mensah, 2004).

The present structure of Ghana's education system consists of 6years of primary education, 3years of Junior High School, 3years Senior High School and 4years University degree, 3years High National Diploma (HND) or courses at other tertiary institutions. The first 9years forms the basic education which is free and compulsory with science forming an integral part of the curriculum. The lower primary pupils study natural science while Integrated Science is learnt from the upper primary to Senior High School. The curriculum for the Senior High School has core subjects and elective subjects. Every student takes four core subjects: English language, Mathematics, Social Studies and Integrated Science (including Agriculture Science, Biology, Chemistry, Environmental studies and Physics). This implies that Agricultural Science which is an aspect of Science cannot be left out of the Ghanaian education system. Since agriculture is one of the backbones of many economies including Ghana, its teaching and learning in schools must be emphasized seriously. In this regard, education reforms in many countries including Ghana have been committed to make the issue of teacher and student quality and its development the cornerstone of the strategy to improve the quality of education and increase learning outcomes (Anamuah-Mensah, 2000).

The Senior High School Integrated Science consists of various subjects in the sciences put together with Agricultural Science being one of its components. The current state of teaching and learning of Agricultural Science aspect of the Integrated Science is a concern to all. Critical look at the current Integrated Science syllabus reveals that many of the basic Agricultural Science topics have been eliminated (Curriculum Research and Development Division [CDDR], 2010). Students at the Senior High Schools find the Agricultural Science aspect of the Integrated Science difficult and uninteresting. It is therefore important to look at those factors that militate against good performance of students in the Integrated Science subject of which the Agricultural Science forms a major component. It is against this background that this research was conducted to provide antidotes to the problem.

METHODOLOGY

Research Design

A descriptive research design was used. According to Creswell (2012), descriptive research design describes what exist with respect to variables or condition in a situation. Descriptive research design aims predominantly at describing, observing and documenting aspects of a situation as it naturally occurs rather than explaining them. It serves as a starting point for hypothesis generation or theory development. The design has advantage of producing good amount of responses from a wide range of people. In addition, it provides accurate picture of events and seeks to explain people's perception and behavior on the basis of data gathered at a point in time. Another reason why descriptive research design was used is that it has the potential to provide a lot more information from large sample of individuals (Tamakloe *et al.*, 2005).

Population

The population of the research was made up of Integrated Science teachers and students in selected Senior High Schools in the Ga South, Ga Central and Ga West municipalities of the Greater Accra region. Six schools were selected in the municipalities. The six schools consisted of three public Senior High Schools and three private Senior High Schools. In all, 150 students and 14 Integrated Science teachers took part in the study.

Sample and Sampling Procedure

Sampling is the process of selecting a number of individuals for a study in such a way that the individuals represent the larger portion of the group from which they were selected. The disproportional sampling technique was adopted in selecting student from both the public and private Senior High Schools. With this, a fixed number of thirty (30) students were randomly selected from each public school while twenty (20) students were also selected randomly from each private school by hand-pointing. More participants from the public schools were made to take part in the study

because the entire students' population of the public Senior High Schools was relatively higher than the private schools. Also, convenient sampling technique was adopted in selecting the teachers from the public Senior High Schools while the census sampling technique was adopted in selecting teachers from the private school because the Integrated Science teachers in the private schools were very few, hence all of them were made to take part in the study.

Research Instrument

Questionnaires were the instrument used to collect the information from respondents. Questionnaires were chosen because it is effective for securing information and employs less complicated and less time-consuming procedure of subject selection (Crawford, 1990). According to Gilham (2008), questionnaire provides firsthand information without relying on the report of others and also can offer data when respondents are unable and or unwilling to offer information.However, its use cannot study opinions or attitudes directly and cannot offer quantitative generalization of results (Foody 1994). Two sets of questionnaire were used for the study. One set for the Integrated Science teachers and the other set for the students. The design was guided, to a large extent, by the material acquired from the literature review and also in line with the research questions. The questionnaires comprised both close-ended and open-ended items. Most of the close-ended questions were made up a four-point Likert scale items of strongly disagree to strongly agree. Others also required the respondents to simply indicate Yes/No and True/False. Respondents were required to respond by ticking the appropriate column with respect to the close-ended questions and also to write their own responses in the case of the open ended questions.

Items on the questionnaire were arranged in accordance with the research questions that guided the study. Before the research, a pilot test of the questionnaires was done in one school which was not within the samples selected but in Greater Accra region and the results were used to correct some anomalies associated with the instrument.

Data Collection Procedure

The researcher applied to the Senior High Schools involved to be permitted to conduct the research.

The head master/mistress of the institution in the various schools, by approval introduced the researcher to the teachers and students and teachers concerned. The researcher followed up with the questionnaire administration. One set was given to teachers and another set to the students. All distributed questions were collected on same the same day. All questionnaire administered were successfully returned, hence the return rate was hundred percent. This was made possible because of the presence of the researcher and also due to the fact that the selected Senior High Schools were not on vacation hence teachers and students were available.

Data Analysis Procedure

Data analysis is a whole process which starts immediately after data collection and ends at the point of processing and interpretation of results. The raw data collected from the study were processed and analysed using computer-based Statistical Package for Social Sciences (SPSS) version 21.0 for windows based on the study objectives and the research questions. Tables were used to summarize the information obtained. Inferential statistics, succinctly the independent samples t-test as well as descriptive statistics such as frequencies, percentages, bar graph, pie chart as well as means and standard deviations were used in presenting the results of the data analysis. Statistical significance was tested at 5% significance level.

RESULTS AND DISCUSSION

Demographic Information

Section A of the teachers' questionnaires sought to obtain information on their demographic characteristics. This information includes information on their age, sex, place of teaching, academic qualification, professional qualification, area of specialization, and the number of years taught. The results of their responses are presented in Table 1, as well as in Figure 1, 2, and 3.

Table 1: Demographic Characteristics of Teachers

Demographic Characteristic	Frequency (N)	Percentage (%)
Age		
21-30	3	21.4
31-40	9	64.3
41-50	2	14.3
Sex		
Male	14	100
Female	-	-
School		
CMSHS	3	21.4
AMASTECH	3	21.4
ASSAS	2	14.3
PANK	2	14.3
NASEC	3	21.4
COSMOS	1	7.1
Number of Years Taught		
Below 3 years	2	14.3

3-6 years	2	14.3
7-10 years	4	28.6
Above 10 years	6	42.9

Source: field data, 2015

It is evident from the results in Table 1 that the Integrated Science teaching workforce of the Senior High Schools is dominated by young and energetic teachers. Hence, all other factors being held constant, it is expected that they will deliver.

Again, the results from Table 1 indicate that all the teachers 14(100%) were males. This is possibly due to the apparent apathy which females have for taking up science related programmes in our various institutions, hence the few number of females in various Science related fields including teaching. More females should, therefore, be encouraged to pursue science and other science related courses in Senior High School. This will, to a large extent help in dealing with the deficit regarding males to females ratio in science related occupations in the Ghana.

Additionally, the results show that teachers from the public Senior High Schools dominated the sample of teachers who took part in the study. This occurred principally because the public schools had a relatively larger number of Integrated Science teachers compared to the private schools. For example, only one teacher from Cosmos Senior High School took part in the study because the school had only one Integrated Science teacher at the time of the study. Similarly, Pank Senior High School and Apostle Sarfo School of Arts and Science (ASSAS) had only two representatives each because they also had only two Integrated Science teachers in the whole school.

In relation to the number of years taught, it was found that most of the teachers 10(71.4%) had taught for not less than 5 years, which could mean that they had acquired some level of experience.

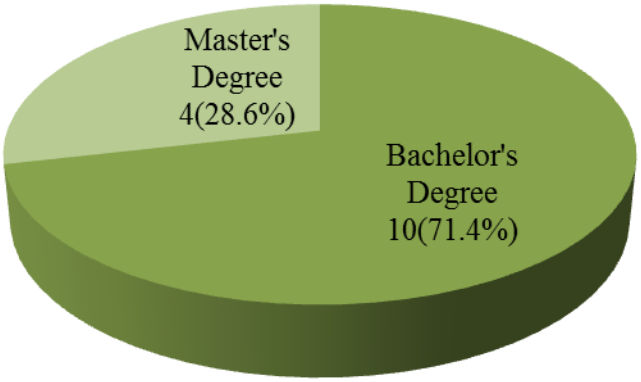

Figure 1: Academic Qualification of Teachers

The results from Figure 1 imply that the Integrated Science teaching workforce in the Senior High Schools is dominated by holders of Bachelor's Degree. This might have occurred partly due to the fact that a Bachelor's Degree is regarded as the ideal minimum academic qualification that one should possess to be qualified to teach at the Senior High School level in Ghana.

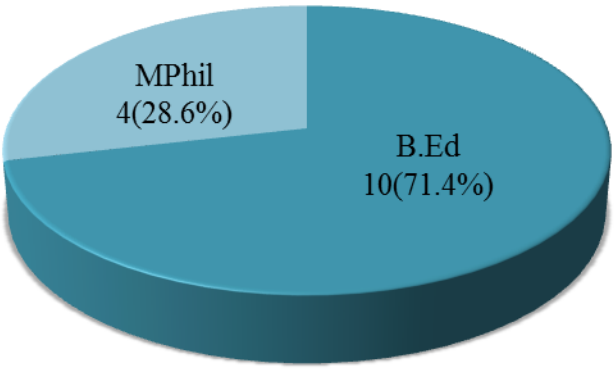

Figure 2: Professional Qualification of Teachers

The results from Figure 2 imply that majority of Integrated Science teaching workforce in the Senior High School have background in education, precisely teaching. Again, the results mean that the teachers are pretty aware of effective teaching principles hence, they stand in the position to deliver as professional teachers. This finding is contrary to an argument by (Ololube et al., (2008) who said that the falling educational standards can be attributed to the use of teachers who are unqualified for instructional purposes, including those with general education (academic) qualifications such as Bachelors of Science (B.Sc.), Bachelors of Arts (B.A), Master of Science (M.Sc.) and Masters of Arts (M.A) degrees without teaching qualifications.

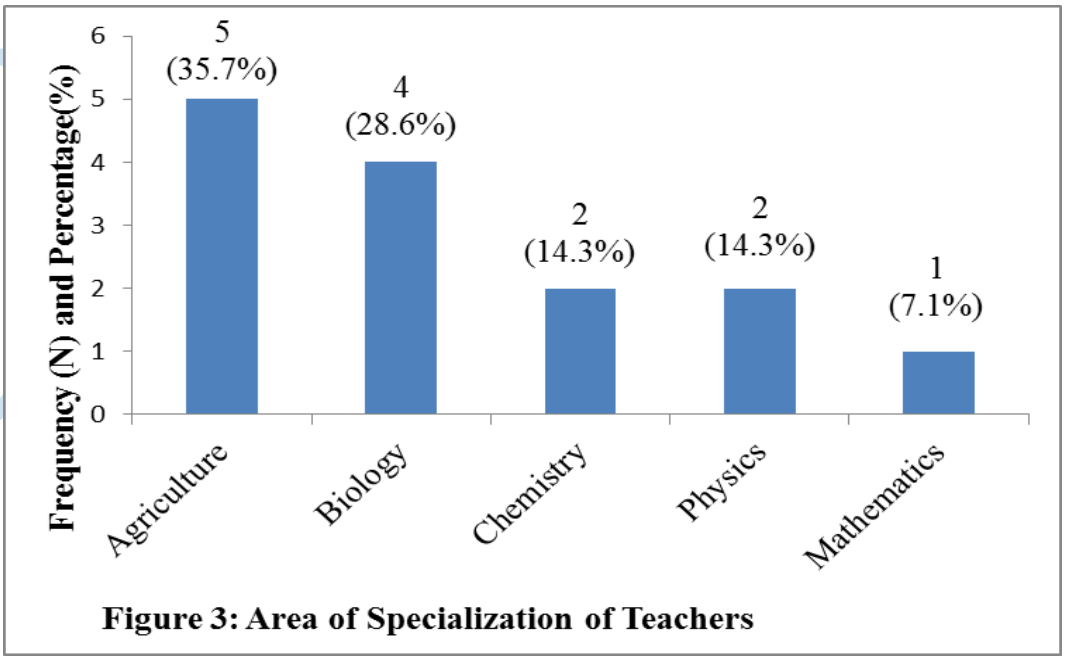

Figure 3: Area of Specialization of Teachers

Results from Figure 3 reveals that majority of the teachers 9(64.2%) who took part in the study did specialize in Agriculture Science, but in areas such as Biology, Chemistry, Physics, and Mathematics. The results imply that though there were holders of various degrees in education, they were not specially trained to teach Agricultural Science. In line of the results of this study, Ekwere (2014) posit that most of the teachers who teach Agricultural Science in the Senior High Schools are not real graduates of Agricultural Science education. They were not specifically trained to teach Agriculture

Science hence, they do not really know the boundaries and the skills involved in teaching. This situation, according to the author, hinders the effective teaching of Agricultural Science.

Research Question One: What level of interest do students show in learning the Agricultural Science aspect of Integrated Science?

Research question one sought to determine the level of students' interest in Agricultural Science as an aspect of Integrated Science. The results are presented in Table 2.

Table 2: Students' interest in Agricultural Science

Statements	YES		NO		TOTAL	
	No	%	No	%	No	%
Do you have interest in studying the Science aspect of Integrated Science?	137	91.3	13	8.7	150	100
Do you have a role model for studying ıral Science aspect of Integrated Science?	73	48.7	77	51.3	150	100
Do you find the various topics ience student, particularly those under Science interesting?	136	90.7	14	9.3	150	100
Do you have career ambition for grated Science, especially the Science aspect of it?	86	57.3	64	42.7	150	100

Source: field data, 2015

Results from Table 2, in effect, indicate that students at the Senior High Schools have high interest in learning the Agricultural Science aspect of Integrated Science. The results concur with a study conducted in Kenya by Njoroge and Orodho (2014) which showed that the Senior High School students had a positive attitude and interest towards the Agriculture Science subject.

However, the finding is contrary to that of a recent study conducted by Darko *et al.* (2015) which found that many students did not have interest in the Agricultural Science subject, primarily due to

their wrong perception about Agricultural Science. Additionally, the finding of the present study does not agree with the disconfirms finding of study conducted by Ekwere (2014) that students' perception towards the Agricultural Subject and Agriculture as an occupation.

The inconsistency between findings of this study and the other studies, especially that of Darko *et al.* (2015) could be due to the difference in the focus of both studies in terms of the scope of the study. Unlike the other studies, the present study focused on the Agricultural Science aspect of Integrated Science and not the actual Agricultural Science programme. According to Ester (2007), parental influence and job opportunities are among the major factors that influence students to pursue Agricultural Science at the Senior High School. Similarly, a study Fizer (2013) found that family and rewarding career were the major factors that influenced students' choice of Agricultural Science as a programme of study at the Senior High School level.

By implication, most students reading the actual Agricultural Science programme at the Senior High School may not necessarily have interest in the programme possibly due to the fact that they did not willingly choose to read the programme as they might have been, in one way or the other, influenced by their parents and career opportunities in their decision to pursue the programme.

Research Question Two: What is the level of students' knowledge in the Agricultural Science aspect of Integrated Science?

Research question two sought to determine the students' knowledge level in the Agricultural Science aspect of Integrated Science. Here, the respondents were presented with eleven basic questions on Agricultural Science of which they were required to indicate their agreement or otherwise to each of these eleven statements. Table 3 presents results on the students' responses to the statements that sought to determine their knowledge level in the Agricultural Science aspect of Integrated Science.

Table 3: Students' knowledge in Agricultural Science

Statements	TRUE		FALSE		TOTAL	
	No	%	No	%	No	%
Most of the farmers in Ghana engage in arming compared to subsistence farming.	106	70.7	44	29.3	150	100
Land tenure system refers to the land.	84	56.6	66	44.4	150	100
Subsistence farming is also known a arming.	92	61.3	58	38.7	150	100
Okra and beans are all nursed before into the field.	57	38.0	93	62	150	100
Leguminous plants area included in crop ld potassium to the soil.	107	71.3	43	28.7	150	100
Crops which are planted by seeds are er vegetative propagation.	99	66.0	51	43.0	150	100
Organic fertilizers are also known as	134	89.3	16	10.7	150	100
NPK stands for Nitrogen Potassium	104	89.3	46	30.7	150	100
Broadcasting is a method of fertilizer	118	78.7	32	21.3	150	100
Fingerling is a tool for catching or sh.	87	53.0	63	42.0	150	100
It is important to use LED bulbs in a e for day-old chicks because it saves cost.	80	53.3	70	46.7	150	100

Source: field data, 2015

Results from Table 3 show that the knowledge level of students with regard to the Agricultural Science aspect of Integrated Science is low. Out of the eleven basic questions that were asked to find out

degree of their knowledge in the Agricultural Science aspect of Integrated Science, majority of the students had only four of the questions correct. The findings of this study concur with an assertion by Adetaye (2008) that the performance of students in the Integrated Science subject is low. Also, Olasehinde and Olatoye (2014) revealed that students' attitude/interest regarding science accounted for just 0.7 percent, a figure which is not even up to one percent of the variance in their achievement in science. They further emphasized that in present study of the subject, students' interest towards Integrated Science, particularly the Agricultural Science aspect was found to be high; however their knowledge level in the subject was found to be low. Olasehinde and Olatoye (2014) reiterated that the non-performance of students in science was not because they did not have favourable scientific interest in or attitude towards Science, but there were other factors such as the teacher's method of teaching that hindered science achievement of the students.

According to Ampiah (2002), the teaching and learning of an applied science like Agricultural Science consists of learning facts and figures, rules, laws formulae, problem solving, understanding of basic scientific principles of concepts and explanation of concepts and observed phenomena. It is therefore of utmost significance for the teacher to use the appropriate pedagogy to bring to good understanding and learning of a particular learning task.

However, this study found that most of the teachers who participated in the study mainly use the lecture method in their teaching. A study conducted by Darko *et al.* (2015) within the Cape Coast Metropolis revealed frequent use of lecture method, principally with the aim of completing the syllabus was of the major challenges impeding the teaching and learning of Agriculture Science in the Senior High Schools. The lecture method has been shown to be ineffective in engaging learner's positive attitude, in developing the conceptual understanding of the subject. This is probably why the problem of poor achievement in science subjects still persists.Moreover, according to Nneji (1997), the traditional talk and chalk method, thus the lecture method most widely used in schools including the Senior High School is wasteful and unproductive, particularly with slow and average learners.

(Costello, 2001), also posits that the lecture method is ineffective as turns the learners into passive participants in the learning process though it is useful in covering large content.

Omrod (2008) contends that some students seem to learn better when information is presented through words (verbal learners), whereas others seem to learn better when it is presented in the form of pictures (visual learners). Therefore, in a class where only one instructional method is employed, there is a strong possibility that a number of students will find the learning environment less optimal and this could affect their academic performance. However, Agyei (2010) contend that teachers of science related subjects mostly adopt the expository method of teaching that induces rote learning ("chew and pour"), where students only learn to pass their exams and forget what they have learned soon afterwards. The author, therefore, recommends discussions, project, and discovery methods of teaching. To him, these methods provide an enabling environment for the learners and ensure that individual differences are taken care of.

Research Question Three: Is there statistically significant difference in students' knowledge of Agricultural Science between those who are taught Integrated Science by one teacher and those who are taught by two or more teachers?

Having determined the knowledge level of students in relation to the Agricultural Science aspect of the Integrated Science subject, the researcher sought to investigate whether or not there exists a statistically significant difference in the knowledge level of students in Agricultural Science between those who are taught Integrated Science by a single teacher and those who are taught by two or more teachers. The independent samples t-test was adopted for this test as the groups of interest were only two. Significance of the difference was tested at 95% (0.05 level of significance) confidence interval. The results of the analysis are presented in Table 4.

Table 4: Differences in students' knowledge of Agricultural Science between those who are taught Integrated Science by a single teacher and those who taught by two or more teachers

Item	Mode of	Freq.	Mean	Std.	t	df	Sig.	(2-
Knowledge	One teacher	50	5.80	1.818	1.103	148	.278	
	Two or s	100	5.46	1.761				

*Significant, p < 0.05

The results from Table 4 indicate that the mean score for those who are taught Integrated Science by a single teacher (M= 5.80) was higher than those who are taught by two or more teachers (M=5.46). However, the difference observed was not statistically significant at 0.05 level of significance; t (148) = 1.103, p= 0.278 two tailed. In other words, the knowledge level in Agricultural Science of students who are taught by a single teacher and those who are taught by two or more teachers were largely the same. The results imply that students' knowledge in the Agriculture Science aspect of Integrated Science is not influenced by the number of teachers who handle a given class for Integrated Science. The result is in agreement with an assertion by Olasehinde and Olatoye (2014) that there may be other factors that influence students' knowledge in Agriculture Science.

Research Question Four: To what extent is practical work in Agriculture performed in the Senior High School?

Research question four sought to establish the extent to which practical work in Agricultural Science is performed in the Senior High School. To determine the direction of the various responses as indicated by the respondents, the possible responses to each statement were rated as follows: Strongly Disagree=1, Disagree = 2, Agree = 3 and Strongly Agree = 4. The measure of linearity of this scale revealed a Mean (cut-point) of 2.5. Therefore, any mean score less than 2.5 denoted that the majority

of the respondents disagreed to the item while any mean score equal to or greater than 2.5 denoted that the majority of the respondents agreed to the item. The outcome of the respondents' responses is presented in table 5.

Table 5: The extent to which practical work in Agriculture is performed in the Senior High School

Statements	Mean	Std.
Practical lessons in Agricultural Science are frequently ı your school.	2.44	.327
My school has a well-equipped laboratory for practical ıce related subjects such as agricultural Science.	2.14	.134
My school has a garden for agricultural Science	1.73	.046
My school plants crops like cereals, legumes, root and rops, vegetables, ornamental plants, etc.	1.92	.132
My school has an animal farm.	1.65	.079
My school's prospectus requires every student to bring ɛe cutlass and hoe to school.	3.19	.461
My teachers sometimes use audio, audio-visual and ıids in their teaching.	2.58	.267
My school has adequate teaching and learning resources work in Agriculture.	2.00	.502
My school usually visits commercial farms for practical ɡricultural Science.	1.78	.211

Source: field data, 2015

The results from Table 5 reveal that the extent to which practical work in Agricultural Science is performed in the Senior High School is low. This situation might have contributed, in part, to the students' low performance in Agricultural Science. Greene (1980) contends that for Agriculture to make its maximum contribution to the educational and well-being of the child and society, agricultural programmes must be more practical than theoretical. Similarly, Itodo, (2004) is of the view that

practical work facilitates the process of acquisition of basic knowledge and practical skills that prepares students for occupation in agriculture. Exposing and involving learners to various practical tasks and projects will help them develop the necessary skills, understanding, and abilities required in agricultural production (Njoroge & Orodho, 2014).

According to Darko *et al.* (2015), effective teaching and learning of Agricultural Science calls for adequate practical work on the field. However, the authors indicated that the practical aspect is often neglected due to an erroneous perception of students that practical work in agriculture is a form of punishment as well as laziness on the part of both students and teachers. From Table 5, majority of the students disagreed to the statements that practical lessons in Agricultural Science are frequently carried out in their school. The finding is in line with an assertion by Stamper (1993) that some teachers regard the practical aspect side of Agricultural Science as tiresome because it usually requires more preparation than the purely oral lesson. Similarly, Abdulahi (2007), and Ogbeba (2010) have observed that most teachers place emphasis on theory rather than practical aspects of Science subjects while most of them also lack adequate knowledge of the subject matter and the competency to deliver.

Also, the results from Table 5 show that the majority of the Senior High Schools do not have following: a well-equipped laboratory for practical; school farm animal farm; adequate teaching and learning resources for practical work in Agricultural Science. In addition to these challenges, the students are not made to visit commercial farms for practical lessons in Agricultural Science. According to Thall (1986), field trips should constantly be organized for students because such situations allow students not only to use some of the ideas or methods that have been discussed in class, but also to understand some practical aspects of Agricultural Science.Also, a case study conducted by Adessiyun (2009) showed that students are not learning Integrated Science by experimentation since most of the Integrated Science lessons are presented theoretically. This state of affairs was attributed to a severe lack of equipment, material, or even laboratory. Adeife (2013) also noted that lack of adequate teaching materials and equipment resulted in schools graduating pupils

with poor quality, devoid of enough vocational and job skills as well as ability to solve practical problems. In addition, Lu et al., (2010) are of the view that study trips provide sound and concrete basis for conceptualization, first-hand learning experiences, opportunity to improve social relationships among students and between students and teachers, and make learning more meaningful and lasting.

Notwithstanding the aforementioned findings which suggest low level of practical Agricultural activities at the Senior High School, majority of them revealed that their teachers sometimes use audio, audio-visual and other visual aids in their teaching. Teachers may purchase or construct their own devices to aid them in drawing or placing information on a chalkboard. Makgato (2007) advises that considering the fact that Science subjects, especially Agriculture Science is practical orientated, learners need to be given the opportunity to undertake practical sessions and experiments.

Research Question 5: What factors do teachers and students perceive as militating against quality of teaching and learning of Integrated Science at the Senior High School?

Research question five sought to determine the major factors that both teachers and students perceive as challenges associated with the teaching and learning of Integrated Science at the Senior High School. Just as it was done under research question four, the various possible responses to each statement were rated as follows: Strongly Disagree = 1, Disagree = 2, Agree = 3 and Strongly Agree = 4. The measure of linearity of this scale revealed a Mean (cut-point) of 2.5. Therefore, any mean score less than 2.5 denoted that the majority of the respondents disagreed to the item while any mean score equal to or greater than 2.5 denoted that the majority of the respondents agreed to the item. The outcome of both the teachers' and students' responses is presented in table 6.

Table 6: Challenges associated with the study of Integrated Science in the Senior High School

Statements	Category of	Mean	Std.
Integrated Science teachers in this go regular in-service training.	Teachers	2.43	0.016
	Students	2.22	0.989
This school has a library which is well- Integrated Science books.	Teachers	2.39	0.852
	Students	2.28	0.879
This school has adequate number of :ience teachers.	Teachers	2.58	0.716
	Students	2.56	0.479
Some of the Integrated Science books ıkes.	Teachers	2.71	0.825
	Students	2.57	0.951
Students are sometimes asked to own notes with regard to Integrated	Teachers	2.71	0.469
	Students	3.27	0.757
Integrated Science teachers in this e lecture method because it helps to ɔf the content.	Teachers	3.51	0.012
	Students	2.81	0.984
The total time allocated for the teaching Science in your school is adequate.	Teachers	2.42	0.014
	Students	2.01	0.022
Different teachers teaching the various :egrated Science sometimes confuse	Teachers	2.51	1.05
	Students	3.34	0.001
Integrated Science lesson are affected ɔsenteeism and lateness.	Teachers	2.59	0.994
	Students	2.62	0.755
Sometimes teachers find it difficult in ain topics outside their area of ı.	Teachers	3.10	1.002
	Students	3.45	0.034

When different teachers teach the cts, it leads to repetition of some topics.	Teachers	2.56	1.067
	Students	2.59	0.085
When students are taught by different y exhibit seriousness in some aspects uring examination.	Teachers	3.20	0.034
	Students	3.14	0.772
Students' performance in Integrated ly depends on the teacher's attitude, mitment to teaching.	Teachers	2.48	0.049
	Students	3.21	0.879
Integrated Science teachers adopt the od because it helps the class to cover content	Teachers	2.84	0.008
	Students	2.79	0.098

Source: field data, 2015

Results from Table 6 indicate that the teaching and learning of Integrated Science at the Senior High Schools is hindered by a number of challenges from both the point of view of teachers and students. The challenges include inadequate in-service training for Integrated Science teachers; inadequate Integrated Science textbooks in the school's library; inadequate time allocation for the teaching of Integrated Science; mistakes in most of the students' personal Integrated Science textbooks; students being asked to prepare their own notes; frequent use of the lecture method with the aim of covering much content; confusion as a result of different teachers teaching the various aspects of the subject; teachers' difficulty in teaching certain topics outside their area of specialization; and teacher absenteeism and lateness to class among others.

Greene (1980) pointed out that some teachers have resigned themselves to going over the same ideas in the same way year after year while they should endeavor to keep pace with current trends in agriculture by attending conferences and continually revising their teaching. Pullan (1993) also posits that the lecture method permits rapid coverage of materials. Nonetheless, the lecture method is a one-

way mode of communication which does not provide room for any proper active interaction between teachers and students (Pullan, 1993

According to Olaitan & Ajala (2007), the provision of adequate resources for teaching and learning agriculture in Senior High Schools constitute and remains a serious problem. Also, a case study conducted by Adessiyun (2009) in Nigeria showed that inadequate time allocated to the teaching and learning of Integrated Science; poor instructional methodology that does not actively involve students in the teaching and learning process such as the lecture method; inadequate in-service training for teachers; inadequate Integrated Science textbooks and laboratory equipment as well as teachers whose training background is not directly linked to Integrated Science were the factors that were found to militate against the effective teaching and learning of Integrated Science in the schools studied.

According to Ammani and Ogunyinka (2011), majority of Senior High Schools lack the needed teaching materials, tools and equipment for the effective teaching and learning of Agricultural Science. Similarly, findings of the study by Darko *et al*. (2015) showed that that frequent use of lecture method in teaching; inadequate teaching and learning materials; difficulty in planning field trips as well as laziness and truancy on the part of teachers were the major challenges facing the teaching and learning of Agricultural Science in the Senior High Schools.

Another study conducted by Mbugua *et al.* (2012) revealed that under staffing, inadequate teaching/learning resources, lack of motivation and poor attitudes by both teachers and students were the main factors contributing to the students' poor performance in Integrated Science. However, understaffing was not seen as a challenge in the present study. With respect to the problem of teacher absenteeism and lateness to class, Koomson et al. (1999) have indicated that about 50% of the instructional time on the average is wasted due to several factors which include late starting of schools and absenteeism on the part of teachers and students. This has reduced instructional time and has resulted in low academic achievement. Also, Darko *et al*. (2015) posit that teachers' lateness and

absenteeism appear to be among the factors that impede the effective teaching many subjects including Agricultural Science. A survey conducted by Mbajiorgu *et al.* (2014) revealed that the Agricultural Science teacher's poor attendance to classes was one of factors that impeded the effective teaching and learning at the schools.

Notwithstanding the aforementioned challenges, majority of both the teachers and students agreed respectively that their school has adequate number of Integrated Science teachers. During the study, it was found each of the public schools had at least three Integrated Science teachers while the private school had at most two Integrated Science teachers. However, the class sizes of the private school were found to be relatively small, each not exceeding thirty-five students. This situation might have probably informed both the teachers' and the students' assertion that they have adequate number of Integrated Science teachers.

Conclusions

- Adequate time should be allocated to the teaching and learning of Integrated Science on the schools' time table. This will help teachers to take their time when teaching to enhance students' understanding.

- Integrated Science teachers should be encouraged to adopt more interactive teaching methods like discussion and role play as these styles help students to get more involved in the teaching and learning process compared the lecture method. The lecture usually causes students to be pretty passive in the teaching and learning process, a situation which does not really promote students' understanding. Additionally, the teachers should be encouraged to employ audio, audio-visual, and visual aids like projectors, posters, and pictures in their teaching to enable students have practical knowledge of the various theoretical concepts that they are taught in the classroom.

- The government, Parents Teachers Association (PTA) and other stakeholders should help in providing the needed resources such as textbooks and other tools and instruments that are needed for the effective teaching and learning of Agriculture Science and Integrated Science as a whole.

- Tertiary institutions of education should specially design academic programmes that will solely train Integrated Science teachers for the various Senior High Schools in the country. This will help in curbing the confusing that normally arises due to different teachers with varied backgrounds teaching the subject.

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