APPRAISAL OF BIOLOGY TEACHERS' PRACTICES IN ORGANISING PRACTICAL WORK IN SECOND CYCLE INSTITUTIONS IN EASTERN REGION, GHANA

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ABSTRACT

The study examined Biology teachers' practices in organising practical work in Second Cycle Institutions in Eastern Region of Ghana. A descriptive survey research design was employed for the study. A stratified simple random sampling technique was employed to select 80 Biology teachers with at least three years teaching experience from 20 district capital schools and 18 outside district capital schools. A closed - ended questionnaire was used to collect quantitative data while observation protocol and document analysis were used to collect qualitative data. Descriptive and inferential statistics were used to analyse the data. The study revealed that Biology teachers exhibited good practices in organising practical work. Statistically, in-service training contributed 15.6 % to Biology teachers practices in organising practical work ($r = -0.156$, $p < 0.01$). Teachers organised an average of two practical lessons per month with adequate provision of appropriate materials and supervision. In addition, teachers improvised where materials for organising practical work was not available. However, teachers never allowed students to perform practical work in groups; never followed procedures outlined in the Ghanaian Senior High School Biology syllabus and they never planned fieldtrips to enable their students observe organisms in their habitats. Also, students' disregarded biological drawing rules in most of their drawings and never designed their own experiments during practical lessons. It is recommended that Biology teachers in Second Cycle Institutions in Eastern Region of Ghana should organise practical work at least once a week and follow procedures outlined in the Biology syllabus to help improve students practical work performance in West African Senior High School Certificate Examinations.

Keywords: Biology Teachers, Demographic Factors, Laboratory, Practices, Practical Work, School.

INTRODUCTION

The main feature of science education that sets it apart from other school subjects is that it involves practical work in which the students manipulate and observe real objects and materials (Abrahams & Millar, 2008). Studies in science education worldwide have also recognised that practical work plays a central role in the teaching and learning of science at different levels of educational system (Motlhabane & Dibacha, 2013; Danmole, 2012; Cossa, Holtman, Ogunniyi & Mikalsen, 2008; Al – Naqbi & Tairab, 2005). Practical work is considered as hands – on learning experience, which prompts thinking about the world in which we live (Science Community Representing Education, 2008). According to Mashita, Norita and Zurida (2009), practical work creates exceptional learning surrounding that helps students to construct their

knowledge, enhance logical, inquiry and psychomotor skills. Also, practical work offers an interactive experience to students where they can broaden their scope of constructivism learning (Umar, Ubramaniam & Ukherjee, 2005) and provides opportunities for students to actually do science as opposed to learning science.

Practical work in Biology helps students understand biological concepts better (Mwangu & Sibanda, 2017). Similarly, Gott and Duggan (2009) assert that students understand natural phenomena better when science teachers give students opportunities to engage with and fully participate in practical work. According to Gecer and Zengin (2015), during practical activities students learn Biology more effectively and discover basic concepts, principles and laws. In addition, practical work offers an essential opportunity for students to link first-hand experience with scientific concepts and ideas (Cossa, 2007). The Ghanaian Senior High School Biology curriculum is designed to guide and inculcate in the learner skills of observation, measurement, formulation hypothesis, predication, designing, investigation, recording and interpretation of data, drawing conclusions and communicating them (Curriculum Research and Development Division, 2011). It provides the learner with the necessary tools for employment in laboratory, industry, agriculture, forestry, health care, administration and teaching. Furthermore, it equips the learner for further studies and research in pure and applied science and technology that are vital areas for the advancement of society and make the leaner capable of critical thinking, making meaningful decisions and solving problems. It is also emphasised that the teaching of Biology should be student-centred and activity oriented where the teacher acts as a facilitator (Na'Omi, 2013). Biology teachers with good practical work practices are therefore needed to achieve the set objectives of the Senior High School Biology syllabus in Ghana.

The effectiveness of Biology practical activity depends on the practical knowledge level, skills and the ability of the Biology teacher to organise practical work (Copriady, 2015). Notwithstanding, Biology teachers demographic variables such as sex, academic qualification, area of specialisation, years of teaching experince and professional status also affect their practices in organising practical work. Similarly, Biology teachers demographic factors also affect students academic achievements in Biology practical examiantion. A study carried out by Akiri and Ugborugbo (2008) to examine the influence of gender on the productivity of secondary school teachers in Delta State, Nigeria showed that male teachers were productive than their female counterparts. Huang and Moon (2009) showed that teacher qualification accounted for approximately 40 to 60 % of students academic achievements in science. Also, studies have proven that advaced academic degrees have positive effect on students performance (Maundu, 1986; Rice, 2003; Wayne & Youngs, 2003). Experienced Biology teachers have richer background of experience to draw from and can contribute to their practical work practices (Kosgei, Mise, Odera & Ayugi, 2013). Gibbons, Kimmel and O'shea (1997) showed that teachers with more years of teaching experience made students had higher academic achievments than teachers with less years of teaching experience.

In-service training is another important factor that can impact Biology teachers practices in organising practical work. It is generally believed that with the implementation of certain in – service training programs, teachers professional skills, knowledge and experience in organinsing practical work can be significantlly improved. Cossa and Uamusse (2015) found that teachers' improved their understanding of the importance of using practical work to teach Biology after attending an in-service program. A study carried out by Ahmed, Sarwar and Junejo (2017) in assessing the impact of in- service training on the performance of teachers revealed that in – service training positively impacted their perfomance. Similarly, Somer and

Sokorava (2002) showed that in-service training had a positive impact on teachers' practices. This suggests that the impact of Biology teachers demographic factors on their practices in organising practial work cannot be undermined.

Effective implementation of Biology practical activities in many developing countries including Ghana is a general problem as there are so many constraints (Cossa & Uamusse, 2015). Some of these constriants include the inexistence of adequate conditions and availability of equipment and laboratory materials, including financial resources, to teach practical Biology, poor preparation of teachers, poor implementation of practical procedures, overwhelming activities demanded by the curriculum and bad practical work practices teachers exhibit when organising practical work (Cossa &Uamusse, 2015; Motlhabane, 2013). Mwangu and Sibanda (2017) posit that unavailability of science teachers in schools, lack of materials, lack of funds and time have constrained the teaching of Biology practical lessons. Consequently, many students fail to perform well in Biology. The constriants encounted by Biology teachers when organising practical work make them either neglect or place less emphasis on the practical skills development aspect of learning Biology (Cossa & Uamusse, 2015). Bello (2015) posits that lack of in-service training for Biology teachers is one of the main reasons for few and poor practical activities carried out in schools by Biology teachers. Hinneh (2017) asserts that the poor quality of practical work carried out in Biology classrooms leads students to develop undesirable attitudes toward practical work.

The performance of students in West African Senior School Certificate Examinations (WASSCE) in Biology practical is not encouraging, even though, Ghana is said to be the first independent sub-Saharan African country to embark on a comprehensive drive to promote science education and the application of science in industrial and social development (Anamuah-Mensah, 1999). The performance of students who wrote the May/June West African Senior School Certificate Examination (WASSCE) Biology paper 2 (practical), improved in 2015 and 2016, declined significantly in 2017 and improved slightly in 2018 with raw mean performance scores of (29.0 ± 8.2), (31.0 ± 11.7), (24.0 ± 9.2) and (27.0 ± 10.3) respectively (WAEC Chief Examiner's Report, 2015; 2016; 2017; 2018). WAEC Chief Examiner's Reports (2017; 2018) on Biology practical stated that candidate's inability to spell technical terms correctly, answer questions on adaptation and to relate structure with functions of specimens made students lose huge marks. In addition, poor drawing of specimens, drawing specimens without adding magnification, inability to title drawings and labeling with guidelines that are not ruled were captured in the WAEC Chief Examiner's Reports for 2017 and 2018.

Practical work need to be carried out during Biology content lessons to change students' perception and improve on their academic work. However, the situation in most schools in many developing countries including Ghana is different. Teachers lack exposure to science process skills to carry out activities in class (Rose, Saltar, Azlin, Zarina & Lyndon, 2013). As a result, teachers try avoiding the practical work in the laboratory and do not understand the importance of laboratory experiments. The findings of a research work carried out by Ghartey, Tufour and Gadzekpo (2004) on teachers view on the role of science practical activities in the teaching of science in Ghanaian Senior High Schools was that little emphasis was placed on the use of science practical work to develop students' cognitive skills. A study conducted by Mwangu and Sibansa (2017) revealed that the planning of Biology practical work by most teachers, lacked details and in some cases the objectives of the practical activity were poorly defined. Furthermore, Leach and Paulsen (1999) reviewed the use of practical work in science education in different countries and found out that the bulk of science assessment including

Biology was traditionally non-practical. These shortfalls may be common in Ghanaian Biology classrooms and may account for the poor performance of students in the West African Senior School Certificate Examinations. A search of available literature did not reveal any study on Biology teachers' practices in organising practical work in Second Cycle Institutions in Eastern Region of Ghana. This study was designed to fill the gap. This study examined Biology teachers' practices in organising practical work in Second Cycle Institutions in Eastern Region of Ghana. Specifically, the study sought to assess Biology teachers' practices in organising practical work in the Eastern Region of Ghana. It also sought to assess the influence of Biology teachers' demographic factors on their practices in organising practical work in Second Cycle Institutions in Eastern Region of Ghana.
The following questions were posed to guide the study:

1. What practices do Biology teachers exhibit when organising practical work in Second Cycle Institutions in Eastern Region of Ghana?
2. Does Biology teachers' age, sex, years of teaching experience, academic qualification, professional status, in–service training influence their practices in organising practical in Second Cycle Institutions in Eastern Region of Ghana?

The null hypothesis that guided the study was:
Ho 1**:** Biology teachers' age, sex, years of teaching experience, academic qualification, professional status, in-service training have no influence on their practices in organising practical work in Second Cycle Institutions in Eastern Region of Ghana.

METHODOLOGY

Research design

The study was carried out in 78 public Second Cycle Institutions in the Eastern Region of Ghana. Out of the 78 schools, 40 were located in the district capitals whiles 38 were outside the district capitals. A descriptive survey research design was employed for the study. This research design was used because it provided information useful to the solution of problems. Furthermore, it employed scientific method by critically analysing and examining the source materials, by analysing and interpreting data, and arriving at generalisation and prediction (Salaria, 2012). Descriptive survey data test hypotheses or answer research questions concerning the current object of study (Gay, 1987). Babbie (2001) recommended the descriptive survey for the purposes of generalising from a sample of a population so that references can be made about some characteristics, attributes or behaviour of the population.

Sample and sampling technique

A stratified simple random sampling technique was employed to select 80 Biology teachers with at least three years of teaching experience from 20 district capitals schools and 18 outside district capital schools. Stratified random sampling ensures each item has an equal or known opportunity of being selected (Yeboah 2010). The Biology teachers in the selected schools formed the study sample. The sample consists of 57 males and 23 females. Forty eight percent of Senior High School Biology teachers in the Eastern Region of Ghana were randomly selected for the study. Since Patton (2002) argues that 30% of the target population is enough in a descriptive survey study, the number of Biology teachers used for the study is justified.

Research Instruments

A closed-ended questionnaire was used to collect quantitative data whilst observation protocol and document analysis were used to collect qualitative data respectively. The questionnaire consisted of two sections. Section A and B. Section A was made up of eight items that collected information on respondents' demographic characteristics which included gender, age, years of teaching experience, academic qualification, professional qualification, area of specialisation and in-service training. Section B contained 17 items and elicited information on Biology teacher's practices in organising practical work. The 17 items were adapted from instruments developed by Khatoon, Alam, Bukhari and Mushtaq (2014). All the items in section B were closed-ended and of the five-point Likert type scale. Robson (2002) reiterates that Likert-scale looks interesting to respondents and people enjoy completing a scale of this kind. Neuman (2000) on the other hand, considers the simplicity and ease of use of the Likert scale as its real strength. Five-point Likert scale was adapted because studies on the use of Likert scale indicated that reliability increases up to 5 categories, beyond which no further substantial gains are made (Preston & Colman, 1999). According to Likert (1932), respondents usually avoid choosing the "extremes" options on the scale, because of the negative implications involved with "extremists", even if an extreme choice would be the most accurate. The respondents were asked to indicate the intensity of their responses to each of the items on the five-point Likert scale. Positive statements were scored as follows: strongly agree (5), agree (4), neutral (3), disagree (2) and strongly disagree (1). However, negative statements were scored as follows: strongly agree (1), agree (2), neutral (3), disagree (4) and strongly disagree (5). Reverse order of scoring was important for reducing respondents' bias. It was to counteract the tendency for respondents who without much thought, would give the same answer to all questions (Gay, 1987). The lesson observation protocol consisted of ten items, which collected information on how practical activities were set up for students, the equipment and materials used, procedures used and how the practical activities were supervised. The observation protocol was used to determine whether the respondents expressed views in the questionnaire were consistent with their practices and to examine what goes on in the laboratory during practical work.

Instrument validity and reliability

The instruments were reviewed by experts in science education at Department of Integrated Science Education, University of Education, Winneba to ensure their face and content validity after which they were pre- tested in 10 Second Cycle Institutions in the Greater Accra Region of Ghana to estimate their reliabilities. The items of the questionnaire were subjected to item analysis in order to identify those whose removal or modification would enhance the internal consistency of the instruments (Onwoioduokit, 2000). The Statistical Package for Social Sciences (SPSS) was used to determine the Cronbach alpha coefficient value for the questionnaire, which was found to be 0.79. According to Leech, Barrett and Morgan (2005), Cronbach alpha coefficient value of 0.70 and above indicates a reasonable internal consistency and that alpha value between 0.60 and 0.69 indicate minimal adequate reliability. According to Ary, Jacobs and Razavieh (2002), where results are used to make decisions about a group, reliability coefficient of 0.50 to 0.60 is acceptable. The questionnaire items were therefore reliable as the Cronbach alpha coefficient value was above 0.70. To determine the reliability of the observation protocol, experts observed practical lessons in Second Cycle Institutions in the Greater Accra Region of Ghana using the observation protocol. The Cohen's kappa coefficient value, depicting inter-rater reliability of the observation protocol was determined using Statistical Package for Social Sciences. A Cohen's kappa coefficient value of 0.77 was

obtained. According to Multon and Coleman (2018), observation data with an inter-rater reliability of 0.7 or 70% is considered reliable. This implies that the observation protocol was reliable.

Data collection procedure

Permission was obtained from heads of Second Cycle Institutions in Eastern Region of Ghana to carry out the study. The questionnaires were administered to 80 Biology teachers with at least three years of teaching experience from 20 district capital schools and 18 outside district capital schools. Well-trained research scientists from the Department of Science Education administered the questionnaires directly to the respondents. The research scientists explained the purpose of the study and any part of the questionnaire that posed problem to the respondents. All the respondents were assured that the information they will provide would be confidential. Each respondent was given adequate time to complete the questionnaire. The questionnaire was completed and collected the same day and 100% return rate was achieved. A sub-sample of two teachers, one from a school in the district capital and the other from an outside district capital school were used for the second phase of the research. An 80 minutes practical lesson each was observed using the observation protocol or checklist. The purpose of selecting two teachers was that the analysis of the quantitative data revealed similar responses by teachers and exhibited possible common behaviour during practical lesson. The observation protocol was used to confirm the quantitative information provided by respondents' with regards to their practices in organising practical work. During the practical lesson, every observable behaviour (verbal and non-verbal) of the teachers were ticked (√). The researchers were non-participant observers. Notes were also taken during the lesson to take care of relevant issues not covered by the observation schedule, such as the topic and objectives for the lesson, list of materials and equipment used in each observed lesson. Notes were taken on the nature of laboratory activities and the involvement of students in these activities. Documents related to the study were thoroughly examined. The documents included students' practical notebooks, teacher's lesson notes, Biology syllabus and WAEC Chief Examiners' reports. The students practical notebooks were examined to find out the type of practical activities students had undertaken, frequency of practical work and their relationship to the Biology syllabus, and how teachers made use of WAEC Chief Examiners' reports.

Data analysis

The participant's responses of the questionnaire were entered into Statistical Package for Social Sciences (SPSS) version 20 software for analysis. To ease interpretation, strongly agree and agree responses by participants were considered as agree whilst strongly disagree and disagree were considered as disagree. The descriptive function of the SPPS was used to organise the data into frequency counts, percentages and mean scores. A mean score above 3 was considered good practice whilst mean score below 3 was considered bad practice. A mean score of 3 was considered as neutral. Pearson product moment correlation was used to determine the relationship between Biology teachers' demographic factors on their practices in organising practical work. Data collected using observation protocol was analysed using frequency count and percentages. Documents related to the study were analysed descriptively to answer the research questions.

RESULTS

Biology teachers' sex, age, years of experience, academic qualification, area of specialisation, professional status and in – service training affect the outcome of practical lessons organised by teachers. Table 1 presents the demographic information of respondents in the study area.

Table 1. Demographic information of Biology teachers (N= 80)

Variation		Number of respondents	Percentage (%)
Sex	Male	57	71
	Female	23	29
Age	26 – 30	15	19
	Above 30	65	71
Years of teaching experience	3 – 5	32	40.0
	6 – 8	20	25.0
	9 – 11	9	11.0
	12 – 14	5	6.0
	Above 14	14	18.0
Academic qualification	First degree	71	89.0
	Second degree	9	11.0
Professional status	Professional	72	90.0
	Non professional	8	10.0
Areas of specialisation	Biology	60	75.0
	Chemistry	1	2.0
	Biology and Chemistry	5	6.0
	All the three sciences	5	6.0
	Others	9	11.0
In-service training status	Yes	56	70.0
	No	24	30.0
In–service training organisers	GAST	34	42.0
	GES	12	15.0
	GAST and GES	10	13.0
	None	24	30.0

*GES = Ghana Education Service; GAST = Ghana Association of Science Teachers

From Table 1, the number of male Biology teachers (71 %) in the study area was significantly higher than their female counterparts (29 %). The age group of the respondents varied between 26 and 30 years and above. Majority of the respondents (81 %) were above 30 years of age. The years of teaching experience ranged from 3 to 14 years and above with 40 % respondents having 3 to 5 years of teaching experience. Some respondents (6 %) have 12 to 14 years of teaching experience. The professional Biology teachers (90 %) were significantly higher than the non-professional Biology teachers (10 %). It was found that majority of respondents (89 %) had first degree in Biology and other disciplines. Teachers with specialisation in Biology constituted 75 % while few (6 %) had specialities in both Biology and Chemistry. Few respondents (11 %) had specialities in disciplines such as Agricultural Science, Environmental Studies and Health Physical Education Recreation and Sports. Biology teachers who received in–service training were 40 % more than those who never had in – service training. However, the respondents (42 %) who had in – service training from Ghana Association of Science Teachers (GAST) were more than respondents (15 %) who obtained their in- service training from Ghana Education Service (GES).

Table 2 presents Biology teachers' practices in organising practical work.

Table 2. Biology teachers' practices in organising practical work (N= 80)

S/N	Statement	A	N	D	Mean	SD
1	I supervise what students do during practical work	79 (99 %)	1 (1%)	0	4.58	0.57
2	At school, I teach the theory before students perform the practical work	75 (94 %)	4 (5%)	1(1 %)	4.37	0.64
3	I allow students to work in groups during practical lessons	76 (95 %)	3 (4%)	1 (1 %)	4.39	0.62
4	I give students immediate feedback when they need directions to proceed.	73 (91.5%)	5 (6 %)	2 (2.5 %)	4.31	0.71
5	The theory lessons are not related to the practical work	7 (9 %)	4 (5%)	69 (86 %)	3.34	0.80
6	I organise group work because there are enough equipment and materials	58 (73 %)	9 (11%)	13 (26 %)	3.10	0.86
7	I do not go round to supervise students during practical work	1 (1 %)	0	79 (99 %)	4.58	0.57
8	I provide the appropriate equipment/materials for Biology practical work	73 (91 %)	6 (8%)	1 (1 %)	4.31	0.70
9	Students perform Biology practical work in the school laboratory without any guidance	1 (1 %)	2 (2.5%)	77 (96.5 %)	4.40	0.62
10	There are no equipment/ materials in the laboratory so I do not organise Biology practical work	1 (1 %)	4 (5%)	75 (94 %)	4.37	0.64
11	Students do not get the opportunity to handle every equipment in our school laboratory	2 (2.5 %)	1 (1%)	77 (96.5 %)	4.40	0.62
12	The equipment in the Biology laboratory give inaccurate result	0	1 (1%)	79 (99 %)	4.58	0.57
13	I allow students to design their own experiments during biology practical work	11 (14 %)	19 (24%)	50 (62 %)	2.70	0.88
14	I allow the students to perform experiments based on WAEC past questions	52 (65 %)	17 (21 %)	11 (14 %)	2.78	0.86
15	I select practical tasks from GES approved textbooks	70 (88 %)	5 (6%)	5 (6 %)	3.40	0.82
16	I have enough specimens for biology practical work	40 (50 %)	21 (26 %)	19 (24 %)	2.50	0.90
17	Where there are no materials I improvise	67 (84 %)	12 (15%)	1 (1 %)	3.22	0.86

*A=Agree; N= Neutral; D= Disagree; SD = Standard Deviation

From Table 2, the respondent's mean score on their practices in organising practical work ranged from 2.50 to 4.58. About 82 % of the items had mean scores above 3.0, which indicate that respondents exhibited good practices during practical work. The results as presented in Table 2, showed that majority of the participants (94 %) organised practical work. This could be because there were enough materials and equipment in the laboratory (item 10). Almost all respondents (99 %) pointed out that equipment in the Biology laboratory gave accurate result. In addition, a huge proportion of participants (91 %) provided appropriate equipment and materials for Biology practical. Notwithstanding, most participants (84 %) improvised where these materials were not available. Half of the respondents had enough specimens for Biology practical work. Almost all the participants (99 %) went round to supervise what students did during Biology practical work by guiding them. A high proportion of respondents (94 %) taught Biology content before students performed practical work. They did so because Biology

content lessons were related to the practical activities. It was found that majority of the respondents (88 %) selected practical tasks from GES approved textbooks when organising practical work. Furthermore, 13 out of every 20 participants allowed the students to perform experiments based on WAEC past questions. Many participants (62 %) never agreed that students design their own experiment during Biology practical work whilst few (14 %) agreed. About 97 % of the participants revealed that students get the opportunity to handle equipment in their school laboratories. In addition, a huge proportion of the respondents allowed students to work in groups (95 %) during practical lessons and gave immediate feedback to students when they needed directions to proceed during practical lessons.

The results of observation made during practical lessons conducted by a teacher from a district capital school (DCT) and a teacher from an outside district capital school (ODCT) are presented in Table 3.

Table 3. Results of observation made during practical lessons

S/N	Activity	Remarks	
		OCT	ODCT
1.	Does the teacher set up practical work for students	√	√
2.	Does the teacher give clear explanation before practical work	√	√
3.	Teacher teaches theory before practical	√	√
4.	Teacher provides enough items/equipment during practical lessons	√	√
5.	Students work in group during practical lessons	×	×
6.	Teacher marks students' work and provide immediate feedback	×	√
7.	Teacher guides students during Biology practical lessons	√	√
8.	Students follow rules and in their drawing	√	×
9.	Students are given enough time to complete tasks	√	×
10.	Students use the right equipment during practical work	√	√
11.	Teacher links concrete and abstract experiences of students	√	√
12.	Teacher collects animal and plant specimens for Biology teaching	√	√
13.	Teacher supervises students while performing practical tasks	√	√

* DCT = District Capital Teacher; ODCT = Outside District Capital Teacher

From Table 3, respondents from the two categories of schools performed 92 % of the practical activities. The participants from both categories of schools did not perform activity 5. The participant from the district capital school failed to mark students' work and never provided feedback to students (Item 6). The participant from an outside district capital school failed to help students to follow rules in drawing (Item 8) and also failed to give students sufficient time to complete task given to them (Item 9). The participants from both categories of schools carried out practical lessons for students, guided students during practical lessons, gave clear explanation before performing practical work, and provided enough materials during practical lessons. It was observed that participants from the two categories of schools linked concrete and abstract experiences of students, provided materials for students during practical work and supervised practical lessons.

Analysis of related documents such as district capital school students workbooks indicated that an average of two practical exercises were conducted in a month whilst that of outside district capital school students' workbooks revealed that an average of two practical exercises were conducted in a term (every three months). However, the Biology curriculum indicates that there should be practical lessons every week (Curriculum Research and Development Division, 2011). It was discovered that students' disregarded biological drawing rules in most of their

drawings. Critical analysis of teacher's lesson notes revealed that no group practical work has been carried out and teachers did not follow the procedures outlined in the syllabus when organising practical lessons for students. Some preserved specimens such sea anemones and *Ulva* were found at the Biology laboratory. This supports the fact that teachers collected animal and plant specimens for practical work (item 12).

The results of the correlational analysis to establish the relationship between Biology teacher's practical work practices and their demographic factors are presented in Table 4.

Table 4. Relationship between Biology teachers' practical work practices and their demographic factors

Relationship	Correlation value	p-value
Sex and practices	- 0.109	0.337
Age and practices	0.100	0.379
Years of teaching experience and practices	- 0.096	0.399
Academic qualification and practices	- 0.030	0.108
Area of specialisation and practices	- 0.040	0.723
In – service training and practices	- 0.156*	0.001*

*Significant

There was weak significant negative relationship between Biology teachers' practices in organising practical work and in - service training ($r = -0.156$, $p < 0.01$). Thus, in- service training contributed 15.6 % to Biology teacher's practices in organising practical work. Notwithstanding, no statistically, significant relationship existed between Biology teachers' practices in organising practical work and their sex ($r= -0.109$, $p > 0.01$), age ($r=0.100$, $p >0.01$), years of teaching experience ($r=-0.096$, $p>0.01$), academic qualification ($r = - 0.030$, $p >0.01$) and area of specialisation ($r = -0.040$, $p>0.01$).

DISCUSSION

This study examined Biology teachers' practices in organising practical work in Eastern Region of Ghana. The study revealed that Biology teachers exhibited good practices in organising practical work. This could be because greater proportions of the teachers were professional teachers with first degree in Biology and had their in – service training either from Ghana Association of Science Teachers and or Ghana Education Service. In addition, the teachers had varied years of teaching experiences with most teachers (60 %) having 6 years of teaching experience and above. It was found that majority of the teachers had their age to be 30 years and above. Statistically, there was weak significant relationship between Biology teachers' practices in organising practical work and in – service training ($r = - 0.156$, $p < 0.01$). Thus, in-service training contributed 15.6 % to Biology teacher's practices in organising practical work. The finding of this study is in parallel with the study carried out by Ahmed et al. (2017) where in – service training had a positive impact teachers' performance. Similarly, the finding of this study is also parallel with the study carried out by Somer and Sokorava (2002) where in – service training had a positive impact on teachers' practices. It is generally believed that with implementation of certain in – service training programs, teachers professional skills, knowledge and experience in organising practical work can be significantlly improved. Cossa and Uamusse (2015) found that teachers improved their understanding of the importance of using practical work to teach Biology after attending an in – service program. There was no statistically significant relationship between Biology teachers practices in organising practical work and their sex ($r= -0.109$, $p > 0.01$), age ($r=0.100$, $p >0.01$), years of teaching experience ($r=-0.096$, $p>0.01$), academic qualification ($r = - 0.030$, $p >0.01$) and area

of specialisation (r = -0.040, p>0.01). Again, the finding of this is in contrast with the study carried out by Kosgei et al. (2013) where Biology teachers years of teaching experience in organinsing practical work had a positive effect on their practices. Again, the finding of this study is in contrast with a study carried out by (Wayne & Youngs, 2003) where teachers academic qualification had influence on their teaching performance. The hypothesis that Biology teachers' age, sex, academic qualification and years of teaching experience have influence on their practices in organising practical work was rejected. Notwithstanding, the hypothesis that in–service training had influence on Biology teachers practices in organising practical work was accepted.

The study showed that participants organised practical work for students and provided appropriate materials and equipment during practical work. This will make the students understand Biology better (Gott & Duggan, 2009) and will offer essential opportunity for students to link first - hand experience with scientific concepts and ideas (Cossa, 2007). In addition, students acquire scientific process skills as they are exposed to Biology practical lessons (Merriam, Caffarella & Baumgartner, 2007). Most participants (84 %) improvised where materials for organising practical work were not available. The provision of equipment during Biology practical made students had opportunity to handle equipment in their school laboratories. It was found that respondents taught Biology content well before students performed practical and supervised practical work. Furthermore, respondents selected practical tasks from Ghana Education Service approved textbooks when organising practical work and allowed students to perform experiments based on WAEC past questions. This increased the understanding of students in practical lessons and might have contributed to the good performance of students in the 2015 and 2016 WASSCE Biology practical (WAEC Chief Examiner's Report, 2015 & 2016). Nevertheless, participants never allowed students to design their own experiments during practical lessons. This could prevent students from acquiring fully the needed scientific process skills (Merriam, et al., 2007) and make their own conclusions and discoveries. According to Ormrod (2000), students conceptualise knowledge when they are exposed to first–hand experience of the scientific inquiry process through designed centred investigative approach.

The qualitative findings revealed that an average of two practical works was conducted in a month. However, the Ghanaian Senior High School Biology curriculum indicates that there should be practical lessons every week (Curriculum Research and Development Division, 2011). This implies that the Biology practical lessons organised by teachers were inadequate. It was found that students disregarded biological drawing rules during practical work. In addition, teachers barely gave enough time for students to complete task when performing practical work and barely marked students work and provided immediate feedback. This prevented students from doing their corrections, contributing to low students understanding in practical lessons (Owino, Ahmed & Yungungu, 2014) and might have contributed to the inability of students to draw specimens correctly, add titles and magnifications to biological drawings during West African Senior School Certificate Examination in Biology practical paper (WAEC Chief Examiner's report, 2016 and 2018). Moreover, students never worked in groups during practical activities. This finding is in contrast to the study conducted by Kandjeo–Marenga (2011), where Biology teachers in Namibian secondary schools organised practical lessons in groups, which allowed students to acquire variety of scientific process skills such as classifying, measuring, inferring and predicting. Furthermore, teachers never followed procedures outlined in the syllabus and never allowed students to observe organisms at their habitat. This implies that teachers never took students out on field trips to observe organisms in nature for better understanding of concepts that cannot be demonstrated in the laboratory.

Teachers attributed the failure to embark on field trips to lack of funds.

SUMMARY OF FINDINGS

1. Biology teachers exhibited good practices in organising practical work. This was due to fact that most of the teachers were professional teachers with first degree in Biology and had their in–service training from Ghana Association of Science Teachers and or Ghana Education Service. In addition, the teachers had varied years of teaching experience with most teachers (60 %) having 6 years of teaching experience and above.
2. Participants liked practical work as a results organised practical lessons for students with adequate provision of appropriate equipment, materials and supervision. Notwithstanding, most participants (84 %) improvised where materials for organising practical work were not available.
3. A huge number of respondents (88 %) selected practical tasks from GES approved textbooks when organising practical and allowed students to perform experiments based on WAEC past questions. Notwithstanding, teachers never allowed students to design their own experiments during practical lessons.
4. Qualitative findings revealed that on the average two Biology practical lessons were carried out per month. Teachers never followed procedures outlined in the syllabus and never allowed students to observe organisms at their habitats. In addition, students disregarded biological drawing rules during practical work. Teachers barely gave enough time for students to complete task when performing practical work, barely marked students work and never provided immediate feedback.

CONCLUSIONS

The study revealed that Biology teachers organised an average of two practical lessons for students per month with adequate provision of appropriate equipment and materials. Teachers improvised where materials for organising practical work were not available. Participants' selected practical tasks from GES approved textbooks when organising practical work and allowed students to perform experiments based on WAEC past questions but never allowed students to design their own experiment during practical lessons. Teachers taught Biology content lessons before performing practical work. Notwithstanding, teachers never allowed students to work in groups, never followed procedures outlined in the syllabus and never allowed students to observe organisms in their habitats. Biology teachers exhibited good practices in organising practical work. Statistically, in–service training contributed 15.6 % to Biology teacher's practices in organising practical work ($r = -0.156$, $p < 0.01$). The practical lessons organised by Biology teachers was not adequate.
It is therefore recommended that,

1. Biology teachers in Second Cycle Institutions in Eastern Region of Ghana should organise practical work at least once a week as indicated in the Ghanaian Senior High School Biology syllabus to help students acquire the process skills and improve upon their practical work performance. Biology teachers should allow students to design their own experiments during practical lessons to help them acquire fully the needed scientific process skills and make their own discoveries.
2. Biology teachers in Second Cycle Institutions in Eastern Region of Ghana should make students perform practical work in groups to help them acquire variety of scientific process skills. Furthermore, Biology teachers should follow procedures outlined in the

Ghanaian Senior High School Biology syllabus and should organise fieldtrips enable their students observe organisms in their habitats. This will help students make their own discoveries and construct new meanings.

3. Biology teachers in Second Cycle Institutions in Eastern Region of Ghana should train students to perform practical work within stipulated time, mark student's practical work and provide immediate feedback. This will make students do their corrections and perform better in Biology practical examinations.

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