AVAILABILITY, UTILIZATION AND BARRIERS TO TEACHER'S USE OF INSTRUCTIONAL MATERIALS IN SCIENCE TEACHING AND LEARNING IN GHANAIAN JUNIOR HIGH SCHOOLS

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Abstract*: The study sought to assess the availability; utilization and barriers to teacher's use of instructional materials in teaching and learning of integrated science in selected Junior high schools (JHS) in Assin-Central Municipality, Assin-South and Assin-North Districts in the Central Region of Ghana. The descriptive survey was the research design used for the study. The sample size consisted of 120 integrated science teachers; made up of 75 males and 45 females drawn from 120 JHS; with 60 teachers from each District. Questionnaire and interview were the two (2) instruments used for the study. The study employed both quantitative and qualitative methods of data analysis. Data from the questionnaire were analysed quantitatively using mean, frequency and percentage computations whereas data from science teachers' interview guide were analysed qualitatively. The study revealed that all the 120 integrated science teachers representing 100% indicated that chalkboards/marker boards; real objects/specimens and wall charts were highly available whereas science laboratories with equipment; filmstrip; projector and screen; magnetic and flannel boards were not available in schools for science teaching. Also, it was observed that chalkboards/marker boards, text books, real objects/specimens and flow charts were often utilized by teachers in teaching integrated science. Also, filmstrips, projectors and screens, magnetic boards, still pictures and flannel boards were found not often utilized. It was observed that majority (115 out of 120) of JHS did not have well-built science laboratories equipped with basic science equipment for practical lessons. Also, it was found out that some schools had well-built ICT laboratories or had created spaces/rooms as ICT laboratories but most teachers did not use these rooms for science lessons involving ICT integration due to lack of space such rooms. Finally, all the 120 teachers representing 100% indicated that government's inability to supply instructional materials to schools; increased work load on teachers and lack of well-equipped science laboratories were the three (3) major barriers impeding the teaching and learning of integrated science. Therefore, it was recommended that the government of Ghana and other stakeholders in Basic education should do well to supply instructional materials to all JHS so as to help in improving the teaching and learning of integrated science in schools.

***Keywords:* Availability; utilization, barriers, instructional, materials, teachers, integrated science, technology.**

I. INTRODUCTION

The importance of science to the development and advancement of every nation cannot be overemphasized. According to Bergqvist (2012), the importance of science in the present society is increasing, and that science education is a growing domain that has gain international concern and become an important education for modern citizenship.

In recent times, students' performances in integrated science subject in the Basic Education Certificate Examinations (BECE) and international educational surveys (i.e. Trends in International Mathematics and Science Study (TIMSS) have not been the best for several years now. Bergqvist (2012) posited that for these young students, science subjects are considered to be abstract, irrelevant to them and thus, they perform poor in the sciences.

For example, in comparative study of Ghana's JHS 2 students' performances in TIMSS Reports in 2003, 2007 and 2011 by (Buabeng, Owusu & Ntow, 2014) revealed that Ghana's JHS 2 students' performance in 2007 was better than that of 2003, but there was no significant improvement in the performance as compared to that of 2007. The study further revealed that although there was slight improvement in 2011, yet Ghana's JHS 2 students' performance was the lowest in Africa and the world at large. The study concluded that Ghana's performance relative to other African countries gives some indications that Ghanaian JHS students are not achieving at the levels expected when compared to students at comparable grade levels in different parts of world.

Numerous research studies by (e.g. Nwagbo, 2001; Ogunniyi, 2002; Bajah, 2003) have assigned various reasons for students' poor performances in science as school subject. The commonest factor that has been incriminated by these studies is lack of instructional materials for the teaching and learning of integrated science in basic schools. Nwagbo (2001) pointed out that lack of teaching and learning materials impede the teaching and learning of science in our basic schools.

With this finding from Nwagbo, it is suffice to draw these real life analogies here. In every aspects of human endeavour, every profession requires very good and appropriate materials to work with so as to achieve optimum results. For example, a medical doctor requires basic materials like stethoscope, gloves, consulting room and supporting staff before he/she can diagnose, treat diseases and also perform surgeries to save human life. Again, a miner needs basic materials such as helmet, nose mask, protective clothes, etc so as to work effectively. Also, a farmer requires basic materials like cutlass, protective gear, etc to become more productive.

In the same vein, a classroom integrated science teacher requires various instructional materials such as chalk/marker board, marker, text books, computers, flip charts, etc to facilitate teaching and learning and also ensure meaningful learning among students in the classroom.

Science teaching is supposed to be activity-oriented and student-centered in basic schools and these can be achieved when teachers are favourably disposed to the use of appropriate instructional materials (Danmole, 2010). Young children, according to Butler and

Nesbit (2008), love to explore the natural world to make sense of it and are excited about science when they are given the chance to explore science with several appropriate instructional materials.

In a speech to members of the National Academy of Sciences in 2009, President Obama (National Academy of Science, 2009) addressed the need to improve science education in the United States. The president outlined number of budget and policy priorities and the key among them was investing in the provision of instructional materials to improve science teaching in schools.

Frazer, Okebukola and Jegede (1992) stressed that a professionally qualified science teacher no matter how well trained would not be able to put his ideas into practice if the school setting lacks the instructional materials necessary for him or her to translate his competence into reality.

Bassey (2002) posited that the teaching of science in school is material resources intensive. This suggests that teaching and learning or mastery of science concepts cannot be fully achieved without the use of various instructional materials.

Numerous studies by (Mkpa, 1996; Adebimpe, 1997; Bassey, 2002; Esiobu, 2005; Amadioha, 2009) have shown that instructional materials play a very critical role in the teaching and learning process and that science teaching without instructional materials affect science teachers' lesson delivery and will certainly culminated in poor performance of the students in the subject.

Since lack of instructional materials in teaching affect science teachers' lesson delivery and also impacts negatively on students' academic performance in schools; it is imperative to assess the availability and utilisation of instructional materials as well as the barriers to teacher's use of instructional materials in teaching and learning of science Ghanaian Junior High Schools.

It is against this background that this study was undertaken to assess the availability; utilization and barriers to teacher's use of instructional materials in the teaching and learning of integrated science in some selected JHS in the Assin-Central Municipality, Assin-South and Assin-North Districts of the Central Region of Ghana.

Statement of the Problem

In Ghana, the JHS curriculum requires students to study and write their final examination in the following subjects such as integrated science, information communication and technology (ICT), English language, mathematics, social studies, religious and moral education (R.M.E), French and Ghanaian language.

However, over the years, JHS students' performances in integrated science have not been the best. For example, in 2011, over 40% of candidates who sat for BECE failed the examination and could not gain placement in any of the second cycle institutions, and this because these students performed below the average scores in the integrated science (Ghana News Agency, 2008).

The WAEC chief examiner's reports on 2004 to 2018 BECE results have attributed this abysmal performance to lack or unavailability of instructional materials in teaching and learning of integrated science. These reports required science teachers to use appropriate instructional materials in teaching integrated science in schools. Also, the new JHS syllabus required science teachers to use varieties of instructional materials including technology integration or (ICT) into teaching and learning of science.

Studies by (Ibe-Bassey, 1988; Obioha, 2006; Opara & Etukudo, 2014) have shown that unavailability; improper utilization and constraints to teacher's use of instructional materials could affects the teaching and learning of integrated science in JHS and thereby impacting negatively on the academic performances of the students.

In other jurisdictions, some studies have been conducted in this regard. However, in Ghana, no or only few studies have been conducted into the availability and the usage of instructional materials in integrated science. It is on this premises that the study deems it necessary to delve into this grey area of research, so as to highlight on the availability; their utilization and barriers to teacher's use of these materials in some selected JHS in the Assin-Central Municipality, Assin-South and Assin-North Districts in the Central Region of Ghana.

Purpose of the Study

The purpose of the study is to assess the availability; utilization and barriers to teacher's use of instructional materials in teaching and learning of integrated science in some selected JHS in the Assin-Central Municipality, Assin-South and Assin-North Districts in the Central Region of Ghana. Specifically, the study intends:

1) To assess the availability or non-availability of instructional materials for teaching and learning of integrated science in the selected JHS.
2) To determine the extent to which the availability instructional materials are often utilized or not utilized for the teaching and learning of integrated science in the selected JHS.
3) To identify the barriers to science teacher's use of instructional materials in teaching and learning of integrated science in the selected JHS.

Research Questions

The following three (3) research questions were formulated to guide the study:

1) What instructional materials are available or unavailable for teaching and learning of integrated science in the selected JHS?
2) What available instructional materials are often utilized or not utilized for the teaching and learning of integrated science in the selected JHS?
3) What are the barriers to science teacher's use of instructional materials in teaching and learning of integrated science in the selected JHS?

II. REVIEW OF RELATED LITERATURE

This aspect of the study deals with the review of related literature that supports the study. The review of related literature that supports the study was done under the following subtopics:-

1) Meaning of Instructional Materials.
2) Importance of Instructional Materials in Teaching and Learning.
3) Availability and Utilization of Instructional Materials.

4) Barriers to Teacher's Use of Instructional Materials.

Meaning of Instructional Materials

Instructional materials have been defined differently by different authors. Abdullahi (1982) defined instructional materials as materials or tools locally made or imported that could make tremendous enhancement or impact of the lesson if intelligently used. Agina-Obu (2005) sees instructional materials as concrete or physical objects which provide sound, visual or both to the sense organs during teaching.

Esiobu (2005) conceptualized instructional materials as didactic materials or things which are supposed to make teaching and learning possible. Amadioha (2009) opined that instructional materials refer to those alternative channels of communication, which a classroom teacher can use to concretise a concept during teaching and learning process.

Amadioha (2009) again indicated that instructional material is anything that constitutes the medium of exchange through which a message transaction is facilitated between a source and a receiver. Isola (2010) described instructional materials as objects or devices, which help the teacher to make a lesson much clearer to the learner. Effiong and Igiri (2015) defined instructional materials as print and non-print items that are rested to impact information to students in the educational process.

According to NAPTEA (2003), instructional material are classified into six (6) groups namely graphic materials, three-dimensional materials, still pictures, still projected pictures, motion pictures and audio materials.

Studies by (Amadioha, 2009; Oladejo, Olosunde, Ojebisi & Isola, 2011; Effiong & Igiri, 2015) have also categorised instructional materials into three (3) namely audio (aural), visual and audiovisual. The audio instructional materials refer to devices that make use of the sense of hearing only and they include radio, audio tape recording, etc. Visual instructional materials on the other hand, are those devices that appeal to the sense of sight only and they include chalkboard, chart, slide, filmstrip, etc. Audio-visual instructional materials however, are devices which appeal to both sense of hearing and seeing; and they include television, motion picture and computers.

These observations revealed that various authors have different lenses of conceptualising instructional materials.

Importance of Instructional Materials in Teaching and Learning

Instructional materials play very crucial role in the teaching and learning process. Several authors (Orji, 2000; Amadioha, 2009; Effiong & Igiri, 2015) have described the importance of instructional materials in the literature as follow:

Orji (2000; 3) asserted that instructional material is the "guidance of learning activities" that "a teacher uses to motivate and arouse student's desire to learn". Amadioha (2009) outlined the following as the importance of instructional materials in the teaching and learning:

1) Instructional materials help to facilitate the teaching learning process.
2) They supply a concrete basis for conceptual thinking and reduce meaningless work and responses for students as it makes learning more permanent.
3) Instructional materials have a high degree of interest for the learner; for they offer a reality of experience, which stimulates self-activity on the part of students.
4) Instructional materials develop a continuity of thought, this is especially true of motion pictures, as they provide experiences not, easily obtained through other materials and contribute to the efficiency and variety of learning experiences.
5) The use of instructional materials in teaching/learning process exposes the learner to primary experiences and this enriches learning.

In a similar study, Effiong and Igiri (2015) also commented on the importance of instructional materials in teaching and learning of sciences. They posited that:

1) Instructional materials help to impact teaching and learning sciences to students.
2) The use of instructional materials makes learning real and permanent in sciences.
3) The use of instructional materials promotes retention in sciences.
4) The use of teaching aids influences the academic achievement of students in sciences.
5) Instructional materials enhance the memory level of the students in sciences.
6) The use of instructional materials can appeal to the individual attention by creating interests that will help the learner achieve direct effort.

These observations revealed that instructional materials play very vital role in the teaching and learning of sciences and other subjects in schools.

Availability and Utilization of Instructional Materials

Bassey (2002) opined that science teaching is resource intensive, and that there should be enough available resources for the teacher and learner to use during teaching and learning process. A study by (Oladejo, Olosunde, Ojebisi & Isola, 2011) pointed out that mastery of scientific concepts might not be fully achieved without the appropriate use of instructional materials.

On the availability and usage of instructional materials, Ibe-Bassey (1988) revealed that most teachers had materials such as bulletin boards, maps and globes, posters, drawing and paintings at their disposals in schools yet the media use in instructions were not encouraging among teachers.

In a study, Opara and Etukudo (2014) indicated textbooks, chalkboard, pictures, diagrams, wall charts and specimen were the available instructional materials for teaching basic science in schools. The study also revealed that instructional materials such as flannel board, magnetic board, flow charts, flip charts, firm strips, slides, projector, radio set, models, tape recorders, posters, television, computer and video were not available in schools. Thus, the unavailability of such materials would impede the effective teaching and learning of science in schools.

On the availability of instructional materials in teaching basic science, Effiong and Igiri (2015) reported that charts, posters, globes; video tapes and cassette tape were the available instructional materials in schools. Their study concluded that some of these materials may be available but they are insufficient in schools, hence teachers do not use them.

A study by (Obioha, 2006) revealed that there were inadequate resources for teaching science subjects in schools. The study further stated that the available ones are not usually in good conditions. Ibe-Bassey (1988) posited that the extent of usage of instructional materials by teachers was not commensurate to their availability.

These studies revealed that instructional materials in schools for teaching and learning of science in schools may be unavailable and but the available ones are under-utilization or not used at all in the teaching and learning of integrated science in Basic schools.

Barriers to Teacher's Use of Instructional Materials

Effective science teaching and learning cannot take place when teachers are confronted with certain barriers or constraints with the use of instructional materials during teaching and learning process.

Several authors (e.g. Oyeneyin & Balogun, 1982; Olarewaju & Balogun, 1984; Opara & Etukudo, 2014) have indicated that there are several barriers or constraints to teacher's use of instructional materials in the teaching of integrated science in basic schools. Some of these barriers include:

1) Low level of readability of the instructional materials.
2) Lack of skills in using some of the complex materials by some teachers.
3) Lack of funds in maintaining and servicing the instructional materials.
4) Most teachers of basic science were not qualified to teach the science subject.
5) The materials in science books were too much and as such none could be completed within one academic year.
6) The teaching strategies designed for the course could not be completely followed because of lack of adequate equipment, teachers and time.

Bajah (2003) indicated that lack of physical facilities such as classroom furniture, service points, equipment and apparatus are some of the constraints to teacher's use of instructional materials in teaching basic science. Contributing to this debate, Medupe (1999) also mentioned lack of science equipment and laboratory, as well as under-qualified teachers as some of the barriers to teacher's use of materials in South Africa's schools.

In a similar study, Opara and Etukudo (2014) posited that non-availability of materials, lack of funds, non-availability of electricity and lack of motivation by the government are some of the barriers to teachers' use of instructional materials in teaching integrated science in the Basic schools. In another study, Effiong and Igiri (2015) opined that factors that constraints teacher's use of instructional materials in teaching science include poor remuneration, poor condition of service, low social status and increase work load on teachers in schools.

The above review showed that there are several barriers that impede teachers' efforts in teaching integrated science in schools.

III. METHODOLOGY

Research Design

The descriptive survey was the design used for the study. This research design was appropriate for this study because the study sought to assess the views and opinion of large group of integrated science teachers on the availability and utilization of instructional materials as well as barriers to teacher's use of instructional materials in the teaching and learning of integrated science in some selected JHS in the Assin-Central Municipality; Assin-South and Assin-North Districts of the Central Region of Ghana.

Sample and Sampling Procedure

The sample size consisted of 120 integrated science teachers drawn from 120 Junior high schools in the Assin-Central Municipality, Assin-South and Assin-North Districts. One (1) integrated science teacher was purposively selected from each of the selected JHS. The 120 integrated science teachers were made up of 75 male teachers and 45 female teachers.

A simple random sampling employing lottery method was used to select the 120 JHS from the study areas. Also, purposive sampling technique of the non-probability sampling procedure was used to select the integrated science teachers as respondents for the study. These respondents were selected because of their in-depth knowledge on the availability, utilization and barriers to teacher's use of the instructional materials in teaching integrated science in Ghanaian Junior high schools.

Research Instruments

Questionnaire and interview were the two (2) instruments used for the study. The questionnaire called science teachers' questionnaire (STQ) was developed and used to collect data from the respondents. The STQ had 3 sections (A, B & C) containing 50 question items (items 1-50). Section A had 20 question items (items 1-20) on the availability of instructional materials; Section B also had 20 question items (items 21-40) on utilization of instructional materials whiles Section C had 10 question items (items 41- 50) information on barriers to teacher's use of instructional materials.

Moreover, science teachers' interview guide (STIG) was also designed and used to gather additional data from the respondents during interview session.

Validity and Reliability of the Instruments

The face validity of the instruments was established by having the instruments validated by two (2) experts from the Science Education Department, University of Cape-Coast. The reliability of the instruments was established by pilot-testing the instruments

using fifteen (15) selected integrated science teachers from the Cape-Coast Metropolis. The reliability analysis done showed that the designed instruments were reliable and could be used for the study.

Data Collection Procedure

Permission was sought from the school authorities and the integrated science teachers of the 120 selected JHS to carry out the study. In all, three (3) weeks were used to collect the data from the respondents using the questionnaire and the interview guide.

On the whole, one hundred and fifty (150) science teachers' questionnaire (STQ) questionnaires were given out. The selected respondents were given about one week to fill them out. One hundred and twenty (120) questionnaires were later retrieved. This represented a return rate of about 80%.

Additionally, data were obtained through semi-structured interviews. Thirty (30) of the respondents were selected using Patton's (1990) maximum variety sampling techniques for in-depth interview using the science teachers' interview guide.

Data Analysis Method

The study employed both quantitative and qualitative methods of data analysis. Data from the questionnaire were analysed quantitatively using mean, frequency and percentage computations. The mean computation was done to determine the availability and the utilization of the instructional materials.

In determine each of the items; values were assigned to the rating scales as follows;

Degree of availability	Scores on availability
Highly- Available	4
Available	3
Less available	2
Not available	1

The mean (X) was used in analysing each questionnaire items. The formula for the mean is as follows.

$\overline{X} = \frac{\sum Fx}{N}$	Where; $\sum$ = Summation; N = Number of responses;	F = Frequency; $\overline{X}$ = Mean	x = Nominal value

$$\text{Mean } (\overline{X}) = \frac{4 + 3 + 2 + 1}{4} = \frac{10}{4} = 2.50$$

Since the four point rating scale was used for the instruments, the decision rule was based on the mean 2.50. An interval scale of 0.5 was added to the mean of the nominal value. Thus, 2.50 + 0.5 = 3.00; hence item with mean response of:

Mean response	Interpretation of mean response	Symbols for interpretation
3.00 – 4.00	Highly- Available	H. Av
2.00 – 2.99	Available	Av
1.00 – 1.99	Less available	Less Av
0.10 - 0.99	Not available	Not A

On the issue of utilization and non-utilization, item with mean response of 3.00 and above was regarded as utilized whiles any mean score below 3.00 was regarded as not-utilized.

On the other hand, the data obtained from the science teachers' interview guide were analysed qualitatively, transcribed and summarised thematically based on the availability, utilisation and barriers to teacher's use of instructional materials teaching integrated science in Junior high schools.

IV. RESULTS AND DISCUSSION

Analysis of the Results

The analysis of the results was done to answer the 3 research questions posed by the study.

Research Question 1: What instructional materials are available or unavailable for teaching and learning of integrated science in the selected JHS?

In answering research question 1, the respondents' responses to questionnaire items (1-20) on the availability or otherwise unavailable instructional materials for teaching integrated science in selected JHS were analysed and are presented in Table 1 below:

Table 1: Availability and Non-availability of Integrated Science Instructional Materials

No	Instructional Materials	H. Av	Av	Less Av	Not A	Frequency	Mean	Remarks
1.	Chalkboard/marker boards.	120	0	0	0	120	4.00	Highly- Available
2.	Text books.	22	77	11	10	120	2.53	Available
3.	Tape recorders & Discs.	0	2	4	114	120	0.36	Not Available
4	Diagrams/ pictures/posters	11	78	23	8	120	2.95	Available
5.	Educational video game.	1	5	17	97	120	0.17	Not available
6.	Real objects/specimens.	79	26	11	4	120	3.65	Highly Available
7.	Filmstrips.	0	0	1	119	120	0.10	Not available
8.	Projectors & screens.	0	0	8	112	120	0.78	Not available

9.	Wall charts.	81	34	5	0	120	3.43	Highly available
10.	Magnetic boards.	0	0	0	120	120	0.24	Not available
11.	Computers.	2	19	56	42	120	1.62	Less available
12.	Still pictures.	35	13	66	6	120	1.89	Less Available
13.	Models & mock-ups.	15	25	33	47	120	0.91	Not available
15.	Course wares/ Topics on CDs	4	32	77	7	120	1.24	Less available
15.	Kits & dioramas	4	7	21	88	120	0.44	Not available
16.	Flannel boards.	0	1	2	117	120	0.72	Not available
17	Flow charts.	116	3	1	0	120	3.89	Highly available
18.	Flip charts	22	38	57	3	120	1.90	Less Available
19.	ICT laboratories (rooms).	8	15	53	44	120	1.30	Less available
20.	Science laboratories (rooms) with basic equipment.	0	2	3	115	120	0.15	Not available

Source: (Respondents' Questionnaire, 2019)

Data in Table 1 shows the instructional materials that are highly available for the teaching and learning of integrated science in the JHS in the study areas include chalkboard/marker board; real objects/specimens; wall charts; and flow charts. Again, instructional materials perceived to be available for teaching integrated science include textbooks; diagrams; pictures; and posters.

Also, instructional materials that are less available include computers, still pictures, course wares (topics on CDs), flip charts and ICT laboratories (rooms). Finally, instructional materials that are not available for teaching include science laboratories (rooms) with basic science equipment; tape recorders and discs; educational video game; filmstrip; projector and screen; magnetic board; models & mock-ups; kits & dioramas and flannel boards.

During the interview session, it was observed that most of the selected JHS have ICT laboratories where some of the computers for ICT lessons are kept. However, 115 integrated teachers indicated lack of science laboratories with basic equipment for science practical lessons in their schools. This statement is confirmed by the data in Table 1 above.

These observations made from this research question and the responses of the respondents clearly showed that most instructional materials for effective teaching and learning of integrated science in JHS in the study areas were not available.

Research Question 2: What available instructional materials are often utilized or not utilized for the teaching and learning of integrated science in the selected JHS?

In answering research question 2, the respondents' responses to questionnaire items (21- 40) on the utilization or non-utilization of available instructional materials for teaching integrated science in JHS in the study area were analysed and are presented in Table 2 below;

Table 2: Utilization and Non-Utilization of Instructional Materials in Integrated Science

No	Instructional Materials	Utilized	Not- Utilized	Total	Mean	S D	Remarks
21.	Chalkboards/marker boards.	120	0	120	4.00	1.22	Utilized
22.	Text books.	118	2	120	3.98	1.23	Utilized
23.	Tape recorders & Discs.	6	114	120	0.34	1.27	Not- Utilized
24	Diagrams/ pictures/posters	113	7	120	3.73	1.35	Utilized
25.	Educational video games.	22	98	120	0.55	2.69	Not- Utilized
26.	Real objects/specimens.	116	4	120	3.87	1.26	Utilized
27.	Filmstrips.	1	119	120	0.12	0.68	Not- Utilized
28.	Projectors & screens.	8	112	120	0.66	2.67	Not- Utilized
29.	Wall charts.	113	7	120	3.73	1.35	Utilized
30.	Magnetic boards.	3	117	120	1.14	1.56	Not- Utilized
31.	Computers.	102	18	120	3.16	1.55	Utilized
32.	Still pictures.	105	15	120	3.24	1.52	Not- Utilized
33.	Models & mock-ups.	44	76	120	1.83	0.37	Not- Utilized
34.	Course wares/ Topics on CDs	99	21	120	3.12	1.57	Utilized
35.	Kits & dioramas	32	88	120	1.64	0.34	Not- Utilized
36.	Flannel boards.	4	116	120	0.32	1.66	Not- Utilized
37	Flow charts.	103	17	120	3.23	1.49	Utilized
38	Flip charts	109	11	120	3.54	1.38	Utilized
39.	ICT laboratories (rooms).	52	68	120	2.54	0.52	Not- Utilized
40.	Science laboratories (rooms) with basic science equipment.	5	115	120	0.26	0.59	Not- Utilized

Source: (Respondents' Questionnaire, 2019)

Data in Table 2 shows that chalkboards/marker boards, text books, diagrams, pictures, posters, real objects/specimens, wall charts, computers, course wares (topics on CDs), maps, flip and flow charts are the available instructional materials perceived to be utilized often by most of the integrated science teachers for the teaching and learning of science in schools.

However, the available instructional materials not utilized often by most of the integrated science teachers include tape recorders and discs, educational video games, filmstrips, projectors and screens, magnetic boards, still pictures, models and mock-ups, kits and dioramas, flannel boards, ICT laboratories and science laboratories with basic science equipment.

During the interview session, it was revealed that some of the schools had created a space or rooms as ICT laboratories where few available desktop and laptop computers are kept. However, most teachers did not use these supposed ICT rooms for practicals but instead, they usually take some of the available laptops to the classroom for demonstration during science lessons involving ICT integration due to lack of space in those supposed ICT laboratories. It was revealed that only few schools have well-built ICT laboratories that can also be used during science lessons involving ICT integration.

Finally, it was revealed that only five (5) JHS have very small-built science laboratories equipped with very few obsolete basic equipment whiles the remaining 115 JHS have no science laboratories; as confirmed by the data in Table 2 above.

These observations made from this research question and the responses of the research sample clearly showed that teachers' utilization of instructional materials was generally not good.

Research Question 3: What are the barriers to science teacher's use of instructional materials in teaching and learning of integrated science in the selected JHS?

In answering research question 3, the respondents' responses to questionnaire items (41-50) on the barriers to teacher's use of instructional materials were analysed and are presented in Table 3 below:

Table 3: Major Barriers to Teacher's Use of Instructional Materials

No.	Possible major barriers	Frequency	Percentage
41.	Lack of knowledge on usage of basic science-technology materials.	85	70.8
42.	Government's failure or inability to supply the materials to schools.	120	100
43.	No time to use them due limited time to cover syllabus.	80	66.7
44.	Increased work load on teachers.	120	100
45.	Lack ICT laboratories in some schools.	70	58.3
46.	Lack of qualified science/ICT teachers.	69	57.5
47.	High electricity bills and non-payments of electricity bills.	40	33.3
48.	Lack of well-equipped science laboratories in schools.	120	100
49.	No electricity in some Junior high schools.	88	73.3
50	Lack of science and ICT laboratory technicians.	**100**	83.3
	Total	**120**	**100**

Source: (Respondents' questionnaire, 2019)

Data in Table 3 shows there are several barriers that impede integrated science teacher's use of instructional materials in the teaching and learning of integrated science in the selected JHS. The barriers identified by all the 120 respondents representing 100% include government's failure or inability to supply instructional materials to schools; increased work load on teachers and lack of well-equipped science laboratories.

Again, as many as 100 respondents representing 83.3% indicated lack of science and ICT laboratory technicians as barrier to integrated science teaching. Also, 88 respondents representing 73.3% stated that lack of electricity in some schools as barrier to integrated science teaching. Also, 85 respondents representing 70.8% opined that teacher's lack of knowledge on the usage of basic science-technology materials as a barrier. Moreover, as many as 80 integrated science teachers representing 66.7% indicated that there is no time to use available instructional materials due limited time to cover syllabus.

Also, other barriers identified during the interview session include lack of in-service training on the usage of science-technology instructional materials; frequent breakdown of instructional materials, lack of funds for maintenance of materials and teacher's inability to improvise instructional materials for teaching and learning integrated science in the selected JHS.

Discussion of the Results

The results of this study showed that there were only few instructional materials available in the selected JHS for the teaching and learning of integrated science. It was observed that chalkboards/marker boards; real objects/specimens; wall charts; and flow charts were the instructional materials considered to be highly available. Also, instructional materials like textbooks; diagrams; pictures and posters were also considered as available in these schools. Again, it was revealed that instructional materials such as computers, still pictures, course wares (topics on CDs), flip charts and ICT laboratories were less available for teaching and learning. Finally, it was observed that instructional materials such as science laboratories with basic equipment; tape recorders and discs; educational video game; filmstrip; projector and screen; magnetic board; models and mock-ups; kits and dioramas and flannel boards were considered to be unavailable (or not available) in the selected JHS for science teaching and learning. This result is in agreement with the findings of (e.g. Opara & Etukudo, 2014; Effiong & Igiri, 2015) that textbooks, chalkboard, pictures, posters, globes; wall charts and specimen were the available instructional materials for teaching basic science in schools.

The study also revealed that chalkboards/marker boards, text books, diagrams, pictures, posters, real objects/specimens, wall charts, computers, course wares (topics on CDs), maps, flip and flow charts were the instructional materials often utilized by the teachers for the teaching and learning of integrated science in the JHS. However, tape recorders and discs, educational video games, filmstrips, projectors and screens, magnetic boards, still pictures, models and mock-ups, kits and dioramas, flannel boards, ICT laboratories and science laboratories with basic science equipment were the instructional materials not often utilized in schools.

This implies that the utilization of the available instructional materials in schools were not good. This result is in consonance with the findings of Ibe-Bassey (1988) that most teachers had materials such as bulletin boards, maps and globes, etc at their disposals in schools yet the media use in instructions were not encouraging among teachers.

The study revealed that 115 JHS did not have well-built science laboratories equipped with some basic science equipment. This condition could make the teaching and learning of practical science lessons in schools very difficult. Also, it was observed that only few schools had well-built ICT laboratories or had created spaces (rooms) as ICT laboratories where few available computers are kept. However, most teachers did not use these supposed ICT rooms for practicals instead, they usually take some of the available laptops to classroom for demonstration during science lessons involving ICT integration due to lack of space in these supposed ICT laboratories or rooms.

The results of the present study revealed that there were several barriers that impede teacher's use of instructional materials in teaching of integrated science in schools. The three (3) major barriers identified in this study include government's failure or inability to supply instructional materials to schools; increased work load on teachers and lack of well-equipped science laboratories in schools. Other barriers identified include lack of science and ICT laboratory technicians; lack of electricity in some schools; teacher's lack of knowledge on usage of basic science-technology materials; frequent breakdown of some instructional materials, lack of funds for maintenance of materials and teacher's inability to improvise instructional materials for teaching and learning of integrated science. This result lend credence to the findings of some pioneer researchers (e.g. Oyeneyin & Balogun, 1982; Olarewaju & Balogun, 1984; Opara & Etukudo, 2014) that there are several barriers or constraints to teacher's use of instructional materials in the teaching of Integrated Science in basic schools.

V. CONCLUSIONS

Based on the major findings of the study, the following conclusions were made:

1) It can be concluded that chalkboards/marker boards; real objects/specimens; wall charts; and flow charts were highly available instructional materials whereas textbooks; diagrams; pictures and posters were seen as available instructional materials for teaching integrated science.
2) It can also be concluded that computers, still pictures, course wares (topics on CDs), flip charts and ICT laboratories were the less available instructional materials whereas science laboratories with basic science equipment; tape recorders and discs; educational video game; filmstrip; projector and screen; magnetic board; models and mock-ups; kits and dioramas, and flannel boards were instructional materials not available (unavailable) for teaching integrated science.
3) It can be concluded that chalkboards/marker boards, text books, diagrams, pictures, posters, real objects/specimens, wall charts and maps were available instructional materials often utilized by the teachers for teaching integrated science.
4) It can also be concluded that tape recorders and discs, educational video games, filmstrips, projectors and screens, magnetic boards, still pictures, kits and dioramas, flannel boards, ICT laboratories and science laboratories with basic science equipment were instructional materials not utilized often by the teachers for teaching integrated science.
5) It can also be concluded that majority (115 out of 120) of the Junior high schools did not have well-built science laboratories equipped with basic science equipment for integrated science practical lessons.
6) It can also be concluded that some schools had well-built ICT laboratories or had created spaces (rooms) as ICT laboratories but most teachers did not use these rooms for science lessons involving ICT integration due to lack of space in these supposed ICT laboratories.
7) Finally, it can also be concluded that government's failure or inability to supply instructional materials to schools on time; increased work load on teachers and lack of well-equipped science laboratories in schools were the three (3) major barriers identified in the study. Other barriers identified include lack of science and ICT laboratory technicians; lack of electricity in some JHS; teacher's lack of knowledge on the usage of basic science-technology materials; frequent breakdown of instructional materials and lack of funds for maintenance of materials.

Recommendations

Based on the major findings and conclusions drawn, it is recommended that:

1) The Government of Ghana and other stakeholders in Basic education should do well to supply instructional materials to all the Junior high schools so as to improve the teaching and learning of integrated science in schools.
2) The government of Ghana and other related stakeholders in science education should build science laboratories in all Junior high schools and equip them with basic science materials to help integrated science teachers to do more practical activities so as to demystify science teaching.
3) The stakeholders in Basic education should build ICT laboratories in all Junior high schools and equip them with needed computers and other accessories to help in the teaching and learning of ICT (technology) in Junior high schools.

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