

Classroom Factors that Affects the Performance of Integrated Science Students at the Junior High School in the Kumasi Metropolis of Ghana

Michael Owusu

Science Department, Wesley College of Education, Kumasi-Ghana

Charles Agyei Amoah

Science Department, OLA College of Education, Cape Coast-Ghana

Richard Akwasi Frimpong

Science Department, Agogo Presbyterian College of Education, Agogo-Ghana

Abstract

The purpose of the study was to find out the opinions of public and private Junior High School science teachers on the classroom factors that affect performance of students in integrated science in public and private junior high schools in the Kumasi metropolis. The study used descriptive survey designed. The sampling procedure employed for the study was both random and purposive sampling. While the integrated science teachers were purposively sampled due to their subject they teach, the students were randomly selected. Questionnaire and interview were used for data collection. It was found out that integrated science teachers to be aware that classroom factors such as teacher-student relationship, availability of science resource materials, teaching methods employed by teachers, class size, supervision and physical infrastructure are likely to affect performance of students in integrated science at the J.H.S. level. Again, the findings revealed that the selected public schools within the Kumasi metropolis were well resourced with the following: adequate physical infrastructure, adequate science resource materials, adequate science text books and adequate trained science teachers as against their private school counterparts with inadequate physical infrastructure, inadequate science resource materials, inadequate science text books and few trained science teachers. It was recommended that effective supervision must be performed regularly by heads of schools during integrated science lessons. The heads of the public JHS especially, those in the Kumasi metropolis must be made to regularly ensure that their science teachers teach very well during integrated science lessons.

Keywords: Laboratory, Performance, Classroom factors

Introduction

Akpan (1992) stated that Ghana as a nation has not seen so much progress in Science and Technology education. According to Akpan (1992), this has been attributed to the system of education inherited from the colonial masters. In my view, there is the need to restructure our educational system to enable learners to apply what they learn to help solve their challenges and that of the nation as a whole. In order to improve on the quality of the educational system, the Junior High School (J.H.S.) was introduced as a way of correcting some of the deficiencies in the educational system. The concept allows that every student who goes through the basic school level is expected to acquire basic knowledge in science. However, it appears that the aims for restructuring the educational system have not been fully realised. Consequently, the performance of students in the basic level of both public and private schools is still not good enough. This can be seen in the integrated science results for 2006/2007 year group analysed by the Kumasi Metropolitan Education Directorate as shown in Table 1.

Table 1: Twelve best performed schools in B.E.C.E integrated science in the Kumasi Metropolis for 2006/2007 examination period

School	No. of Candidates	Position
Vicande	91	1 st
HILL TOP	36	2 nd
SSNIT Presby Model	20	3 rd
High Academy	30	4 th
Froebel Educational Centre	30	5 th
Our Lady of Apostles	38	6 th
Holy Trinity Lutheran	31	7 th
Good Shepherd R/C*	115	8 th
Oniwaa Memorial Int.	14	9 th
All Saints Anglican	31	10 th
T. I. Ahmadiyya “B”	124	11 th
Nagies	23	12 th

Source: Kumasi Metropolitan Education Directorate

Key: School with asterisk is a public school.

Table 1 shows the first twelve schools ranked according to performance in integrated science. It indicates the general performance pattern for both public and private Junior High Schools in the Kumasi metropolis for 2006/2007 WAEC examination period.

The researcher was so much alarmed as to why only one public school was ranked within the twelve best performed schools as against their counterparts from the private schools. The above performance pattern therefore motivated the researcher to undertake this study.

Even though the application of science and technology is growing very rapidly in all spheres of life in every society, it seems students do not seriously take to its learning at schools. This unserious attitude happens mainly in highly developed societies. They appear to have developed ambivalent attitudes to and perceptions of science and technology (Schreiner & Sjøberg), as cited in Anderson (2006). In the quest for solutions to the lack of seriousness that students have for science education, most research works in science and technology education have focused on the cognitive sides of teaching and learning. However, this situation might be understood better if other factors affecting teaching and learning of science at the basic school are considered (Anderson, 2006). Among these factors is the classroom factor. The classroom factors considered were the methods teachers use in teaching integrated science, physical structures available, supervisory role the heads of schools embark on during integrated science lessons, interpersonal relationships between teachers and students and the available science resource materials. Class size was also considered. If these classroom factors are positive, there is the likelihood that teaching and learning of integrated science may improve.

Statement of the Problem

The Chief Examiner’s reports for integrated science for a three-year period (2006-2015) for Basic Education Certificate Examination (BECE) mentioned one of the major weaknesses of candidates of the Basic Education Certificate Examination (BECE) as “poor expressions and inappropriate representation of diagrams”. This weakness is more found in the public school candidates than their counterparts from the private schools. The candidates could not draw lines with straight edge as a demand of biological drawing. However, the same reports state that in the instance where candidates attempted a question, they do not show clear mastery of the concepts. However, public schools appear to be endowed with trained teachers with the requisite know-how. Hence candidates from public schools performing poorly at examination as against private schools become difficult to comprehend. If factors that militate against science teaching and learning must be addressed in Ghana, then information on classroom factors and how they affect the level of understanding of students must be available. The underlying question therefore is: How do classroom factors affect performance in integrated science in public and private J.H.S?

Purpose of the Study

The purpose of the study was to find out the opinions of public and private Junior High School science teachers on the classroom factors that affect performance of students in integrated science in public and private junior high schools in the Kumasi metropolis.

Research Questions

1. What are the opinions of public and private Junior High School science teachers on the following classroom factors on performance of students in integrated science?
 - Physical infrastructure

- Class size
- Resource materials
- Methodology teachers often employ
- Supervisory role of heads of schools
- Teacher-student relationships

Methodology

The study was a descriptive survey designed to find out the opinions on classroom factors on performance of students in integrated science in the junior high schools in the Kumasi metropolis. The target population for the study was integrated science teachers, students and head teachers from J.H.S in some selected schools in the Kumasi Metropolis in the Ashanti region of Ghana. The sampling procedure employed for the study was both random and purposive sampling. While the integrated science teachers were purposively sampled due to their subject they teach, the students were randomly selected.

Ten (10) private schools out of twenty-five (25) and ten (10) public schools out of thirty-two (32) were selected making a total of twenty (20) schools. Ten (10) each were randomly selected from each of the public schools and ten (10) each from each of the private schools resulting in a total of two hundred (200) participating in the study. Two (2) science teachers were selected from each of the twenty (20) schools, making a total of forty (40) teachers participating in the study. The head teacher of each of the twenty (20) schools was also chosen, making a total of twenty (20) head teachers taking part in the study. All together, a sample of two hundred and sixty (260) subjects participated in the study.

The instruments that were used in the study were questionnaire, and interview schedule. The questionnaire was developed based on the research questions and through information derived from the related literature. All the questionnaire items were developed in consultation with my supervisors and experts providing excellent advice for correction and amendment to ensure that the instrument was valid.

The test-retest method was used to test for the reliability of the instruments. A pilot test of the study was personally conducted. Students, head teachers and science teachers of six selected basic schools in the Kumasi metropolis which included three private and three public junior high schools were used for the pilot study. The items were administered to the respondents and re-administered after three weeks so as to minimise errors and improve upon the reliability and content validity. Percentages of the responses of the items of the questionnaires were found.

The pilot test was used to enhance content reliability and validity of the instrument. It also improved the quality of the questions since those with ambiguities were corrected before the actual instrument was administered. The comments given by respondents on the items enabled the Researcher to remove all the questions which looked ambiguous. The clarity of the questions was therefore ensured.

The Cronbach Coefficient Alpha was determined as a means of measuring the internal consistency of the items of each of the questionnaire. The Cronbach Coefficient Alpha for the science teachers' questionnaire determined was 0.72, students' questionnaire was 0.75 and the head teachers' questionnaire was 0.74.

Results/Discussion

Research question 1

What are the opinions of public and private Junior High School science teachers on the following classroom factors on performance in integrated science?

- Physical infrastructure
- Class size
- Resource materials
- Methodology teachers often employ
- Supervisory role of heads of schools
- Teacher-student relationships

The percentages for each of the factors were determined as found in Table 2 for twenty teachers each from public and private J.H.S. sampled. The percentages are in parenthesis.

Table 2: Teachers' responses to classroom factors that affect performance

Item	Public	Private
	Yes	Yes
Adequate physical infrastructure	13 (65%)	7 (35%)
Perception of class size	20 (100%)	20 (100%)
Availability of science resource materials	16 (80%)	8 (40%)
Use of lecture method	13 (65%)	3 (15%)
Use of discussion method	0 (0%)	15 (75%)
Use of activity method	2 (10%)	17 (85%)
Use of demonstration method	16 (80%)	5 (25%)
Inclusion of laboratory work	1 (5%)	15 (75%)
Embarking on field trip	0 (0%)	12 (60%)
Cordial teacher-student relationship	20 (100%)	20 (100%)
Heads' supervision during science teaching	6 (30%)	20 (100%)

From Table 2, percentages of the responses to the classroom factors from science teachers in public schools showed that out of the twenty (20) public school science teachers who answered the questionnaire, thirteen (13), representing sixty-five percent (65%) agreed having adequate physical infrastructure for teaching and learning of integrated science at the J.H.S. level. On the other hand, out of the twenty (20) private school science teachers, only seven (7) of them representing thirty-five percent (35%) agreed that they have adequate physical infrastructure to enhance teaching and learning of integrated science at that level.

The observed difference between the public and private teachers on adequacy of physical infrastructure could probably be due to the fact that the physical infrastructure of the public schools are provided by the government and likely to meet the basic requirements as compared to that of private schools which are owned by private individuals, hence resourcing comes with difficulty.

A study conducted by Holly and Michele (1994) indicated that infrastructure such as science library provides suitable opportunity to use the knowledge they have acquired arrive at their own independent conclusions. They further stated that science library facilities enable students to grow in enriched knowledge, ability, skills and interest.

The findings of National Research Council on infrastructure also indicate that science can best be taught when it is done in the right place using the right facilities and equipment. (National Research Council [NRC], 1999).

A similar conclusion was also arrived at by Amitaba, De and Chitragada (2001) who stated that if classroom furniture is not enough, teachers find it extremely difficult to teach as well as affecting ' learning negatively.

Comparing the differences in responses made by the teachers from the two types of schools on the adequacy of physical infrastructure existing in both types of schools, one would expect the public schools to always perform better in integrated science. However, as found in Table 2 more private schools rather perform better in integrated science than in public schools. This shows that physical infrastructure might not be the only factor that positively influences performance in integrated science.

Responses from both public and private science teachers on class size also indicated that they all have large class sizes at the J.H.S. level, representing 100% each. This is an indication that large class size may not necessarily have any effect on performance in integrated science.

Sixteen (16) representing eighty percent (80%) from the public school agreed that they have enough science

resource materials for teaching of integrated science at the J.H.S. level. Only eight (8) of the science teachers from private schools representing forty percent (40%), agreed that they have enough science resource materials for teaching of integrated science at that level.

Although science teachers from public school selected for this study confirmed the availability of science resource materials, as to whether these materials are used effectively during practical activity is another issue. However, it had been indicated in a study by Walklin (1982) that science is a discipline which is understood better through practical activities. In the same study, Walklin (1982) concluded that materials and equipment play a very important role in the teaching and learning of science. It becomes very difficult to explain why many private schools despite fewer science resource materials, continue to perform better in integrated science than public schools. This shows that science resource materials alone might not be the only factor that positively influences performance in integrated science.

UNESCO (2004) in a study indicated that the science teacher needs enough teaching and learning materials in order to help learners to develop scientific skills, knowledge and attitude toward science.

Sixty-five percent (65%) of science teachers in the public school agreed that the method they frequently use in teaching integrated science at the J.H.S. level is the lecture method, ten percent (10%) use activity method of teaching, eighty percent (80%) use demonstration method and five percent (5%) do laboratory work. On the other hand, for the private school science teachers, fifteen percent (15%) agreed to the use of lecture method, seventy-five percent (75%) agreed that the method they frequently use in teaching integrated science at the J.H.S. level is by discussion. Eighty percent (80%) also said that the method they often use in teaching integrated science is mainly activity method; twenty percent (20%) also indicated that they frequently use demonstration method. Seventy-five percent (75%) did laboratory or experiments as a preferred method of teaching integrated science.

The above results from the two types of school indicate that 65% of the public school science teachers as against 15% of the private school science teachers use lecture method in teaching science. However, Brown, Oke and Brown (1982), see lecture method as only preparing the learner to be a good listener, memorize facts and concepts. It can be deduced that majority of teachers in the public schools within the sampled area are not likely to take note of whether the learner understands or not. The advantage of managing time and resources are likely the concern of such teachers (Reisman & Payne, 1987). According to Reisman and Payne (1987), most of teachers who use lecture methods are able to finish a lot of topics within the shortest possible time, but at the disadvantage of the learner. The claimed teaching methodology used by some of the teachers in the public school may account for the low performance exhibited by majority of students in the public schools as shown in Table 2.

None of the twenty teachers in the public school used discussion as a method of teaching. On the other hand, seventy-five percent (75%) of the twenty (20) private school teachers involved students in discussion during integrated science lessons. It appears the discussion as a method of teaching attracts the attention of some science education researchers. For example, Hake (1993) states that discussion as a method of teaching is the best way of helping learners to understand and learn ideas. Hake further indicated in the same study that when learners are allowed to talk about things, it becomes easier to find out their knowledge level in that topic. It has also been echoed in an earlier study by Graves (1985) that in situations where class discussions are frequent, each student develops self confidence, provide excellent opportunity for students to practice their oral communication skills and encourage critical and evaluative thinking. The teachers in the private schools appear to be better positioned to improve understanding of integrated science among their students. However, only two teachers out of the twenty from the public schools reported using activity as a method of teaching integrated science as against seventeen in the private schools. The method of teaching integrated science as reported by teachers in the private schools appear to be more acceptable in some studies compared to those adopted in the public schools. Mensah (1992), for example, found that activity method of teaching science assists learners to discover their own knowledge and also leads to the acquisition of process skills such as measuring, recording, analyzing and interpretation of data which the learners may need in the course of their schooling and working in future. It has also been observed in a study that activity-based method is more of a child-centered approach, as such, children may learn better and faster when they are taught through activities (Reisman & Payne, 1987). This method according to Reisman and Payne (1987) takes full advantage of the students' individual differences and abilities.

This might be one of the reasons why the private schools appear to perform better in integrated science than their public school counterparts.

Majority of the teachers (80%) in the public schools demonstrated in their lessons during the teaching of integrated science as against twenty-five percent (25%) from the private schools. Smith (1987) and Smith (1990) have indicated in their studies that doing demonstration in science lesson only helps learners to acquire skills as against involving them in activities. However, it becomes difficult to imagine the reason why the teachers in the public schools do demonstration than to involve students in activities, since they claimed to be well resourced in

materials and space than private schools.

Only one teacher representing five percent (5%) involved students in laboratory work when teaching integrated science in the public schools. The private schools on the other hand, have fifteen (15) of the twenty (20) respondents representing seventy-five percent (75%) used laboratory work as part of teaching integrated science. Laboratory work is seen to provide scientific literacy and also to prepare students for further study, work and citizenship (Jenkins, 1998), but not much of this is done in the public schools, though the teachers in this type of school agreed to having enough science materials.

None of the teachers in the public schools in this study embarked on field trip as compared to twelve (12) teachers in the private schools who claimed to include field trips in the teaching of integrated science. Field trip is recognized as one of the integral part of the methodology employed in science teaching. For example, Reisman and Payne (1987) have stated that field trip enables learners to see those things they have learnt theoretically and makes learning real. They further indicated that it becomes very difficult for learners to forget what had been learnt and seen in field trip. This method has therefore been recommended for children at the basic level since they are likely to remember easily the things they have been taught and seen (Akpan, 1992).

It appears teachers in the private schools employed more of the accepted methodologies in teaching, especially in integrated science than their counterparts in the public schools. It is therefore easy to conclude that students in the private schools are likely to understand and perform better at tasks.

On the issue of teacher-student relationships, all the teachers from both school types agreed that they have cordial relationships with their students. It has been observed in a study by Balogun (1999) that teachers must create cordial relationship with their students. Balogun (1999) further indicated in the same study that this relationship created must be combined with consistent enforcement of rules so as to promote positive learning atmosphere for students. It has also been said in an earlier study by Brown, Oke and Brown (1982) and discussed by Kuhlen (1999) that students usually want to perceive a teacher who works for their benefits and will make them feel more comfortable. Students want someone they can ask questions when they do not understand something. This shows that creating good relationships with your students alone might not be the only factor that positively influences performance in integrated science.

In the area of supervision, six (6) representing thirty percent (30%) of public school science teachers agreed that they are supervised by their head teachers at most, twice within a given term during integrated science lessons. Those supervisors also discuss their findings with them for improvement in areas of instruction and learning. With their private school counterparts, all the twenty teachers, representing one hundred percent (100%), agreed that they are supervised almost every week by either the head of the respective schools or the owners of the schools concern. The findings during the supervision are also discussed with them. However, supervision is recognized as one of the factors that enhance teaching and learning. For example, Pollard (1994) sees supervision as a tool that results in improving instruction, learning and curriculum. It has also been indicated in a study elsewhere that supervision as a democratic action is designed to ensure improvement in teaching through the continuous growth of all concerned individuals (Neagly & Evans, 1980).

It appears teachers in the private schools are well supervised during integrated science lessons more than their counterparts in the public schools. It can therefore be said that teaching and learning of integrated science will be more effective in the private schools than in the public schools; hence, the private schools are likely to perform better in integrated science than those in the public schools.

Responses on interview items from the integrated science teachers

I: What is the effect of physical infrastructure on your teaching of integrated science?

A1: Physical infrastructure affects my teaching of integrated science. For instance, if the classroom in which I am teaching is pulled down, I don't think teaching and learning would be effective.

A2: Infrastructure really affects my teaching. For example, if students are studying under trees and there is heavy down pour of rains, teaching and learning can't go on successfully.

B1: Physical infrastructure does affect teaching and learning of integrated science. For instance, if there are well furnished classrooms with all needed facilities provided, teaching and learning become enjoyable.

B2: If physical infrastructure is adequately provided, I believe teaching would be effective.

The responses given by the two science teachers from the public school in relation to the effect of physical infrastructure in teaching of integrated science were that adequacy of physical infrastructure really has positive effect on teaching of integrated science. Other studies elsewhere have also shown the importance of physical infrastructure on teaching. For example, a study conducted by Holly and Michele (1994) indicated that infrastructure such as science library provides suitable opportunity for students to use facts in a reproductive way to arrive at their own independent conclusions. They further stated that science library facilities enable students to grow in enriched knowledge, ability, skills and interest.

The findings of National Research Council on infrastructure also indicate that science can best be taught when it is done in the right place using the right facilities and equipment. The findings further indicate that the

right place for the teaching and learning of science is the science laboratory (NRC, 1999).

A similar conclusion was also arrived at by Amitaba, De, F., and Chitrangada (2001) stated that if classroom furniture is not enough, teachers find it extremely difficult to teach as well as affecting students' learning negatively.

I: What methods do you use most during the teaching of integrated science?

A1: I am used to the lecture method of teaching science. This is because there are a lot of topics to be treated but we don't have enough time. The lecture method, to me, saves time. Actually, I don't like the use of methods such as the activity because it's mostly time consuming.

A2: I mostly use lecture method so that I can finished all my topics for the term before the students write their final examinations.

B1: I am always conscious about the method I use in teaching, because if I don't select the right method to teach and the students do not understand and therefore do not pass well, I will be sacked by the owner of the school. This is because, if the students pass very well, a lot of parents will enrol their children thereby, making the owner gets more money. Don't forget that the owner is into profit making. I'm comfortable in using activity-based and laboratory methods. This is because if the children participate fully in the teaching, they do not easily forget what they learn. This is the main aim of using the said methods.

B2: I always like my students to fully participate in the science lessons and therefore I prefer using activity method in teaching integrated science. I sometimes send them to nearby science resource centres for science practical to be performed.

On the issue of the method often used in teaching integrated science, the public school science teachers responded that they are more comfortable with the use of lecture method. This according to them saves time and energy. A study about the use and effect of lecture method on teaching was conducted by Brown, Oke and Brown (1982). The study stated that the use of lecture method makes teaching economical because no laboratory and expensive apparatus are required. According to the study, it also encourages efficiency in time management since a single teacher can teach any number of students at a time. However, Brown, Oke and Brown, (1982), see lecture method as only preparing the learner to be a good listener, memorize facts and concepts. It can be deduced that majority of teachers in the public schools within the sampled area are not likely to take note of whether the learner understands or not. The advantage of managing time and resources are likely the concern of such teachers (Reisman & Payne, 1987). According to Reisman and Payne (1987), most of teachers who use lecture method are able to finish a lot of topics within the shortest possible time, but at the disadvantage of the learner. However, the private school science teachers were comfortable in using activity-based method and embarked on laboratory work. The method of teaching integrated science as reported by teachers in the private schools appeared to be more acceptable in some studies compared to those adopted in the public schools. Mensah (1992), for example, found that activity method of teaching science assists learners to discover their own knowledge and also leads to the acquisition of process skills such as measuring, recording, analyzing and interpretation of data which the learners may need in the course of their schooling and working in future. It has also been observed in a study that activity-based method is more of a child-centered approach, as such, children may learn better and faster when they are taught through activities (Reisman & Payne, 1987). This method according to Reisman and Payne (1987) takes full advantage of the students' individual differences and abilities. It has been said in an earlier study by Jenkins (1998) that Laboratory work is seen to provide scientific literacy and also to prepare for further study, work and citizenship, but not much of this is done in the public schools, though the teachers in this type of school agreed to having enough science materials.

This might be one of the reasons why the private schools appear to perform better than their public school counterparts in integrated science.

I: Comment on the availability of resource materials for teaching integrated science. What are the effects of resource materials on your teaching of integrated science?

A1: We have plenty materials at our disposal to be used in teaching science. I only use some few because I don't actually have so much time. I don't actually see any influence of those resources materials on my teaching. This is because I can still teach without them.

A2: We have a lot of science resource materials at our school. I hardly use them because the kinds of method I use do not require those materials.

B1: We don't have so much science resource materials, but I make sure that the few available in the school are used. At times too I improvise those that I can to supplement my teaching. I have come to realise that the materials do convey a lot of meanings to the children more than using just words.

B2: Only few science resource materials are available in my school. But I try to manage with the few. Sometimes, I visit nearby schools for those that I need to use for science lessons.

Although the two science teachers from public schools selected for this study confirmed the availability of science resource materials, but these materials are not been used effectively during science lessons. However, it had been indicated in a study elsewhere that science is a discipline which is understood better through practical

activities (Walklin, 1982). In the same study, it was therefore concluded that materials and equipment play a very important role in the teaching and learning of science. UNESCO (2004) indicated that the science teacher needs adequate teaching and learning materials in order to help learners to develop scientific skills, knowledge and attitude toward science.

It becomes very difficult to explain why many private schools despite fewer science resource materials, continue to perform better in integrated science than public schools.

I: Comment on the teacher- student relationship during science lessons.

A1: There is cordial teacher-student relationships in my science classroom so as to create an atmosphere where students are able to approach a teacher for assistance when the need arises.

A2: There is good relationship between myself and the students during science lessons. This will enable the students to approach me when they want to do so.

B1: I have good relationship with my students. Having cordial relationship with the students will enable them to ask questions if they want to do so.

B2: I relate with the students as parents do to their children during science lessons.

All the teachers from both school types agreed that they have cordial relationships with their students. It has been observed in a study that when teachers create cordial relationship with their students, it enhances the way they learn. For example, Balogun (1999) stated that teachers must create cordial relationship with their students. Balogun (1999) further indicated in the same study that this relationship created must be combined with consistent enforcement of rules so as to promote positive learning atmosphere for students. It has also been echoed in an earlier study by Brown, Oke and Brown (1982) and discussed by Kuhlén (1999) that students usually want to perceive a teacher who works for their benefits and will make them feel more comfortable. Students want someone they can ask questions when they do not understand something.

I: What will be an ideal class size for an effective teaching of integrated science?

A1: An ideal class should not be more than thirty-five in number. This is because an ideal class to me is a class one should be able to teach, give exercises, mark and discuss students' weaknesses with them so easily. Unfortunately, my science class enrolment is seventy due to the capitation grant provided by the government.

A2: An ideal class for effective science teaching should be less than forty so that the teacher can attend to each and every one when the need arises. Meanwhile, I have seventy-one students in my science classroom.

B1: I have no control over the class size since the more the children, the higher the profit margin of the owner of the school. For this is the ultimate aim of the owner of the school. Nevertheless, I believe that for effective integrated science teaching and learning, the class size should not be more than forty.

B2: Actually, I can say that for effective science teaching, the class size should not be more than thirty. Nevertheless, my class size during science lessons is seventy but I can't do anything about that.

On class size, science teachers from both school types agreed that small class size enhanced effective science teaching but all the four teachers interviewed agreed that they have large class sizes. Studies by Katona (2004) state that larger class size creates frustrations and difficulties in ensuring and maintaining discipline during science teaching. A similar study by Hutt and Viazay and cited by Barley and Wokey (1996) stated that when a group size within a given classroom space increases, students exhibit increased aggressiveness. Another study by Lewis and Doorlag (1995) stated that students' achievement decrease as the number of students in a class increase. Sharing a similar view with Lewis and Doorlag (1995), Hudelson (1982) said that small class size may have sufficient motivational value for a teacher to cause him/her to spend more time in preparation of his/her lesson and thus to produce a better teaching.

I: How often are you supervised during integrated science lessons in a term? Comment on the effect(s) that supervision has on your teaching of integrated science.

A1: I am supervised at most twice in a term. Anytime I am informed about supervision, I make sure I prepare very well for all my science lessons. Therefore, supervision puts me on my toes to work much harder.

A2: I am supervised once every term. Supervision makes me prepared very well.

B1: I am always being supervised by either my head teacher or my proprietor. At times almost the whole week depending on what they are looking for. Because of this, I am always very well prepared before coming to class. Therefore, supervision helps me to do excellent work.

B2: My head teacher supervises my science lessons once every week. As a result of this continuous exercise, I'm always fully prepared before I enter my classroom for my science lessons.

Pollard (1994) stated that supervision is a tool that results in improving instruction, learning and curriculum. It has also been indicated in a study elsewhere that supervision as a democratic action is designed to ensure improvement in teaching through the continuous growth of all concerned individuals (Neagly & Evans, 1980).

It appears teachers in the private schools are well supervised during integrated science lessons more than their counterparts in the public schools. It is therefore easy to conclude that teaching will be more effective in the private schools than in the public schools; hence, students in the private schools are likely to perform better in integrated science than those in the public schools.

Conclusions

The purpose of the study was to find out the opinions of public and private Junior High School science teachers on the classroom factors that affect performance of students in integrated science in public and private junior high schools in the Kumasi metropolis. Based on the findings of this study, it can be concluded that it is very important for integrated science teachers to be aware that classroom factors such as teacher-student relationship, availability of science resource materials, teaching methods employed by teachers, class size, supervision and physical infrastructure are likely to affect performance of students in integrated science at the J.H.S. level in the Kumasi metropolis. The findings revealed that the selected public schools within the Kumasi metropolis were well resourced with the following: adequate physical infrastructure, adequate science resource materials, adequate science text books and adequate trained science teachers as against their private school counterparts with inadequate physical infrastructure, inadequate science resource materials, inadequate science text books and few trained science teachers.

Recommendations

1. Policy makers responsible for the Kumasi metropolis should make every effort to integrate the private schools in their planning concerning the provision of materials as in the public schools
2. Effective supervision must be performed regularly by heads of schools during integrated science lessons. The heads of the public JHS especially, those in the Kumasi metropolis must be made to regularly ensure that their science teachers teach very well during integrated science lessons.

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