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The Teaching of Science: Challenges and Prescription

Fiifi Mensah[1] (PhD), Beatrice Asante Somuah[2*]
1. Department of Basic Education, University of Cape Coast, Cape Coast
2. Centre for Continuing Education, University of Cape Coast, Cape Coast
*Email of corresponding author: asantebeatrice@gmail.com

Abstract
This is an investigative and explorative study into the challenges of teaching Integrated Science in the public Junior High Schools in the Kwahu West Municipality. The study took a look at the challenges that might exist to hinder the performances of the science teachers. All the 60 Integrated Science teachers, the 50 heads of public Junior High Schools as well as the eight circuit supervisors and science coordinators in the Municipality were purposively selected for the study. A descriptive survey design was used for the study. Data were collected with a set of questionnaire and an interview schedule and were analysed using frequencies and percentages. The results indicated that the science teachers faced some challenges in dealing with the content of Integrated Science in the Junior High Schools. It was, therefore, recommended that there is the need for regular organisation of professional development activities such as induction and in-services by the Ghana Education Services to help them deal with the challenges.
Keywords: Pupils' behaviour, scope and difficulty level of Integrated Science syllabus, instruction and assessment approaches, learning environment, professionalism

1. Introduction

The growing trend of knowledge of science and technology is by no means a major contributing factor to the economic transformation of most of the world's economies. Science has changed the way the natural universe was viewed. When joined with engineering, modern technology and the global economic system; the methods and results of scientific inquiry are found to have profoundly affected humanity's material and societal progress. Bush (1945, p.34) aptly describes scientific endeavour when he stated that:

> Advances in science when put to practical use mean more jobs, higher salaries, reduction in hours of work, more abundant crops, more leisure for recreation, for study, for learning how to live without the deadening drudgery which has been the burden of the common man for ages past. Advances in science will also bring higher standards of living, will lead to the prevention or cure of diseases, and will promote conservation of our limited national resources. But to achieve these objectives, the flow of new scientific knowledge must be both continuous and substantial.

The fast advances in science and technology have influenced the rate of economic development of nations, improved the quality of life in most parts of the world, and provided solutions to some major problems and needs of societies. The impact of science and technology is felt on education, health, nutrition, transport and communication. Our continued existence depends on the mastery of the knowledge and attitudes of science and technology (Anderson, 2006).In view of this, a country like Ghana needs scientific literate citizens who can make informed choices in their personal lives and approach challenges in the workplace in a systematic and logical order. They also need to become competent professionals in the various scientific disciplines who can carry out research and development at the highest level. Therefore, the general aims for science education at the basic level are meant to help pupils to:

a. Develop understanding of scientific concepts and principles;
b. Develop an appreciation for the application of science to life;
c. Think and act scientifically; and
d. Develop scientific attitudes towards life (MoESS, 2007).

In order to realise the above goals, Ghana has sought to increase and sustain interests in science and technology and in science related programmes at the basic, secondary and tertiary levels of education. The Ministry of Education
(MOE) in the 1987 Educational Reforms, encouraged the acquisition of scientific knowledge through the study of General Science and Agricultural Science respectively. But upon several educational reforms, the Integrated Science curriculum has been introduced which integrates General Science, Agriculture and Technology as a unit subject (MoESS, 2007). According to MoESS (2007), the Integrated Science syllabus is a conscious effort to raise the level of scientific literacy of all students and equip them with the relevant basic scientific knowledge needed for their own living and also needed for making valuable contributions to production in the country.
In support of this goal, international organisations and non-governmental organisations and agencies who have the concern for quality of teaching and learning in basic schools in Ghana, have continued to provide assistance

and intervention to improve education in basic schools. Some of these international organisations include the European Union, World Bank, World Vision International and United States Agency for International Development (USAID). The Ghana Education Service is also doing all it can to strengthen the monitoring and supervision of teaching and learning in the basic schools. Two of such measures are the introduction of Performance Monitoring Test (PMT) and School Performance Appraisal Meeting (SPAM) by the various communities and educational authorities.

Despite the great deal of activities that are being directed towards the teaching of science, studies have shown that a large numbers of students seem to learn very little science at school. For example, Salau (1996) has argued that science learning at school tends to be rote and students still find the learning of science to be difficult. The quality of science teaching and learning is questionable because of the poor performance of a great number of junior high school students in Integrated Science. For example, Ghana participated in Trends in International Mathematics and Science Study (TIMSS), a worldwide assessment which takes place every four years and provides data about trends in Mathematics and Science achievement over time in 2003 and 2007. This programme used pupils in their second year in the Junior High Schools. The international score for science in 2003 was 474 and Ghana's score was 255. In 2007, though Ghana registered an improvement by scoring 303 in science, her score was one of the lowest and it was statistically significantly lower than the TIMSS scale average of 500. This poor performance placed Ghana at the 48th or last position on the overall science achievement results table when the 48 participating countries were ranked by their mean performances. Thus, Ghana's performance in science remains one of the lowest in Africa and the world (Anamuah-Mensah, Mereku, & Ampiah, 2009). This raises a serious question about the quality of the teaching of science especially in the basic schools which forms the foundation for the study of science at both the secondary and tertiary levels of education. The goal of the Ministry of Education, Science and Sports (MoESS) for science teaching and learning is to raise the level of scientific literacy of all students and equip them with the relevant basic integrated scientific knowledge needed for their survival and for the development of the country (MoESS, 2007). It is also expected that scientific experiences in school will help cultivate in pupils an interest and love for science that will urge some of them to seek further studies in science as preparation for careers in science. For a successful study of science at the basic level, the curriculum requires that pupils should have good observational skills, mathematical skills and communication skills (CRDD, 2007).

The goal for science teaching and learning as indicated above is not being achieved fully as a result of poor performance of most students in the core subjects which include science. Bonney (2009) reports that just a little over 50 per cent of the candidates who sat for the Basic Education Certificate Examination (BECE) in 2009 qualified for placement into Senior High Schools and Technical Institutes (Daily Graphic, August 27, 2009). This was because most of them could not get a pass in all the four core subjects, especially in Integrated Science. Also, the Chief Examiners' Reports for BECE (West African Examination Council [WAEC], April, 2008) and (WAEC, April, 2009) confirmed this by reiterating the poor performances of students in Science. Since these results represented a summary of the total performances of the pupils across all districts in the country, Kwahu West Municipality was not an exception to this sad phenomenon. To confirm this, data were collected from the Kwahu West Municipal Education Office. The data showed that out of the 2,125 candidates presented for the Basic Education Certificate Examination (BECE) in the 2009, 909 pupils failed (that is, making grades above aggregate 5) in General Science. This represents 43% of the total number of candidates who wrote the examination that year. In 2010, out of the 2,038 candidates who wrote the examination, 1167 passed representing 57% of the total number of candidates presented by the Municipal Education Office. Again, 872 candidates failed in General Science representing 43% of the total number of candidates who wrote the examination that year. The picture was not so much different in 2011 though a little improvement was recorded as depicted in the summary of the results shown in Table 1.

Table 1: Summary of BECE Passes in Science

Year	No. of Students	No. passed	%	No. failed	%
2009	2125	1216	57.0	909	43.0
2010	2038	1167	57.0	872	43.0
2011	2064	1227	59.0	837	41.0

Source: Municipal Education Office, Kwahu West

Based on the above analysis, it may be concluded that the future looks gloomy for the Kwahu West Municipality if for three consecutive years about 42% the pupils who completed Junior High Schools could not gain access into the Senior High Schools because they failed in Science which is a core subject. This study aimed at investigating the challenges teachers faced in the teaching of Integrated Science in the Junior High Schools in the Kwahu West Municipality. Specifically, the study sought to answer the following questions:

(a) How do integrated science teachers in the Kwahu West Municipality view the scope and difficulty of integrated science syllabus?

(b) What topics in integrated science syllabus do teachers in the Kwahu West Municipality find difficult to teach?
(c) (c) How do teachers in the Kwahu West Municipality perceive students' behaviour towards the learning of integrated science?
(d) (d) How do integrated science teachers in the Kwahu West Municipality approach instruction and assessment of integrated science lesson?
(e) In what ways do the Integrated Science teachers in the Kwahu West Municipality develop themselves professionally?

2.0 Methodology

The study adopted a census sampling technique which was appropriate because the population was not large enough to be sampled. This is in line with the view of Nwana (1993, p.58) that every member of the population should be studied "when the population size of the whole population is small". Also, according to Krejcie and Morgan (1970) for smaller population say N=100 or fewer, there is little point in selecting a sample, rather the entire population must be surveyed. Based on the above assertions, the study had the following as the sample; 60 Integrated Science teachers and 50 headteachers of the public Junior High Schools, 7 circuit supervisors and one science coordinator. In all, the study had a total of 118 participants. The Integrated Science teachers, heads of schools, circuit supervisors and the science coordinators who formed part of the sample were all selected. This technique was more appropriate because they were the right people from whom the needed information could be solicited to meet the purpose of the study and also the view of every member was considered as important (MacMillan, 2004; Nwana, 1993).

2.1 Research Design

The research design used for the study was the descriptive survey. The descriptive survey is directed towards determining the nature of a situation as it exists at the time of the study. This design describes and interprets events as they occur (Best & Kahn, 1993). It is versatile and practical in that it identifies present conditions and points to recent needs. It has the characteristics of analysing the relationships, differences and trends that contribute to the challenges teachers face in the teaching of Integrated Science in the Junior High Schools. By this approach, the researcher could find clues to answer research questions which involved classroom related challenges (Cohen, Manion & Morrison, 2000; Sarantakos, 2005). Survey is also considered as the best approach for the study because it is a relatively inexpensive way of getting information about people's attitudes, beliefs and behaviours. It assures manageability of the collected data. It also involves asking the same question or questions prepared in a written questionnaire to a large number of individuals (Mitchell & Jolley, 2004; Fraenkel & Wallen, 2000).

Fraenkel and Wallen (2000) identified three major difficulties associated with descriptive surveys. The first difficulty is ensuring that the questions to be answered are clear and not misleading. The second is getting respondents to answer questions thoroughly and honestly. The third has to do with the difficulty of getting sufficient number of questionnaire completed and returned for meaningful analysis to be made. The above problems were overcome through the use of simple words, appealing to respondents to be frank and truthful and also making effective follow-ups during questionnaire administration. The study also adopted a census survey because data were collected from the entire population.

2.2 Instrument

Questionnaire and semi-structured interview guide were the main instruments for data collection in the study. The questionnaire was used to gather information from the Integrated Science teachers and heads of public Junior High Schools while the semi-structured interview guide helped in gathering data from the circuit supervisors and the science coordinator. The questionnaire and the interview guide were developed through the extensive use of literature and consultations with fellow research colleagues. The questionnaire was pilot – tested and it yielded Cronbach's Alpha value of 0.79 which suggests that the items were measuring the same thing (Vogt, 1999).

2.3 Procedures

Permission was sought from the Municipal Director of Education, Kwahu West, who is in charge of the schools selected for the study, to seek the approval for access to the schools. Two weeks were devoted for the distribution of the questionnaire in all the seven circuits. The collection of the questionnaire also took another two weeks. In all, four weeks were used for data collection which were administered by the two researchers and had a return rate of 100 percent.

3.0 Results and Discussions

Information was elicited from respondents to determine how the integrated science teachers viewed the scope and difficulty of integrated science syllabus. Table 2 presents the results. The results from Table 2 indicate that

majority of the respondents 53 (88.3%) agreed that the scope of the Integrated Science syllabus was too broad. On how difficult it was to teach Integrated Science due to the integration of pure sciences and technology, the results revealed that, while 31 (51.7%) of the respondents agreed to the statement, 25 (41.6%) disagreed and 4 (6.7%) were found in a quandary. The teachers showed diverse views on the statement that teaching practical lessons were difficult. While 31 (51.6%) agreed to the statement, 26 (43.3%) disagreed to it. However, the indication here is that about half of the teachers expressed their difficulty in dealing with practical lessons confirming the assertion made by the WAEC (April, 2008) that most students found it difficult to answer questions on practical work. It can also be observed that 52 (87.2%) agreed with the statement which indicated that teachers must possess knowledge in pure science and technology to be able to handle the subject well. This outcome is consistent with the argument raised by Interstate New Teacher Assessment and Support Consortium (INTASC, 2002) that being prepared adequately, in terms of coursework in science, seems likely to be critical for becoming an effective science teacher. The indication from the results is that majority of science teachers in the Kwahu West Municipality were overwhelmed by the broad and the diversity nature of Integrated Science. This was confirmed by the circuit supervisors and the science coordinator during the interview session. A circuit supervisor remarked that science teaching ought to be practical but with the lack of the teaching and learning resources and expertise most lessons taught were theoretical and abstract. He added that some teachers also complained of the broad and diverse nature of the subject during the interactions they had with the teachers after supervision sessions.

Table 2: Teachers' View of the Scope and Difficulty Level of Integrated Science Syllabus

Statement	SA		A		U		D		SD	
	f	%	f	%	f	%	f	%	f	%
The scope of Integrated Science syllabus is too broad	33	55.0	20	33.3	0	0.0	6	10.0	1	1.7
Integrated Science is difficult to teach because of the integration of pure sciences and technology	4	6.7	27	45.0	4	6.7	20	33.3	5	8.3
Teaching practical lessons in Integrated Science is difficult	11	18.3	20	33.3	3	5.0	18	30.0	8	13.3
Teachers must possess knowledge in pure sciences and technology before teaching integrated science	33	55.5	19	31.7	1	1.7	4	6.7	3	5.0

N =60; SA = Strongly agree; A = Agree; U = Uncertain; D = Disagree; SD = Strongly disagree
Source: Field Data, 2011

Respondents were further asked to state topics in integrated science syllabus they find difficult to teach. Results are shown in Table 3.

Table 3: Topics in Integrated Science Syllabus Teachers find Difficult to Teach

Statement	VD		D		SD		ND	
	f	%	f	%	f	%	f	%
Fish culture	0	0.0	5	8.3	11	18.3	44	73.3
Respiratory system	0	0.0	7	11.7	17	28.3	36	60.0
Basic electronics	12	20.0	26	43.3	16	26.7	6	10.0
Metals and Non-metals	0	0.0	5	8.3	17	28.3	38	63.3
Chemical Compounds	7	11.7	13	21.7	16	26.7	24	40.0
Carbon cycle	1	1.7	5	8.3	18	30.0	36	60.0
Electrical energy	1	1.7	12	20.0	18	30.0	29	48.3
Acids, bases and salts	2	3.3	7	11.7	22	36.7	29	48.3
Magnetism	1	1.7	2	3.3	15	25.0	42	70.0
Tech. and development	0	0.0	7	11.7	17	28.3	36	60.0
Machinery	0	0.0	4	6.7	17	28.3	39	65.0

N = 60; VD = Very difficult; D = Difficult; SD = Somehow difficult; ND = Not difficult.
Source: Field Data, 2011

An inspection of the results presented in Table 3 shows that with the exception of topics such as Basic Electronics and Chemical Compounds, most the respondents felt that most of the topics were not difficult to handle or teach. This is in line with the WAEC (April, 2008) which indicated that emphasis should be laid on the teaching of items on Physics and Chemistry in the syllabus as students performed poorly in these areas. The indication is that items on Physics and Chemistry were not well taught by the science teachers. As indicated in the results, most of them had difficulty handling the topics. It can also be observed that even though 38 (63.3%) of the respondents saw the teaching of Basic Electronics as difficult, 22 (36.7%) claimed they did not have difficulty in teaching the topic. In much the same way, 20 (33.4%) of the respondents felt that the handling of

Chemical Compounds was difficult while 40 (60.7%) saw it as not difficult. The science coordinator confirmed this during the interview session and explained that there were some topics which were quite technical and most teachers found it a bit difficult to handle. As portrayed by the results, she indicated that teachers' capability in handling science topics was about 70% as far as she had observed.

Teachers were asked to state how they perceived students behaviour towards the learning of Integrated Science. Table 4 presents the responses. The teachers showed divided views on the statement that pupils were not interested in learning science. While 31 (51.7%) disagreed to the statement, 22 (36.7%) agreed to it, with 7 (11.7%) not being able to take a position. Again most teachers, that is, 39 (65.0%) out of 60, agreed that pupils do not handle science equipment efficiently. The results also show that 47 (78.3%) of the teachers disagreed that pupils did not pay attention in science class with only 7 (11.7%) supporting this view. The general picture as depicted by the results confirm the findings of Gurney (1995) and Rodriguez (1998) which indicated that teachers hold varied perspectives on learners and are sometimes overwhelmed about working with diverse students. The results also revealed that majority of the science teachers agreed with the observation made by the WAEC (April, 2008) that students had poor grasp of scientific concepts and terms which contributed to the low scores and therefore called for drills on correct use and spellings of scientific language and terms by teachers to help improve students' performance at the BECE level.

Table 4: Teachers' Perception of Pupils' Behaviour towards the Learning of Science

Statement	SA		A		U		D		SD	
	f	%	f	%	F	%	f	%	f	%
Most scientific concepts are difficult for pupils	23	38.3	26	43.3	2	3.3	8	13.3	1	1.7
Pupils are not interested in learning science	6	10.0	16	26.7	7	11.7	24	40.0	7	11.7
Pupils do not handle equipment well	11	18.3	28	46.7	6	10.0	14	23.3	1	1.7
Pupils do not do homework	2	3.2	13	21.7	4	6.7	31	51.7	10	16.7
Pupils do not pay attention during science lesson	0	0.0	7	11.7	6	10.0	35	58.3	12	20.0
Pupils do not like the experimental nature of science	2	3.3	10	16.7	4	6.7	29	48.3	15	25.0

N = 60; SA = Strongly agree; A = Agree; U = Uncertain; D = Disagree; SD = Strongly disagree.
Source: Field Data, 2011

The study also sought to find out how teachers approached instruction and assessment of Integrated Science lesson. The results are shown in Table 5.

Table 5: Teachers' Approach to Instruction and Assessment of Integrated Science Lesson

Statement	EL		ML		SL		NL	
	f	%	F	%	f	%	F	%
I use the required TLMs	8	13.3	19	31.7	33	55.0	0	0.0
I demonstrate experiments for my students to watch	6	10.0	19	31.7	35	58.3	0	0.0
I plan experiments alone	6	10.0	13	21.7	30	50.0	11	18.3
I conduct experiments with students	10	16.7	29	48.5	21	35.5	0	0.0
I make my students work in small groups	5	8.3	20	33.3	33	55.0	2	3.3
I give my students homework every week	21	35.0	25	41.7	13	21.7	1	1.7
I make my students write class tests	18	30.0	30	50.0	12	20.0	0	0.0

N = 60; EL = Every lesson; ML = Most lessons; SL = Some lessons; NR = Never.
Source: Field Data, 2011

It can be noted from the results that the assessment process most frequently used by teachers was giving homework to pupils after science lessons. Majority of the teachers 59 (98.3%), indicated that they gave homework to their pupils after lessons. On the use of required teaching and learning materials during science lessons, only 8 (13.3%) of the teachers reported using it in every lesson, 42 (84.7%) of them indicated that they did use some amount of teaching and learning materials during science lessons. The results also indicated that only 11 (18.3%) teachers reported that they never planned experiments alone. The others, that is 49 (81.7) teachers said they did plan science experiment alone most of the times. Abell, Bryan and Anderson (1998) found that lack of clarity of meaning of scientific concepts could act as obstacles as teachers develop their ideas about instruction. Thus, for more sophisticated ideas or practices with regard to instruction and assessment, Settlage (2000) supports that the teacher may need support to identify effective instructional representations or to develop their own. A critical look at the results presented in Table 5 show that most of the responses fell between "most lessons" and "some lessons". This gives the impression that the science teachers were trying their best in these areas of concern.

To investigate challenges teachers face in the management of learning environment, the results obtained from the teachers have been analysed and presented in Table 6.

Table 6: Understanding the Learning Environment

Statement	SA		A		U		D		SD	
	f	%	f	%	f	%	f	%	f	%
I am able to stop my lesson on time	7	11.7	26	43.3	8	13.3	12	20.0	7	11.7
I am able to vary teaching methods	23	38.3	34	56.7	1	1.7	1	1.7	1	1.7
I deliver lessons in line with lesson plan	19	31.9	34	56.7	4	1.7	1	1.7	2	3.3
What I say is final in content knowledge	7	11.7	9	15.0	8	13.3	26	43.3	10	16.7
I normally use cane in science class	3	5.0	10	16.7	6	10.0	25	41.7	16	26.7
Students come with science problems	15	25.0	28	46.7	2	3.3	8	13.3	7	11.7
Some students skip science lessons	5	8.3	9	15.0	7	11.7	24	40.0	15	25.5

N = 60; SA = Strongly agree; A = Agree; U = Uncertain; D = Disagree; SD = Strongly disagree.
Source: Field Data, 2011

The results show that majority of the respondents declared that they varied their teaching methods to maintain high level of pupils' attention. It could be observed that 57 (95.0%) out of the 60 respondents agreed to this. It is also worth noting that most of the respondents disagreed with the view that the teacher was the finality of knowledge during science lessons. The results show that even though 16 (26.0%) of the respondents agreed to the statement, 36 (60.0%) of them disagreed. These outcomes confirm the assertion of the Ministry of Education, Science and Sports (MoESS, 2007) that the teacher is to serve as a facilitator and motivate the pupils in various ways to sustain their interest. Again, 43 (71.7%) of the teachers agreed that students did come to them with problems in science topics even after classes with 15 (25.0%) of them indicating a disagreement to the statement. In the same way, 41 (68.0%) teachers said they never used the cane to correct students' misbehaviour in a science class though 13 (21.7%) said they normally did that. These outcomes, however, are in the right direction because Interstate New Teacher Assessment and Support Consortium (INTASC, 1992) asserts that teachers need to use their knowledge of effective communication techniques to foster active inquiry among the students. This will also help create collaboration, supportive interaction and a productive classroom culture needed for effective science lessons to take place (Geddis & Roberts, 1998). Thus, science teachers need to create the needed rapport in class to help build up the pupils' interest in science.

The last theme under the classroom-related challenges of Integrated Science teachers looked at understanding of professionalism. This covered activities teachers undertook to enable them improve upon their professional abilities. The responses were summarised using frequencies and percentages and presented in Table 7. It could be observed from the results that 39 (65.0%) of teachers indicated that they often discussed how to teach some scientific concepts with other teachers. Again, even though 27 (45.0%) of the respondents indicated that they consulted others colleagues to help prepare instructional materials, as much as 33 (55.0%) responded that they hardly or never did that. The interview with the circuit supervisors also revealed that most teachers in the Municipality, especially those in the rural areas, as a result of distance found it difficult to seek help from their colleagues in other schools to enable them teach effectively. This outcome contradicts the view that teachers need to develop relationships with all of their constituencies, including colleagues to enable them grow professionally (INTASC, 1992). However, it is quite encouraging to note from the results that most of the respondents admitted that they got access to current science books to help update their knowledge and also took of advantage opportunities available to upgrade themselves. This is depicted in a higher percentage scores such as 86.7% representing 52 respondents said they had frequent access to current science books while 55 (91.7%) confirmed that they took up opportunities for upgrading themselves. The indication is that most teachers had not stop learning because for teacher-effectiveness in the teaching-learning process a sound knowledge base of the teacher is very crucial. This also falls in line with the view of Ukeje, Akabogu and Ndu (1992) that in any profession, if a practitioner ceases to study, that professional ceases to be effective.

Table 7: Activities to Improve Teachers' Professional Development

Statement	VO		QO		SD		NR	
	f	%	f	%	f	%	f	%
I discuss how to teach science concepts with other teachers	10	16.7	29	48.3	19	31.7	2	3.3
I prepare instructional materials with other teachers	7	11.7	20	33.3	19	31.7	14	23.3
I get access to current science books	34	56.7	18	30.0	4	6.7	4	6.7
I take advantage of opportunity to upgrade	30	50.0	25	41.7	4	6.75	1	1.7
I attend refresher courses on science contents	10	16.7	25	41.7	19	31.7	6	10.0
I attend meetings organised by subject association	19	31.7	21	35.0	11	18.3	9	15.0

N = 60; VO =Very often; QO = Quite often; SD = Seldom; NR = Never
Source: Field Data, 2011

4.0 Conclusions

The study showed that the Integrated Science teachers felt that the scope of the subject was broad and diverse and teachers needed to have good content knowledge in technology and pure sciences to be able to handle the subject effectively. It also came to light that the science teachers faced difficulty in handling topics in Basic Electronics and Chemical Compounds. The study revealed that teachers held varied perspectives about students' learning. As some teachers felt students showed interest in learning science others said otherwise. However, most teachers confirmed that students showed difficulty in dealing with scientific terms and concepts. Finally, the results brought to light that, the science teachers were doing their best in assessment and instructional processes in science lessons and took advantage of activities and facilities available to develop professionally in order to maintain their effectiveness. It can therefore be concluded from the study that the science teachers in the Kwahu West Municipality faced some challenges in the teaching of Integrated Science in the Junior High Schools. This was most prevalent in the challenges relating to the understanding of the content and disciplines in science. This was closely linked with the lack of appropriate and adequate teaching and learning resources such as science equipment and science workshops. These challenges seemed compounded with pupils' inability to grasp scientific terms and concepts. In the light of the research findings and conclusion, the following recommendations are made:

1. The Ghana Education Service (GES) need to place more emphasis on the regular organisation of science-specific induction and in-service training programmes for both beginning and experienced teachers especially before a new school term begins. Alternatively, the heads of schools could be well resourced to enable them play this vital role.
2. Science lessons should be more practical oriented to motivate students.
3. The science teachers need to be supported regularly by the GES to enable them identify effective instructional and assessment approaches.

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