GHANAIAN JUNIOR HIGH SCHOOL SCIENCE TEACHERS' PRACTICE OF CONTEXTUALISED SCIENCE INSTRUCTION

Ernest I. D. Ngman-Wara
University of Education, Winneba
GHANA

ABSTRACT

The study investigated Junior High School (JHS) science teachers' practice of contextualised science instruction. The study employed descriptive survey design with qualitative approaches to collect data. The sample consisted of ten Junior High School science teachers. Classroom observation schedule and semi-structured interview schedule were used to collect qualitative data on teachers' practice of contextualised science instruction. Some key findings that emerged in the study were: The Junior High School science teachers' model for contextualised science instruction reflected mixed teaching methods, a dominant teacher-centred classroom with increased accommodation for learner-centred approaches. A number of implications for contextualised science instruction were made. Recommendations made to the Regional Directorate of the Ghana Education Service included the use of in-service training programmes to improve the JHS science teachers' use of contextualised instructional skills in their science lessons.

Keywords: Contextualised science instruction, Junior High School science, science teachers, contextualization.

INTRODUCTION

The main goals of the Junior High School (JHS) science curriculum include enculturation of scientific and technology within Ghanaian society and to make every Ghanaian citizen a science and technological literate (Curriculum Research and Development Division [CRDD], 2007, 2012; Ministry of Environment, Science and Technology [MEST], 2009). It is for this reason that science teachers are required to relate the science content to the cultural and social milieu of the learner so that they can apply the knowledge to solve societal problems. Also, it is believed that when students are taught in a context that closely resembles the situation in which they will have to apply the information a greater chance of transfer of learning occurs (Schell & Black cited in Shamsid-Deen & Smith, 2006).

The importance of context in teaching and learning science is re-echoed by social constructivists who view the context in which learning occurs as central to learning itself (Lave, 1978; Vygotsky, 1978; McMahn, 1997). The chances of enabling students transfer learning from teaching setting to real life situations may increase when science teachers use contextualised instructional strategies.

According to the Merriam-Webster Dictionary (2001), to contextualise means to place (a word or activity) in a context and a context is defined as the interrelated conditions in which something exists or occurs. Contextualising then refers to looking at something in the setting or situation in which it is used or developed. Building from this definition, contextualising science instruction refers to the utilization of particular situations or events that occur outside of science class and are of particular interest to students to guide the presentation of science ideas and concepts (Rivet & Krajcik, 2008; Smith, 2010) to promote understanding of the

ISSN 2056-5852

content being taught. Linn and colleagues (Davis & Linn, 2000; Linn & His, 2000) also describe contextualised instruction as a process of knowledge integration which uses the ideas that students hold prior to instruction as the building blocks to an active process of linking, connecting, distinguishing, organizing, and structuring understandings of scientific phenomena. Therefore, contextualised teaching is a concept of relating subject matter content to meaningful situations that are relevant to students' lives.

Proponents of contextualised teaching feel that students who learn in a contextual environment are simultaneously introduced to the relevance of the learning content, which commensurately improves motivation (Schell & Black cited in Shamsid-Deen & Smith, 2006, Baker, Hope' & Karandjeff, cited in Shan, 2011). Also, contextualised science instruction strategies will promote deep and lasting learning (Fahraeus, 2013). Thus, the context in which the learning occurs as well as the social contexts that the learners bring to their learning environment are crucial to the learning itself.

The benefits of contextualised science instruction are worthy of consideration in any national science curriculum. In Ghana this is reflected in the various revised Junior High science syllabi (CRDD, 2001; 2007; 2012) where learner-centred instructional approaches are recommended. The science teachers are mandated to create an activity-oriented science classroom environment in which the pupil actively constructs scientific knowledge through interaction with his/her existing knowledge and ideas provided by materials, other pupils and the science teacher. However, the ability of the science teacher to relate science and technology to the socio-cultural contexts of the pupil will depend on how the teacher implements contextualised science instruction.

There is dearth of literature on science teachers' practice of contextualised science instruction. The closest is in a study in which teachers' professional growth was facilitated through their involvement in creating context based materials in science (George & Lubben, 2002). Other studies involved the role of science teachers in the use of science textbooks as context for science teaching (Lubben, Campbell, Kasanda, Kapenda, Gaoseb & Kandjeo-Marenga, 2003), leveraging students' prior knowledge and experiences to foster understanding of students (Rivet & Krajcik, 2003) and the use of everyday context in contextualised science instruction (Kasanda, Lubben, Gaoseb, Kandjeo-Marenga, Kapenda, & Campbell, 2005). These studies affirm the role of the science teacher as a facilitator in a contextualised science classroom. However, the implementation of contextualised science instruction will depend on the science teachers' willingness to do so. As an innovative teaching approach contextualised science instruction may pose a challenge to the science teacher's beliefs and conceptions of science teaching and their current classroom practices.

Substantial body of research reported by Metto and Makewa (2014) suggests that teachers' beliefs and values about teaching and learning affect their teaching practices. Teacher beliefs are probably the most important factor in determining the success or failure of a new approach to teaching (Schieba & Karabeininck cited in Metto & Makewa, 2014). Metto and Makewa argued that successful curriculum change is mostly likely to occur when the curriculum goals relating to teachers' practice take into account the teachers' beliefs.

Some teachers react negatively to learner-centred instruction because they feel that, implicit in the notion, is a devaluing of their own professional roles. Others believe that it involves handing over to the learner duties and responsibilities that rightly belong to the teacher (Massouleh, & Jooneghani , 2012). Again as an innovative teaching approach contextualised

ISSN 2056-5852

science teaching instruction may come with demands of some a new methodology (Bennie & Newstead, 1999) to be learned by the teacher if his/her competencies do not meet the demands of the innovation. If teachers' classroom practices are inadequate to meet the new instructional strategies associated with contextualised science instruction, then they may be reluctant to practise it.

It is therefore desirable to investigate science teachers' practice of contextualised science instruction before a demand can be made on them to effectively utilize it. The study investigated the current status of Ghanaian Junior High School Science teachers' practice of contextualized science instruction.

LITERATURE REVIEW

Contextual teaching and learning/contextualised instruction is influenced by Dewey's (1916) pragmatist philosophy, which stresses the priority of experience over theory. According to him, we learn to think and reason by thinking and by tackling real problems which arise in our experience. Dewey advocated a curriculum and a teaching methodology that is tied to the child's experiences and interests as well as to the physical and social contexts, in which learning takes place. The real-world experiences of the learner become the basis of teaching. The teacher facilitates learning by helping students to formulate meaningful questions and devise strategies to answer these questions and the answers discussed through real world experiences (Massouleh, & Joonegharu, 2012). It is therefore important to situate teaching and learning of science within the cultural and social context of the child, hence the choice of situated learning theory as the theoretical framework to guide the study.

Situated learning theory strongly advocates for contextualised science instruction that will use the prior knowledge and daily experiences of the learner as referents in order to make science teaching and learning relevant to the learner. The theory sees learning as the transformation of experience into knowledge within the cultural and social context of the individual learner (Lave, 1988). Ghanaian children learn many things at home and in their social context. They learn through interaction with his/her socio-cultural milieu within the community of practice. The adults (that is, teachers and parents) and more capable peers provide the scaffolding for higher cognitive development in the child (Vygotsky, 1978). Learning takes place either through observation, imitation or active participation depending on the age of the child (Akyeampong, 2001). Therefore, situated learning theory finds a place in the modes of learning encountered in the cultural practices of Ghanaian societies.

Building on pupils' prior knowledge, personal experiences and previous classroom events

Building on the knowledge, skills, beliefs and attitudes learners bring to school is a basic trait of learner-centred instruction including contextualised instruction (Weiner cited in Tawalbeh & AlAsmari, 2015). Pupils learn and remember new information best when it is hooked to relevant prior knowledge. Contextualised instruction is seen to be the means to bridge the gap between the learner's prior knowledge, personal experiences, previous classroom events and school science learning. This is because learning is a process of building on existing knowledge (Bransford, Brown & Cocking cited in Rivet & Krajcik, 2008). However, in order to begin this process of learning, students' prior knowledge, personal experiences in real-world settings and in various learning environments such as previous classroom activities first need to be activated (Rivet & Krajcik, 2008).

Activation of students' prior knowledge and personal experiences is done by engaging the students in meaningful problems that establish a need-to-know situation for learning. By embedding learning in problems and situations that are meaningful for students, the legitimacy and relevance of their prior knowledge is made more transparent (Brown, Collins, & Duguid, 1989). This process helps the learner prepare conceptually for addressing the topic at hand as well as fostering interest and relevance in the content (Land cited in Rivet & Krajcik, 2003).

Rivet and Krajcik (2008) carried out a study which focused on contextualising instruction in two urban middle school classrooms, looking particularly at how students used the contextualising aspects of a project-based instruction and its relationship to their science learning. The study sample comprised 60 grade 8 students from two urban middle school classrooms, 30 from each school. Two science teachers, one with twenty years teaching experience and the other with two years teaching experience were also used in the study. Pre/post tests were administered and target students' final artefacts were collected and evaluated. The findings provided evidence to support claims of contextualising instruction as a means to facilitate student learning.

Kasanda, et al. (2005) investigated the use of out-of-school everyday contexts in Namibian science classrooms as indicator of the ways that learner-centred approaches are implemented in class. The data on classroom activities were collected in 11 junior secondary science lessons and in 18 senior secondary science lessons of 12 teachers in six classes. Verbal classroom discourse and teacher-group interactions during group work were audio-taped and transcribed verbatim. The results showed that more everyday contexts were used in junior secondary than senior secondary science classes and that only a limited range of types of everyday contexts were used at both levels. Also their use often followed theoretical exposition or teacher questioning. These findings were related to three interpretations of learner-centred teaching, namely, common out-of-school experiences, use of common objects and to personalised stories.

Everyday knowledge in the science classroom

Learners' everyday knowledge can be used in the curriculum in a number of ways, namely: 1) as a starting point for learning science, 2) as a reference point for thinking about the nature of science, and 3) as a context for applying scientific ideas and skills. A study based on the framework of the constructivist approach-programme was carried out by Stears, Malcom, and Knowles (2000) to ascertain how teachers and learners from townships and informal settlements in the Cape Flats area of Cape Town introduced and used local knowledge in science classroom and how teachers and learners made shifts between formal science and everyday knowledge.

A purposive sample of grade five pupils and their teachers was used in the study. An interview was used to gather information on the learners' lives, interests and ways in which the learners related their everyday experiences and their formal science learning. Class observations were used to monitor students' activities, and to listen to discussions. It was found that the two groups of students had different motivational drives to learn science because of the differences in their everyday experiences. The pupils from the township were oriented to learning for fun while those from the informal settlement were oriented to learning for survival.

The findings imply that pupils from different socio-cultural backgrounds would have different approaches and different motivation to learn science. It is therefore important for the teacher to know the different cultural baggage the pupils bring to the science classroom to guide instruction.

Everyday context in contextualised science teaching

Research into the effect of the use of everyday context infused in science lessons is limited and inconclusive. Rubba, McGuver & Wahlund (1991) reported that occasional reference to societal issues did not improve American high school students understanding of the related science concepts. On the other hand Dahnke, Behrendt & Reiska (2001) studied two groups of secondary school students from Estonia. The control group followed traditional content-based science lessons and the experimental group followed lessons infused with everyday contexts. Their results showed that the conceptual attainment of the latter group increased significantly.

Najike and Keith (2003) reported findings related to the problems encountered between the informal traditional learning paradigm of knowledge and skills, and the formal school science teaching and learning approaches evident in a high school classroom environment in Papua New Guinea. Findings from the study revealed that the informal traditional practice of teaching and learning in Papua New Guinea differed significantly from the modern approach adopted by the country based on imported models from the West. There was evidence to show that the informal traditional teaching and learning practice in Papua New Guinea of "story telling" and "apprenticeship style" models did not readily facilitate learning for understanding. Accordingly, there were conflicts in students' roles as learners between the new approach and the traditional expectations of students. This impeded their progress in learning. The study recommended that in order to maximise students' learning and understanding of science concepts cultural sensitivity should be incorporated in the pedagogy.

Teachers Practice of Learner-Centred Teaching Approaches

In a contextualised science classroom, there is always a shift from teacher-centred to learner-centred instruction. The teacher becomes a facilitator and provides guidelines to the learner to get to his/her own understanding of the content, and creates the environment for the learner to arrive at his/her own conclusions. This instructional method demands from the teacher an integrated knowledge of the features of contextualised science instruction, namely: a) the milieu of teaching, which includes the learner's prior knowledge and experiences, b) learner's cultural background and c) the science classroom environment. The teacher should have the pedagogical skills to create authentic problem-rich environment that encourages investigation of problems and diversity of presentations, leveraging prior knowledge to link with new knowledge (Rivet & Krajcik, 2003).

All countries in Sub-Saharan Africa place emphasis on learner-centred education and so active learning approaches characterise their science, mathematics and technology curricula. Hence learner-centred education, participatory teaching, inquiry-based approaches, problem-solving and critical thinking are some of the key phrases that feature prominently in curriculum policy documents of these African countries (Ottevanger, Van Den Akker & Feiter, 2005). However reports from these countries, including Ghana, consistently describe the pedagogy that actually dominates the classroom as: "largely traditional, teacher-centred and content-driven, with notes taking and sometimes a practical especially in preparation for the practical examination at the end of secondary; whole class teaching at all levels, in spite of the curriculum advising otherwise" (Ottevanger, Van Den Akker & Feiter, 2005; p.16). Thus there is very little evidence of the formulated curriculum ideals. Three main reasons are often offered to explain this: Lack of teaching and learning materials and other resources; Overloaded curriculum which puts pressure on teachers to complete the syllabus so that cooperative teaching strategies are compromised; Lack of teacher confidence with the subject matter prevents the teacher from using a more learner-centred teaching approaches. But more importantly, adoption of learner-centred teaching methods is a demanding change which requires profound shift in teacher-learner power relations and teacher professional learning (Schweisfurth cited in Metto & Makewa, 2014).

In Ghana the situation is further compounded by the large number of Basic Education Certificate of Education (BECE) graduates turned out every year for senior high schools which have limited space for admission. A good aggregate assures a candidate a place in the senior high school. This exerts a powerful pressure on teachers to optimize the performance of their pupils in the BECE examinations. Therefore, teachers spend little time to make conceptual changes in their pupils instead teaching becomes a drill so that pupils can improve their skills in solving examination-type questions (Osei, 2004).

The above evidence notwithstanding, there are still elements of contextualised science instruction incorporated in the Junior High School science syllabus (Curriculum Research Development Division [CRDD], 2007, 2012). The syllabus is characterised by a range of contextualised instructional strategies such as group work, demonstrations by pupils, class discussions, role-play and project work. The science teacher is expected to play the role of a facilitator. She/he is also required to obtain teaching/learning materials from the child's environment and to draw examples from local technologies to explain certain science processes.

Different variations of contextualisation of science instruction have been identified in the literature. These include: textbook-based (Lubben et al, 2003), problem/situation based (Edelson, 2001), anchoring prior knowledge and previous classroom experiences (Rivet and Krajcik, 2008), using anchoring event or situation to teach new science concepts (Marx, Blumenfeld, , Krajcik, & Soloway, 1997), out-of-school everyday contexts (Kasanda et al, 2005) and using everyday experience in science classroom (Stears, Malcom & Knowles, 2000). Despite these various interpretations of contextualised science instruction, they all have one common characteristic, that is, they are learner-centred approaches. The results of the class-room based studies attest to the myriad benefits students drive from contextualised science instruction (e.g. Kasanda et al, 2005; Rivet & Kajcik, 2008; Stears, Malcom & Kowles, 2000). However, the studies are silent on how science teachers use contextualised science instruction to enable students to benefit from science classes. Evidence is needed to understand teachers' practice of contextualised science instruction in their science classrooms. There is dearth of literature on how the strategies of contextualised science instruction outlined in the JHS science curriculum are carried out in Ghanaian JHS science classrooms. It is therefore not clear about the status of the junior high school science teacher with regard to their classroom practices of contextualised science instruction. For contextualisation of science instruction to be meaningful in Ghanaian Junior High schools, there is the need to find out the science teachers' practice of contextualised science instruction. The outcome of the study may offer an avenue for proper contextualisation of science teaching and learning.

METHODOLOGY

Research Design

The study employed an exploratory descriptive survey research design using classroom observation and semi-structured interviews to gather qualitative data. Qualitative gathering instruments provide intuitive and immense detail information.

Sample

This study was carried out in the Upper West Region of Ghana. It was part of a larger study that investigated Junior High School science teachers' knowledge, attitude, and practice of contextualised science instruction. A sample of ten teachers (two females and eight males) was purposively selected to obtain data on the teachers' practise of contextualised science instruction. The teachers had varied academic and professional background and years of teaching experience.

Instruments

A systematic classroom observation scale and semi-structured interview schedule were used to collect data for the study. The use of multiple sources of data was to ensure trustworthiness of the data collected (Patton, 2002).

Classroom Observation Schedule

A systematic classroom observation schedule was used to investigate the teachers' practice of contextualised science instruction. A set of 12 different descriptors used in the classification scheme of Mayoh and Knutton cited in Kasanda et al (2005) was adapted to develop the observation schedule which was in a form of a checklist. Few changes were made on the original instrument, for example, the phrase, 'situations and activities' was added to item 11. Four other items, 4, 13, 14 and 15, were added to include previous uncommon-out-of school experiences, classroom experiences, indigenous-based industries and local technology respectively. Context 12 of the original instrument reflected an industrialised environment so it was modified to read indigenous-based industries since the study area is characterised by indigenous industries and technology. The adapted instrument was revised from 15 to 12 items (Appendix A).

The final observation schedule consisted of sections A and B. Section A consisted of items to collect background information on teacher's sex, years of teaching, academic and professional qualification while section B consisted of items to collect information on the contexts used during instruction.

The instrument was pilot tested to determine its trustworthiness. Two District Science organisers were recruited and trained on how to use the observation schedule and to help determine its percentage inter-rater reliability. The observation schedule was discussed with the assistants. This was followed up by classroom trails. Two lessons each of two science teachers who were not to participate in the study. The results of the observations by the assistants and that of the researcher were compared and discussed to resolve any discrepancies. This was followed up by another set of observations. The data collected were used to determine the inter-rater percentage agreement or reliability of the instrument which was found to be 80%. This figure compared favourably with percentage inter-rater reliabilities of similar instruments reported in the literature (Borg & Gall, 1989).

Semi-Structured Interview

A semi-structured interview approach was used to collect data to validate the data collected using the classroom observation schedule (Creswell, 2012). A semi-structured guide provides a clear set of instructions for interviews and it can provide reliable, comparable qualitative data (Cohen & Crabtree, 2006). The interview guide had the following set of questions:

1. How do you reach out to your pupils during instruction?
2. Mention some of the factors that prevent you form using learner-centred teaching strategies?
3. How do you make new science concepts meaningful to your pupils?

Item 1was to explore the strategies the science teacher used to link science concepts being taught to the pupil's appropriate familiar context to enable pupils to make meaning of the concepts. Items 2 was to ascertain the nature of interactions in their classrooms and item 3 to ascertain the factors that inhibit the teachers' use of contextualised instructional strategies. One of the primary disadvantages of interview is its potential for subjectivity and bias (McMillan & Schumacher, 1984; Patton, 2002). A pre-test was carried out with some members of the pilot group to check bias in the procedure, the interviewer or the questions. Member check was carried out on the transcriptions of the audio-tape recordings of the interviews to determine the trustworthiness of the instrument. The notes that were taken during the observation were also made available to the science teachers for their comments.

Data Collection Procedure

The two trained assistants involved in the pilot testing of the instrument assisted the researcher to collect the data. A written permission obtained from the district directors of education was used to seek permission of the Head masters/Mistresses to conduct the study in their respective schools. The consent of the teachers was sought to participate in the study. They were assured of the confidentiality of their participation in the study. The data collection covered a period of six weeks and a total of 30 lessons were observed and audio-recorded. Each classroom observation took 70 minutes, equivalent of a double period stipulated on the schools' teaching time table. Each context on the schedule was checked each time that a participant used or referred to the context to make the pupils understand a science concept. Each instance of a context noticed during the lesson was termed an episode.
An audio-tape recorder was placed in a central position in the classroom to capture enough of the classroom discourse. This was to provide information on other aspects of contextualising science instruction which were not captured in the schedule. Notes were also taken during the lesson. These included number of pupils in the classroom, nature of the classrooms, topic for the lesson, list of materials and equipment used in each observed lesson.

Each participant was interviewed once after his/her last lesson was observed. This was to prevent halo effect of the interviews on the teachers' teaching practices if they were interviewed after every lesson that was observed. Each interview session took between 30 and 45 minutes. In addition notes were taken during the sessions to help formulate new questions as the interview progressed. The recorded interviews were played back to each interviewee for him/her to confirm that the recordings were the true reflection of what took place.

Data Analysis
Observation data

Total frequency counts of episodes for each context were determined. The total frequencies were used to rank the contexts referred to during the classroom observations. The average number of episodes per lesson for each context was also determined. Data collected by the assistants and the researcher were used to determine the inter-rater percentage reliability. It was found to be 86 % which was comparable to the values reported in the literature (Borg & Gall, 1989; Patton, 2002; Silverman, 2004).

The transcripts of the audio-tape recorded lessons were also analysed to identify the kind of classroom interactions that took place during instruction and how the contexts for contextualisation were used. The notes taken during lesson observations were analysed to identify features that characterised each of the science classroom in which the lesson was observed.

Interview data

The audio-tape recorded interview of every participant was transcribed verbatim. The transcripts, including preliminary interpretations and follow up questions were given to the participants to obtain their comments and feedback to make sure that the transcription was a true reflection of the recorded version.

Deductive analysis was used to analyse and interpret the data. In deductive analysis, the data are analysed according to an existing framework (Patton, 2002). The interview guide was modified into categories to serve as templates for the analysis of the data. The transcripts were read over and over again to identify the sections that fit into the already defined categories. The data were also thoroughly checked to identify and evaluate the challenges the teachers faced in their attempt to contextualise their science lessons. The outcomes were compared with those of the classroom observation to synchronise them.

RESULTS
Background characteristics of study participants

The background characteristics of the sample are presented in Table 1. Apart from one JHS science teacher who obtained High National Diploma, all other teachers obtained senior secondary school certificate as their highest academic qualification. Also, all except three teachers were professional teachers. One of the professional teachers obtained a three year diploma in basic education certificate and the rest obtained 3-year Post Secondary Teacher's Certificate 'A'. The number of years of teaching experience ranged from one to seven years. Further details on the teachers' background are provided in Table 1. It is significant to note that two of the teachers pursued non science elective programmes at the science high school level of education. While one of the latter pursued general arts programme the other pursued business programme.

Table 1 Background characteristics of the participants

Science teacher's ID	Academic qualification	Professional qualification	Years of teaching experience
JHST 1	SSSCE Agricultural science with Biology& Chemistry	3-year cert A Teacher Post-Sec.	6; 3 as non-professional
JHST 2	SSSCE Agric. Science with Biology & Chemistry	3-year cert A Teacher Post-Sec.	3
JHST 3	SSSCE Science	Nil attended in-service training programmes	6
JHST 4	SSSCE Agric. Science with Chemistry & Mathematics	Nil	2
JHST 5	SSSCE Home economics	HND (Advance catering) core science	2; 1 as science teacher
JHST6	SSSCE Home economics	3-year cert A Teacher Post-Sec. Pre-vocational	3
JHST7	SSSCE; general Arts programme	3-year cert A Teacher Post-Sec science/pre-technical skills.	7
JHST8	SSSCE, Business programme	3-year cert A Teacher Post-Sec.	2
JHST9	SSSCE; general science	3-year Cert A Teacher Post-Sec.	4;2 in primary section
JHST10	SSCE; general science	3-year DBE (General course)	1

Ghanaian Junior High School science teachers' use of contexts of contextualised science instruction in science classrooms

A summary of episodes of the contexts used in the participants' lessons observed are presented in Table 2.

Table 2 Frequencies and Percentage frequencies of the Episodes for different types of Contexts used in Participants' Science lessons

Rank	Context used in the lesson	Episodes in science lessons	% frequency	Average episodes/lesson
1	5. Referring to common objects, e.g. stones, plastic containers and ceramic wares, catapult, dry cells, soil, etc.	381	34.9	12.7
2	7. Referring to (everyday) words in local language	192	17.6	6.4
3	3. Referring to common out-of-school experiences	171	15.7	5.7
4	4. Referring to previous classroom experiences	78	7.1	2.6
5	6. Referring to everyday knowledge	75	6.9	2.5
6	8. Using analogies and metaphors from everyday experiences in the community	63	5.8	2.1
7	2.Referring to pupil's personal experiences: telling stories	51	4.7	1.7
8	10. Developing skills for everyday life situations/activities	30	2.7	1.0
9	11. Referring to locally-based industries	24	2.2	0.8
10	9. Using everyday context for classroom activities	18	1.6	0.6
11	12. Referring to indigenous-based industries	9	0.8	0.3
12	1.Referring to the mass media	0	0	0
	Total	**1,092**	**100.0**	**36.4**

*Total number of lessons = 30

A total of 1,029 frequency counts of episodes with an average of 36.4 % per context were recorded in 30 lessons of the participants observed. The table shows that none of the teachers referred to the media (Context 1). The non-reference to the mass media may be attributed to teachers' initial professional preparation where such contexts might not have featured in their pre-service micro-teaching experiences.

Majority of the episodes could be placed in one of six categories. These categories are in order of decreasing frequency: episodes referring to common objects, (34.9 %) everyday words in local language (17.6 %), common-out-of-school-experience (15.7 %), previous classroom experiences (15.7 %), everyday knowledge (6.9 %) and using analogies and metaphors from everyday experiences in the community (5.8 %).

The most frequently used contexts (3, 5 and 7) are related to the environment of the pupils. These were followed by contexts (2, 3, 6 and 8) relating to various forms of pupils 'experiences. These are indications of the teachers' knowledge of one the demands of the science curriculum for teachers to relate science content to the environment and previous classroom and everyday experiences of the pupils (Curriculum Research Development Division, 2012).

The contexts (3, 5, and 7) with relatively higher percentage frequencies were used to evaluate the teachers attempt at contextualising science instruction through contexts. About 35 % of all episodes referred to common objects (Context 5). The references were used in most cases to explain some science concepts. A case in point was a lesson on transfer of energy. The teacher illustrated the concept this way: **JHST8**: For example, you have torchlight and you have batteries inside it and it gives light. After sometime the chemical energy in the batteries has been converted to light energy.

Another typical example of the use of common objects was provided in a lesson on impurities in water. The teacher guided the pupils to filter samples of water from different sources.
JHST9: We have collection of water samples from different sources –pond, tap, borehole and stream. We are going to examine and see the kind of impurities in the water samples.
JHST9: Let us see the impurities or foreign matter on the filter paper. The foreign bodies are from plants and animals. There are plants around the pond so the plants shed their leaves into the water which rot so the water smells. Animals in the pond also die there.

The teachers used every day or common objects to expand the pupils' experiences on the content. However, they did not encourage the pupils to share their experiences with these contexts as the teachers extensively used lecture method to explain the concepts.
The local language of the pupils was used in almost all the lessons observed. About 18 % of all episodes of contextualisation used everyday words in the local language (Context 7). Some teachers used the local language to explain science concepts and difficult science words to their pupils while others encouraged its usage to enable pupils who were not proficient in the English Language, to participate in the lessons. For example, JHST9 used phrases in the local language of the pupils to explain why deep wells are good sources of water:

> "Some of these sources of water are not good sources. Who has seen a dug up well that is not yet <u>cemented</u> ('anang ba mɛ')? -- aha if you observe it there are <u>different layers of soil</u> ('e mang nye a tani a ba mang yi taa')"

Context 3 was used in two main ways by the teachers. Some of the teachers used their pupils' common out-of school experiences to promote interaction among the pupils and to make the science content being taught meaningful to the pupils. But others only referred to their pupils' common everyday experiences as examples without allowing the pupils to share their experiences with their colleagues. The JHST9 exemplified the first instance:

> **Pupil**: water has different colours.
> **JHST9**: According to Godwin water has different colours. Is that true? Let's find out from the class.
> **Pupil**: No, water has no colour.
> **JHST9**: Godwin, water in its pure state has no colour so we say water that is colourless. Impurities give it the colour.

There was limited dialogue between the teacher and the pupils, the teacher did more of the talking. He provided the explanation instead of allowing the pupils to do so. He failed to probe the pupils' everyday knowledge on the nature of water they see around their environment. In the second instance, JHST1 used examples from the pupil's common out-of-school experiences to illustrate science concepts but failed to engage them in a discussion to deepen the pupils' understanding of the concepts. This is illustrated in the following excerpt:

> **"**Tensional force, you know a catapult, when you put a stone in the leather part of the catapult and you pull it. Once you pull the elastic part of it, it gets elongated then we say it is under tension" (JHST1).

The catapult is a common object especially among boys in the study area who use it to hunt birds and other small animals like lizards, squirrels, etc. The concepts would have been better understood if the pupils were allowed to share their experiences with the catapult.

Teachers who failed to organise practical activities substituted such practical activities with verbal descriptions. For example, JHST8 could have used torchlight and dry cells to demonstrate transfer of chemical energy to light energy. He rather gave a verbal description of how chemical energy is 'transformed' into light energy when dry cells are used in torch. In the same lesson, he also explained how electrical energy is 'converted' into sound energy when an audio-tape record player is connected to electricity.

The use of the contexts by the teachers was more or less in line with contextualised science instruction. However, the instructional options of the teachers were more teacher-centred than pupil-centred. This is because the lessons did not promote discourse among the pupils. Analysis of the transcriptions of the audio-tape recorded lessons also indicated that a good number of teacher-centred teaching methods were used by the teachers. These were lecture method, teaching to the time-table, syllabus-based and examination-driven teaching approaches (including coaching and drilling pupils on how to answer examination questions). A small number of learner-centred teaching methods applicable in contextualised science classroom environments were recorded during the classroom observation phase of the study. These were question and answer method, discussion, brainstorming followed by discussion and group activities. Also, a small number of contextualised science instructional strategies and a limited use of the various contexts were recorded in the science lessons observed.

In summary, the teachers used both learner-centred and teacher-centred teaching methods. However, the latter dominated the science lessons. Therefore, the JHS science classroom environment was more teacher-centred than learner-centred and the teachers had poor understanding of contextualised science instruction.

Junior High science teachers' methods of teaching and contextualised science instruction

The interviews were used to investigate the reasons for the small number of learner-centred teaching methods and limited use of these methods. Also the limited number of these methods applicable in contextualised science prompted the researcher to find out the level of awareness of JHS science teachers of the learner -centred teaching approaches suggested in the JHS science syllabus. The interviews were also to find out why they did not use these methods in their science lessons, if they were aware of them. So the teachers were asked to indicate their preferred teaching methods. Their preferred teaching methods were then compared with the observed methods they used during instruction. The teachers' preferred and their observed teaching methods are presented in Table 3.

Table 3 JHS Science Teachers' Preferred and the observed Teaching Methods

Teacher's ID	Preferred teaching method	Observed teaching method
JHST1	Lecture with question and answer method	Lecture, question and answer method
JHST2	question and answer method	Lecture, question and answer method
JHST3	question and answer method	Lecture, question and answer method, use of analogy
JHST4	question and answer method	Lecture , note-taking
JHSH5	Group Work	Drill, Question And Answer Method
JSHT6	Brainstorming and discussion, role play	Brainstorming and discussion through question and answer method
JHST 7	Practical activity	question and answer method and lecture
JHST8	Demonstration and question	Lecture, coaching

	and answer method	
JHST9	Demonstration	Demonstration and Lecture
JHST10	Activity method	Question and answer method

The preferred teaching method common among the teachers were question and answer method and demonstration method. Some teachers preferred to use a combination of two teaching methods. The combinations recorded were demonstration with question and answer method, brainstorming, discussion and role play methods and question and answer with lecture method.

Another trend that was noticed with observed teaching methods was that all of the participants except JHST1 used teaching methods different from their preferred methods. For instance, JHST5 shifted from a more learner-centred method (group work) to less learner-centred methods (question and answer) in addition to a completely teacher-centred-method (drill). Again, science teacher JHST 4 shifted from the use of more learner-centred methods (question and answer method) to teacher-centred methods (lecture and notes taking).
The most observed teaching method was question and answer method which was limited to the teacher asking the questions and the pupils providing the answers, though in few situations pupils were allowed to ask questions.

The reasons for the participants' shift from their preferred teaching methods, which are applicable in contextualising science instruction, to teacher-centred teaching methods were investigated and reported below as factors influencing their ability to contextualise science instruction.

Factors that limit JHS Science Teachers' use of Contextualised Science Instructional Strategies

The JHS science teachers enumerated a number of factors that constrained them from using their preferred teaching methods most of which were learner-centred. These factors were:

- Inadequate or lack of science teaching and learning materials,
- Loaded teaching time table which leaves teachers with little time to engage their pupils in learner-centred activities which are time demanding,
- Undue pressure on teachers to teach to the examinations and
- Lack of classroom accommodation in some schools and overcrowded classrooms in others.

Teaching and learning materials facilitate teaching of science. Where teaching resources were inadequate most teachers resorted to demonstration lesson. When the resources were not there at all the teachers resorted to non-interactive teaching methods such as lecture method and verbal description of practical components of the lesson. For example, JHST7 preferred demonstration method of instruction but the school lacked science teaching and learning materials and the needed funds to purchase them. So he resorted to lecture with limited question and answer method of instruction. To a question on how he overcame the constraints, he had this to say:

> "We are compelled to use the chew and pour approach" (JHST9).

Some of the teachers were mindful of final examinations the pupils would write at the end of junior high school. So the teachers alleged that the school time-table was loaded and time allocated to each subject was about 35 minutes per teaching period. This, they argued limited

the use of teaching methods that would promote pupil-pupil interactions and other interactions that characterised contextualised science classroom environment.
In other cases, the teaching was integrated with coaching or drills to ensure that the pupils got the facts:

> **Interviewer: S**o would you have taught them differently if you didn't have the idea of preparing them for examinations?
>
> **JHST5:** No, because it is the same way I taught the form ones. But mostly, I try to let them know that they are preparing for examinations and they should take things seriously. I have to ask questions to find out if what I have said, they have understood.

Others coach their pupils on how to approach examination questions. The following excerpt aptly illustrates this point.

> **Interviewer:** I also observed that when you were talking, on two or three occasions, you referred to 'if you are asked this question; like if they ask this question what will you do about it?'. I would like you to explain a bit why you were referring to those questions.
>
> **JHST2:** Yes, eeh is like I was trying to suggest likely examinable questions
> Should they go in and they see similar question, this is how they go about it.
> So I was kind of predicting that ----that question can be a likely question.

Another teacher had a different way of coaching his pupils. He would repeat the answer to a question or an explanation of a science concept in many ways and at different levels of sophistication. This, according to him, was to meet the different needs and levels of understanding among the pupils.

Despite the above limitations, a number of contextualised science instructional strategies were recorded. These were investigated through the interviews and the results are presented in the next section.

Nature of Interactions in the contextualised Science Classroom

Question and answer method, whole class discussion, demonstration and group work were some of the learner-centred instructional approaches observed in some of the classrooms. However, the teachers failed to use them to promote collaboration and dialogue among the pupils. The researcher probed to ascertain the reasons for the teachers' limited use of the methods in the observed science lessons.

Question and answer method was recorded as the most used method during the classroom observations. A number of reasons were given by the teachers during the interview to support their extensive use of the method. According to them, they used the method to/as: 1. sustain attention of pupils, 2. evaluate the lesson, 3. engage pupils in learning activities, 4. find out pupils problems or difficulties with the lesson and 5. a disciplinary measure to keep the pupils in check.
Some of these reasons are confirmed in the following quotations:

> "Question and answer method enables pupils to contribute to the lesson. It gets the pupils involve in the lesson and improves relationship between pupils and teacher" (JHST2).

Also, "Question and answer method is used to draw attention of pupils to the lesson and to find out what the pupils have and for them to contribute to the lesson" (JHST 5).

Despite these claims not much was observed in most of the lessons on the use of question and answer method to promote dialogue between the teacher and pupils and among the pupils. The reasons for the limited interactions in the science lessons observed were sought from the teachers, through the semi-structured interviews. The teachers attributed their inability to increase interactions between them and their pupils and among the pupils to a number of factors. Some of these factors are contained in the following excerpts:

> **Interviewer:** What are some of the factors that limit interaction between you and your pupils and among the pupils?
>
> **JHST**2: Lack of science teaching and learning materials (TLMs) and the inability to improvise the materials for the particular topic limit the interaction between me and the pupils.

Teachers who were examination-oriented in their teaching were mindful of the examinations and would therefore not encourage interaction in the class that would affect their coverage of the subject matter. For example,

> **Interviewer:** **W**hen you were teaching in the JHS 3 class and even in the JHS1 class, I could hear you say 'when they ask you that, when they ask you that at the BECE'. How does this influence your teaching?
>
> **JHST4**: Yea, you know I teach for the children to understand and write examinations and pass the examinations well. That is why I normally alert them that they may be asked some questions.

Another reason the teachers gave for the limited interaction observed in their lessons was the poor standard of the English Language among the pupils. This was manifested in the frequency of words in the local language used to explain some science concepts or ideas. When asked why they used the local language when the language policy in Ghana restricts its use to the lower primary of basic education, one of the teachers had this to say:

> "Some of the JHS form one pupils can't even construct a simple sentence in the English language. So there are some if you ask them a simple question in English, to express themselves might be a problem. May be when you speak the child will understand what you say but how to express him or herself is a problem. So we use both languages, English and Dagaare" (JHST9).

Another teacher said he used the local language of the pupils to address deficiency among the pupils and to encourage interaction among them. This is how he presented his reason for the use of the local language:

> **"**Yes, there is a reason because when you are teaching and the pupils seem not to understand then you have to use the local language and say the same thing in English so that they will know that this is actually what you are talking about" (JHST8).

Making science teaching and learning relevant

Though most of the findings stated in previous sections revealed low level of contextualisation of science instruction the researcher still probed further the teachers' attempts to make science teaching and learning relevant to their pupils. This was done through further probes during the interviews to determine the curricular decisions they took on what to include in their lesson plans. Some of the factors that informed their decisions are presented below.

Some of the teachers were concerned with how to relate the science content to the pupil's environment to facilitate the understanding of the content. They were also concerned with how the content could be of practical use to the pupils in their daily life activities, how the pupils could use the science content to solve problems at home and in the wider society. This is exemplified by the following dialogue:

> **Interviewer:** How do you make science relevant/meaningful to your pupils?
>
> **JHST3:** By explaining to them how teaching and learning of science affect our daily lives, how it affects, hmm our lives. That is, by drawing on practical events that they can relate to the lesson.

Others considered how the science content could be related to the life situations of the pupils, to the day to day activities in the pupils' environment and by comparing the science concepts to real life situations. For example,

> "Yes, to make science relevant to them I relate it to life situations. Yes, I relate my teaching to the day to day activities. That is, by comparing some of the concepts with real life situation" (JHST3).

Still others would consider the previous classroom experiences of the pupils and the pupils' prior knowledge and how would link them to the topic of the day and also how to relate the content to their daily lives. This is exemplified by the following dialogue:

> **Interviewer:** Now that you talk about advance preparation, when you are planning to teach, apart from getting the TLMs, what other considerations do you have or what other factors or things do you consider when you are planning for instruction?
>
> **JHST7:** The previous classroom experiences of the pupil whether it is essential to the current topic that I am to teach; how to link their previous knowledge to the current topic of the day; may be how I will link the topic of the day to their daily lives.

The intentions of the teachers outlined above were not congruent with their classroom practices as revealed by the data from the classroom observations and from analysis of the audio-tape recorded lessons. Generally, these considerations were not used to initiate discussions among the pupils to deepen their understanding of the concepts being taught. For instance, a lot of references were made to daily activities without involving the pupils in a discussion. Even where a pupil made an attempt to contribute to the lesson, the teacher hijacked the point and gave a lecture on it.

DISCUSSION

The science teacher's practice of contextualised science instruction refers to the use of learner-centred instructional strategies/approaches to relate science concepts to pupil's previous classroom and cultural experiences. It also refers to the use of these strategies to activate the prior knowledge of the pupil and relate it to the new science concepts. These are attempts to make science relevant to the pupils. Contextualised science instruction also provides opportunities for peer-tutoring and collaborative learning among the pupils through interactive activities facilitated by the teacher for meaningful science teaching and learning.

The instructional strategies used by the JHS science teachers included linking the new science content with the pupils': a) previous classroom experiences, b) personal experiences and c) everyday life experiences of the pupils. They also used common objects from the environment to explain science concepts and analogy to illustrate abstract science concepts. These strategies are similar to some of the contextualised science instructional strategies reported by other researchers (George & Lubben, 2003; Rivet & Krajcik, 2008; Kasanda, et al, 2005; Stears, Malcolm & Knowles, 2005). For instance, Rivet and Krajcik (2008).reported that science teachers linked new content to the pupils' previous classroom experiences and personal daily experiences. Others used everyday experiences in science classrooms (Stears, Malcolm & Knowles, 2005) and common objects to explain or illustrate science concepts (Kasanda, et al, 2005). The use of everyday experiences of the pupils facilitates their participation in the lesson. It also improves the pupils' understanding of the concepts (Kasanda et al, 2005). In this study, the use of (every day words) local language to explain science concepts was more extensive than in other studies (e.g. Kasanda, et al, 2005; Stears, Malcolm & Knowles, 2005).

The JHS science teachers' classroom practice mirrored their understanding of contextualised science instruction which was similar to two out of three forms reported by George and Lubben (2002). These were object-view of context teaching, which is focused on the use of familiar objects in their science teaching and illustration-view of context teaching, using everyday experiences as illustrations of science concepts. As much as possible the teachers drew from pupils' daily experiences to explain some of the science concepts. For example, JHST1 drew extensively from the pupils' experiences with frictional forces, such as riding of motor cycles, bicycles, pushing a truck, walking on rough surfaces, tear and wear of footwear due to friction to explain friction and its effects on machines.

The use of analogy and storytelling are common in daily discourse in Ghanaian communities and in other African countries. They are important methods of teaching the young (Akyeampong et al, 2000; Najike & Keith, 2003). Analogy is used as an illustration to facilitate the children's understanding of the idea being propagated. While story telling is entertaining, it is also used to impart wisdom, moral and social values to the young ones. So the use of such familiar contexts in science classroom situation is likely to sustain the pupils' interest throughout the lesson.

The teachers also recognised the environment of the pupil as an important factor for contextualising science instruction since they were able to relate the science concepts to situations in the environment and to help the pupils solve societal problems as illustrated in the following excerpt:

> 'In the lesson (properties of pure water) I taught in form one, I considered how the children would apply it in their daily life; we treated the impurities in water. After that how will the children apply it in their daily life activities?' (JHST9)

The use of familiar situations or contexts from the pupils' environment and everyday experiences of the pupils to teach science concepts facilitates their participation in the lesson since the pupils can relate well with the context of the lesson (Kasanda et al., 2005). Also, when pupils feel that their ideas and experiences are valued by the teacher, they will become active. Again, they will find the science concepts relevant if they can relate them to their environment and their daily experiences (Lyons, 2006, Kasanda et al., 2005).

The use of the local language of the pupils was recorded in 80 % of the lessons observed. This, according to the teachers, was in response to the poor English Language background of most pupils. The local language of the pupils was used to explain difficult science words and concepts to improve the pupils' understanding of the concepts. Other teachers used it concurrently with the English Language to translate what is said in the English Language to the pupils to facilitate the latter's participation in the lessons. Science is a discipline in which pupils' experiences in the home can be effectively utilised to enhance their learning experiences in the school. Therefore use of the local language of the pupil as a medium of expression can make the home-school interaction in science learning realisable.

The Junior High School science teachers used a mixture of learner-centred and teacher-centred teaching methods (see Table 3). The commonly used teacher-centred teaching methods were examination-driven methods, such as lecture, drill, coaching and teaching to the syllabus. The learner-centred methods were question and answer method, storytelling, limited group work, discussion and brainstorming. The use of the latter was not completely congruent with contextualised science instruction because they were not used to promote discourse among the pupils. For instance question and answer method and brainstorming were used in the introductory part of the lesson to review pupils' previous classroom and personal experiences and the outcomes used by the teacher to explain new science concepts and to identify contexts with which to link the former.

A number of factors were stated by the teachers as limitations to their use of contextualised instructional strategies to promote active involvement of their pupils during lessons. According to the teachers, overcrowded classrooms, overloaded curriculum and teaching time tables affected the use of these strategies in their lessons. Overcrowded curriculum presents serious threats to possibilities for learner-centred teaching to happen in the classroom. Overcrowded classrooms make it difficult for teachers to come up with seating arrangement suitable for group work and supervision of pupils' activities (Chiphiko & Brain Shawa, 2014). For example, there were 110 pupils in JHS form one class in one of the schools. The pupils were seated in rows with no spaces between rows and the teacher's movement was restricted to the front of the class. The seating arrangement did not permit the pupils to interact with their teachers and among themselves. Similar problems were found in primary schools in Malawi (Chiphiko & Brain Shawa, 2014). This situation did not support the use of contextualised science instructional strategies such as collaborative work.

Also, overcrowded classrooms put added stress on the teachers and classroom management, including maintenance of order and discipline. The classroom space could not be organised for group activities and monitoring of pupils' individual work were limited to the front rows. This is not likely to motivate a teacher to engage in contextualised science instruction.

Some of the teachers alleged that the school time-table was loaded and time allocated to each subject was about 35 minutes per a teaching period. This limited the use of contextualised science instruction which is time bound. Another limitation cited by the teachers was the pressure from school authorities and parents on them for good performance of the schools and wards respectively, in the Basic Education Certificate Examinations. The use of learner-centred methods that would otherwise enhance pupils' participation in the lesson was frowned at. They considered the use of these methods time wasting and that they would not be able to cover enough content before the final examination. So they resorted to examination- driven teaching methods such as lecture method, drill and coaching which promote rote learning among the pupils. For instance JHST8 had this to say:

> 'As I teach I also try to let them go by the way questions are asked especially the final examinations (BECE). I try to let the pupils bear in mind questions they are likely to encounter and the way they should handle them'.

This agrees with the findings of Osei (2004) in a study which investigated the mode of instruction in the then Ghanaian Junior High Schools. The teachers in this study emphasised coverage of syllabus instead of teaching for understanding. It reinforces the phenomenon of 'teaching to the test'. So the teachers rush to cover all topics mechanically in order to finish on time for the examinations, rather than striving for in depth pupil understanding (Ottevanger, Van Den Akker & Feiter, 2005). Similar situations had been identified elsewhere in the African continent. For example, Ajibola (2008) reported that both teacher and pupils in Nigeria work towards ensuring that the examination syllabi were covered. Ajibola concluded that at the operational stage of cognitive development where most Junior High School pupils belong, this mode of instruction which amounts to rote learning, and contradicts meaningful learning.

Another opportunity missed by the teachers was the use of the participatory teaching methods outlined in the Junior High School science syllabus (CRDD, 2012) to engage the pupils in classroom discussion or activities to correct their misconceptions on science concepts. Perhaps they were unable to use these curricular instructional methods either because they were not competent in using them or they were unwilling to move away from the traditional approach (Akyeampong, et al, 2000; Osei, 2004).

Yet another disturbing factor was that of the teachers' failure to use opportunities that emerged during instruction to engage their pupils in class activities for them to verify their ideas. Some of these opportunities were: 1. pupils' questions, 2. use of examples from pupils' environment and everyday experiences, 3. contexts referred to by the teachers, 4. when the pupils' misconceptions surfaced during instruction and 5. when their responses to questions were incorrect.

Almost all the teachers drew examples from the pupils' everyday experiences with common objects to explain science concepts. But instead of using the objects to teach the concepts through practical activities, they rather engaged their pupils in lengthy lectures. For instance, JHST8 used his pupils' everyday experiences with a torch and dry cells to produce light to teach energy transfer. These materials could easily be obtained from the homes of the pupils and used practically to explain the concepts involved in the transfer. Yet he engaged the pupils in a lengthy lecture without giving the pupils any opportunity to make some contributions. In a similar study to investigate the role of everyday contexts in learner-centred teaching practice in Namibian secondary schools, the results showed that the limited range of types of everyday contexts recorded were not used to promote discussion among the pupils. Their use often followed theoretical exposition or teacher questioning (Kasanda, et al, 2005). These are disturbing moments for contextualisation of science instruction if the science teachers at the foundation level are handicapped in using the above common contexts in their lessons.

CONCLUSION AND RECOMMENDATIONS

The JHS science teachers' classroom practices could not be described as being totally contextualised because of their failure to handle fundamental issues that called for contextualised instructional approach. At best, they could be described as mixed since the teachers combined some child-centred teaching methods which involved the use of contextualised science instructional strategies with teacher-centred teaching methods. These need to be addressed if the Ghanaian JHS science teacher is to use contextualised science instructional strategies and to play the role of a facilitator during science instruction as suggested in the JHS science teaching syllabus. The situation calls for a serious curriculum review and possible reform of the current science teacher professional training curriculum. The findings of this study provide the impetus for such a step. In the meantime, the Regional

Directorate of the Ghana Education Service should organise periodic in-service training programmes to upgrade or improve JHS science teachers' science content and pedagogical content knowledge to enable them use the contextualised instructional strategies contained in the Junior High School science syllabus.

The physical classroom and the material environment of the JHS science classrooms are impediments to the teachers' desire to contextualise science instruction. The finding that a decongested physical classroom environment with appropriate furniture and adequate science equipment and materials is a strong feature for contextualised science instruction suggests that to improve contextualisation of science instruction in JHS priority attention needs to be given to this factor. So serious efforts must be made by the Regional Directorate of Education to improve the physical classroom and material environment of JHSs to ensure that science equipment and materials are available and adequate to promote contextualised science instruction.

REFERENCES

Akyeampong, K. (2001). "Initial teacher training in Ghana-Does it count?-A country report" *Muster Discussion Paper* Sussex: Centre for International Education, University of Sussex, U. K.

Akyeampong, K., Ampiah, J., Fletcher, J., Kutor, N., & Sokpe, B. (2000): "Learning to teach in Ghana: An evaluation of curriculum delivery" *MUSTER Discussion Paper 17.*Sussex: Centre for International Education, University of Sussex, U. K.

Aldridge, J. M., & Fraser, B. J. (2000). A cross-cultural study of classroom learning environments in Australia and Taiwan. *Learning Environments Research: An International Journal, 3*, 101-134.

Bennie, K. & Newstead, K. (1999). Obstacles to implementing a new curriculum. In M. J. Smit & A. S. Jordaan (Eds.), *Proceedings of the National Subject Didactics Symposium* (p. 150-157). Stellenbosch: University of Stellenbosch.

Blumenfeld, P. C., Marx, R. W., Krajcik, J., & Soloway, E. (1997). Teaching for understanding. In B. J. Biddle et al. (Eds.), *International Handbook of teachers and Teaching* (pp. 819-878). The Netherlands: Kluwer Academic Publishers.

Borg, W. R. & Gall, M. D. (1989). *Educational Research: An Introduction* 5th Edition U. S. A., New York: Pitman Publishing Inc.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, *18*, 32-42.

Chiphiko, E. & Brian Shawa, B. (2014). Implementing Learner-Centred Approaches to Instruction in Primary Schools in Malawi, *Mediterranean Journal of Social Sciences 5*(23), 967-975. Doi:10.5901/mjss.2014.v5n23p967

Cognition and Technology Group at Vanderbilt (1992). The jasper series as example of anchored instruction: Theory, programme description, and assessment data. *Educational Psychologist*, *27*, 291-315.

Creswell, J. W. (2012). *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*. New Jersey: Pearson.

Curriculum Research Development Division (2001). *Teaching syllabus for science (Junior High School)* Accra: Ministry of Education.

Curriculum Research Development Division (2007). *Teaching syllabus for science (Junior High School)*. Accra: Ministry of Education.

Curriculum Research Development Division (2012). *Teaching syllabus for science (Junior High School)*. Accra: Ministry of Education.

Davis, E. A. (2003). Knowledge integration in science teaching: Analyzing teachers' knowledge development. *Research in Science education, 34*, 21-53

Davis, E. A., & Linn, M. C. (2000). Scaffolding students' knowledge integration: Prompts for reflection in KIE. *International Journal of Science Education, 22* (8), 819-837.

Dewey, J. (1916). *Democracy and Education,* New York: MacMillan Company.

Edelson, D. C. (2001). Learning-for-use: A framework in the design of teacher-supported inquiry activities. *Journal of Research in Science Teaching, 38*, 355-385.

Fahraeus, A. W. E. (2013). Learner-centred teaching: Five key changes to practice. Book Review. *Journal of Scholarship of Teaching and Learning, 13*(4), 1-6.

George, J. M. & Lubben, F. (2002). Facilitating teachers' professional growth through their involvement in creating context-based materials in science, *International Journal of Educational Development, 22, 695-672.*

Government of Ghana (2001). *National science and technology policy document.* Accra: Ministry of Environment, Science and Technology (MEST).

Government of Ghana (2007). *National science and technology policy document.* Accra: Ministry of Environment, Science and Technology (MEST).

Government of Ghana (2009). *Draft National Science, Technology and Innovation Policy 2* Accra, Ghana: Ministry of Environment, Science and Technology (MEST).

Kasanda, C., Lubben, F., Gaoseb, N., Kandjeo-Marenga, U., Kapenda, H., & Campbell, B. (2005). The role of everyday contexts in learner-centred teaching: the practice in Namibia secondary schools. *International Journal of Science Education*, *27*(15), 1805-1823.

Lave, J. (1988). *Cognition in Practice.* Cambridge: Cambridge University Press.

Linn, M. C., & His, S. (2000). *Computers, teachers, peers*: *Science learning partners*. Mahwah, NJ: Lawrence Erlbaum Associates.

Lyons, T. (2006). Different countries, same science classes: Students' experiences of school science in their own words. *International Journal of Science Education, 28*(6), 591- 613.

Lubben, F., Campbell, B., Kasanda, C., Kapenda, H., Gaoseb, N. & Kandjeo-Marenga, U. (2003). Teachers' use of textbooks: Practice in Namibian science classrooms. *Educational Studies*, 29 (2 & 3) 109-125.

McMahon, M. (1997). *Social constructivism and the World Wide Web- A paradigm for learning*. Paper presented at the ASCILITE conference. Perth, Australia.

McMillan, J.H., & Schumacher, S. (1984). *Research in Education-A conceptual Introduction,* (4th Ed.). Addison Wesley Longman, Inc.

Massouleh, N. S., & Jooneghani, R. B. (2012). Learner-Centered Instruction: A Critical Perspective. *Journal of Education and Practice, 3*(6), 50-59.

Marx, R. W., Blumenfeld, P. C., Krajcik, J., & Soloway, E. (1997). Enacting project-based science. *The Elementary School Journal*, *97*(4), 341-358.

Merriam, S. B. (2003). *Knowledge construction and cultural context in adult learning theory*. Taiwan (Journal of Adult Education) (In press).

Merriam-Webster Collegiate Dictionary (2001). Retrieved November 17, 2007 from *http://www.m-w.com/home.htm*

Metto, E., & Makewa, L. N. (2014). Learner-centred teaching: Can it work in Kenya public primary schools? *American Journal of Educational Research, 2*(11A), 23-29, Doi:10.12691/education-2-11A-4.

Ministry of Environment, Science and Technology (MEST) (2000). *National Science and Technology Policy document,* Ghana, Accra: MEST

Najike, S. C. M., & Keith, L. (2003). *Learning science in a high school learning environment in Papua New Guinea*, (Paper NAJ02039).

Osei, G. M. (2004). The 1987 Junior high school reform in Ghana: Vocational or pre-vocational in nature? *International Review of Education*, *50*(5-6), 425-446.

Ottevanger, W., Van Den Akker, J. & Feiter, L. D. (2005).*Developing science, mathematics and ICT (SMICT) in secondary education: Patterns and promising practices*. African Region Human Development Working Paper series (SEIA thematic study report No. 7 Sept. 2005.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed). London: Sage Publications, Inc.

Rivet, A. E. & Krajcik J. S. (2003). *Contextualising instruction: Leveraging students' prior knowledge and experiences to foster understanding of middle school science*. A paper presented at the Annual meeting of the National Associations for research in science teaching (NARST), Philadelphia, PA March, 2003.

Rivet, A. E., & Krajcik, J. S. (2008). Contextualising Instruction: Leveraging students' prior knowledge and experiences to foster understanding of middle school science. *Journal of Research in Science Teaching, 45(1),* 79-100.

Rubba, P., McGuyer, M., & Wahlund, T. (1991). The effects of infusion STS vignettes into the genetics unit of biology on learner outcomes in STS and genetics: A report of two investigations. *Journal of Research in Science Teaching, 28 (*7) 537–552.

Shan, Y. W. (2011). Contextualised teaching towards active learning. *Centre for Development of Teaching and Learning Brief*, *14*(2), 1-3.

Shamsid-Deen, I., & Smith, B. P. (2006). Integrating contextual teaching and learning practices into the family and consumer sciences teachers' curriculum. *Journal of Family and Consumer Sciences Education*, *24*(1), 14-27.

Silverman, D. (2004). *Qualitative research: Theory, methods and practices*. London*:* SAGE Publications.

Smith, B. P. (2010). Instructional strategies in family and consumer sciences: Implementing the contextual teaching and learning pedagogical model. *Journal of Family and Consumer Science Education*, *28(1),*23-38. Retrieved 28/ 01/2013from http://www.natefacs.org/JFCSE/v28no1Smith.pdf

Stears, M., Malcom, C. & Knowles, L. (2000). *Making use of everyday knowledge in science classroom.* Proceedings of the Annual meeting of South African Association for Research in Mathematics and Science Education, January, 2000, 241-246.

Tawalbeh, I., & AlAsmari, A. A. (2015). Instructors' perceptions and barriers of learner-centered instruction in Englis at the university level. *Higher Education Studies, 5*(2), 38-51, doi: 10.5539/hes.v5n2p38.

Vygotsky, L. S. (1978). *Mind in society.* Cambridge, MA: Harvard University Press.

Appendix A
Observation Schedule for Types of Context used in Junior High School Science Instruction.

Type of context used in the lesson	**Frequency of episodes**
Context 1. Referring to the mass media	
Context 2. Referring to personal experiences: telling stories	
Context 3. Referring to common-out-of-school experiences	
Context 4. Referring to previous classroom experiences	
Context 5. referring to common objects, e.g. rocks, shea butter tree	
Context 6. referring to everyday knowledge	
Context 7.referring to every day words in the local language	
Context 8. Using analogies and metaphors from everyday experiences in the community	
Context 9. Using everyday contexts for classroom activities	
Context 10. Developing skills for everyday life situations/activities	
Context 11. Referring to modern locally-based industries and local technology	
Context 12. Referring indigenous based industries	