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**JUNIOR HIGH SCHOOL SCIENCE TEACHERS'
PERCEPTION AND ATTITUDE TOWARDS
IMPROVISATION OF SCIENCE INSTRUCTIONAL
RESOURCES IN GOMOA-EAST DISTRICT**

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Abstract

Purpose: The study investigated the perception, and attitude of the JHS science teachers towards improvisation of science instructional resources. The study also looked at the challenges they face when improvising.

Methodology: The study employed a descriptive research survey design to collect data from 150 JHS science Teachers, 10 head teachers and five circuit supervisors in the Gomoa East District of the Central Region of Ghana using simple random technique. A questionnaire was used to collect quantitative data on JHS science teachers' perception, attitude and problems towards improvisation. Interview schedule was also used to collect qualitative data on head teachers' and circuit supervisors' attitude and support given to their teachers during improvisation. Descriptive and inferential statistics were used to analyze the data. Quantitative data were computed into means, frequencies, percentages, standard deviations and inferential statistics. The qualitative data collected was transcribed and analysed using descriptive and thematic narrative approaches.

Findings: The results of the study showed that JHS science teachers had a negative attitude towards improvisation of science instructional resources despite their positive perception. The male teachers had a better attitude towards improvisation of science instructional resources than the female teachers.

Recommendations: The study recommended that, on-hand mini workshops should be organized for the science teachers in the Gomoa East District to improve their skills and strategies in improvisation of science instructional resources. Secondly, female teachers should be supported by their head teachers to improve their attitude towards the improvisation of science instructional resources. Finally, the District Directorate in collaboration with the heads of schools should put in place strategies to improve upon teachers' skills and techniques to enable them improvise instructional materials.

Keywords: *Perception, attitude, improvisation, improvised materials, teaching & learning resources, teaching & learning materials.*

1.0 Introduction

1.1 Background to the Study

Ghana, like all other nations over the world is striving hard to advance technologically and scientifically since the world is turning scientific and all proper functioning of lives depend greatly on science. Science has become an integral part of human society. According to Onasanya and Mosewo (2011), science is the foundation upon which the bulk of present day technological break-through is built. Science instructional resources are resources that facilitate the achievement of goals and objectives of science education. Science teaching and learning resources play a vital role in the teaching and learning process of science subjects. Instructional resources provide important opportunities for students to explore ideas and knowledge, collaborate, solve problems and develop knowledge and skills.

Many teachers find that seeking and finding resources that produce results when students use them is a distinct pleasure among the multitude of teaching details. Use of teaching and learning resources activates students and as they learn actively, the teacher can enjoy the evidence of their progress. However, in Ghanaian Junior High Schools, there is inadequate provision of these resources such that the schools rely on the very few laboratory resources that were supplied when JHS was instituted in 1987 (Parker, 2011). Yet, these schools sit for the same national examinations with better resourced private schools.

Carin and Bass cited in Eminah (2009) opine that science is a subject that is best learned through practicals. Literary approaches to the teaching of the subject cause the learners to be deficient in the processes of science. According to them, teaching the subject without allowing the children to manipulate the resources available and to learn science by doing and observing may cripple their interest and chances of learning science to the highest level. Kilundo (2002) posits that, it is impossible to have meaningful teaching and learning in schools in the absence of these teaching resources. Lack of teaching resources can hinder any teaching programme from operating with desired efficiency. He argues that while both experience and available literature would support the view that materials are associated with high academic achievement, there is no need just to verify, but to study the efficacy.

Research has shown that with the latest technological innovations in education, teaching has become very interesting since pupils are engaged in a lot of manipulative activities. This means that with teaching and learning resources pupils are made to take part in a lot of activities that arouse and sustain their interest (Agwagah & Uzoegwu, as cited in Parker, 2011). However, in the absence of instructional materials, the teacher should still know how to continue to keep the interest of the students through the use of improvised materials.

1.2 Statement of the Problem

An observation made during in-serve teaching at Gomoa Brofoyedur D/A JHS and Pomadze/Asebu D/A JHS in Gomoa East District as a science teacher in JHS 1-3 from 2000-2016, revealed that science instructional resources are scarce and inadequate so most science teachers teach the subject without resources. They fail to improvise these resources and so they resort to lecture in their science classes. This was corroborated by Acquah (2013) who reported the use of the lecture method by some teachers during science instruction. The use of lecture method at the basic school level seems to be ongoing because teachers at this level may not

improvise non-available teaching and learning materials for their science lessons or they encounter certain challenges when they try to improvise.

Meanwhile, improvisation of science instructional resources is one of the courses taught in teacher training institutions in Ghana. Could it be that the teachers are not getting the raw materials to use or lack the skills to improvise, or the teachers have attitudinal challenges with improvisation? Studies on in-service JHS integrated science teachers' preparation and use of improvised materials in their classrooms. Yet, little comprehensive research has been carried out to describe the perception and attitude of teachers towards improvisation where the teaching materials are inadequate. This study, therefore examined the perception and attitude of JHS science teachers' towards improvisation of science teaching and learning resources.

1.3 Purpose of the Study

The purpose of this study was to investigate the perception, and attitude of the Junior High School science teachers towards improvisation of science instructional resources and the challenges they face. It also explored any gender difference among science teachers' attitude towards improvisation of science instructional resources.

1.4 Objectives of the Study

The objectives of the study were to:

1. Find out JHS science teachers' perception of improvisation of instructional resources.
2. Investigate the attitude of JHS science teachers towards improvisation of instructional resources.

1.5 Research Questions

The following research questions guided the study.

1. What is Junior High School science teachers' perception of improvisation of science instructional resources?
2. What is the attitude of JHS science teachers towards improvisation of instructional resources?

1.6 Research Hypothesis

The study was guided by the following hypothesis and they were tested at 0.05 level of significance.

Null Hypotheses

H₀: JHS female science teacher's attitude towards improvisation of science instructional resources significantly differs from their male counterparts.

H₀: $\mu_1 = \mu_2$

Alternative Hypothesis H₁: JHS female science teacher's attitudes towards improvisation of science instructional resources will not significantly differ from that of their male counterparts.

2.0 Review of Literature

The review of literature presents the review of both theoretical framework and related literature. It begins with discussions on theoretical framework and review of related literature. This is followed by discussions of the meaning of science teaching learning and resources, concept and theories of improvisation, importance of improvisation, teachers' perceptive and attitude towards the production of improvised instructional resources. The importance of instructional materials in the teaching and learning process cannot be over-emphasized. This is because they make teaching and learning more lively, meaningful and understandable. In support of the above opinion, Uzoegwu (2001) maintained that teachers should employ instructional materials in their teaching in order to make sure that teaching is more permanent in the minds of the learners.

Agwagah (1999) rightly noted that instructional materials, if used effectively can arouse interest, foster greater understanding, self-activities, increase retention ability, make the subject matter relevant to life and lessen the burden of teaching.

2.1 Piaget's Theory of Learning

Piaget (1952) theory holds that experiences are necessary for intellectual development and must be organized into meaningful experiences in order to convey the required message. The theory emphasizes the importance and the need for instructional resources to enable learners to develop concepts and skills easily. However, when these instructional resources are not there the science teachers has no option than to find a substitute for them. This theory was applied in the present study on the basis that science teaching and learning resources are woefully inadequate in most schools in Ghana (Parker, 2011) and therefore calls for improvisation. It was on this ground that Piaget's theory continued to appeal as a guide to the present study to investigate the perception and attitude of JHS teachers towards improvisation of teaching and learning resources.

2.2 Shulman's (1986) knowledge domains in teaching.

Shulman (2000) proposed three content knowledge domains for teaching to include: subject matter content knowledge (SMCK), Pedagogical Content Knowledge (PCK) and Curricular Knowledge (CK). Teaching is far more than mere transmitting of concepts and ideas to learners, but it involves bringing out the accumulated ideas and experiences that students come to class with and working on those ideas and experiences together with the pupils by way of refining, reorganizing, co-constructing and repairing these ideas and experiences into meaningful and comprehensible form for students to assimilate (Sulman,2000). This therefore means that for teachers to teach science using improvised resources, they need to have an in-depth understanding of the scientific content of improviesd resources, the pedagogical principles of improvised resources and curricular materials that inform scope and direction of improvisation. More importantly, they need an integrated knowledge of these knowledge domains. Shulman (1986) knowledge domains offer coherent framework for teaching Science by using improvised resources when the actuals are not available or inadequate.

2.3 Concept of Improvisation

Eshiet (2002) is of the opinion that the act of sourcing for instructional materials when the standard ones are not available is improvisation. According to Eshiet, improvisation in science teaching means sourcing, selection and deployment of relevant instructional element of the teaching and learning process in the absence or shortage of standard or accredited teaching and

learning elements for a meaningful realization of specific educational objectives. Improvisation is suggested to provide teaching materials from one's locality when there is a shortage or lack of the standard ones (Mbotto & Udo, 2011). Thus, in order to provide effective teaching and learning experiences, improvising the use of locally available material may enable students to achieve desired scientific results in the classroom.

Tompson cited in Bhukuvhani, Kusure, Munodawafa, and Sana (2010) believes that improvisation is a pedagogical intervention strategy where teachers are being resourceful in the making and using locally available materials where conventional equipment may be inadequate or not available at all. Improvisation in teaching and learning science provides opportunities for creativity and development of manipulative abilities (Limjuco, Glover, & Mendez, 2011). Moreover, during improvisation scientific concepts are learnt and internalized easily by the students rather than proceeding with chalk and teacher talk (Bhukuvhani et al., 2010). This implies that students understand better when they are engaged in hands-on activities. Ogunbiyi, Okebukola and Fafunwa (1990) perceive improvisation as the act of substituting for the real thing that is not available. Baja (1991) takes it to be the use of substitute equipment where the real one is not available. Kamoru and Umeano (2006) further define it as the act of using materials obtainable from the local environment or designed by the teacher or with the help of local personnel to enhance instruction.

2.4 Teachers Perception towards improvisation of science instructional resources

Perception is an experience that involves the organization of objects, events or relationship leading to the process by which we interpret our sensory input. Silverman in Mungal (2007) defines perception as "an individual's" awareness aspect of behaviour; for it is the way each person processes the raw data he or she receives from the environment into a meaningful pattern". He further looked at perception in terms of process, information extractor, preparation to response, sensation, provision of organization and being highly individualized.

2.5 Teachers Attitude towards improvisation of science instructional resources

Here, teacher attitude is defined as expectation of a positive or negative outcome of using improvisation in the classroom based on their perception of how the academic and social community would respond to improvisation in the curriculum. When it comes to the Attitude and Techniques of Teachers, some studies point to the effect of teacher qualifications on academic achievement. According to Rivkin, Hanushek and Kain's study (2005), the professional experiences of teachers have a significant effect on the achievement of students. On student achievement, attitudes and behaviors of teachers are other criteria to think over. The values, attitudes and experiences of teachers affect the way they source or choose relevant instructional element of the teaching and learning process in the absence or shortage of standard or accredited teaching and learning elements for a meaningful realization of specific educational objectives.

3.0 Methodology

Descriptive research design was adopted for the study with both quantitative and qualitative approaches of data collection and analysis. The target population was all JHS Science teachers in the Central Region and the accessible population was all JHS Science teachers in Gomoa East in the Central Region. The Gomoa East District is made up of 10 circuits having 67 public JHS with 150 science teachers, 67 head teachers and 10 circuit supervisors (GES, Gomoa East

District census for 2014/2015 academic year). Therefore, the estimated population was 227 at the time of the research. In this study, census was used to select all the 150 teachers in the district. Because the study sought to investigate the teachers' perceptions and attitudes towards teaching science with improvised resources, it was imperative to include circuit supervisors and head teachers in the study because they supervise and inspect teachers work in the classroom and sometimes organize in-service training for the teachers.

Instrumentation

The instruments used to collect the data were structured questionnaires and semi-structured interview schedule. These instruments provided means of triangulation to validate the data collected.

The questionnaire was a Likert –Type scale. It consisted of 31 items. Each item consisted of a statement followed by five options with weightings. The questionnaire items were either worded positively or negatively. For positive statements, Strongly Agree (SA = 5), Agree (A = 4), Neutral (N = 3), Disagree (D = 2), and Strongly Disagree (SD = 1). But for negative statements, Strongly Agree (SA = 1), Agree (A = 2), Neutral (N = 3), Disagree (D = 4), and Strongly Disagree (SD = 5). The reverse order of scoring was necessary for reducing respondents' bias.

Face and construct validity of the instruments was done by experts in Test and Measurement in the University of Education, Winneba at the Science Education Department and was trial tested on twenty science teachers who were not part of the sample but within the population for the study. A pilot test was conducted to determine the reliability and internal consistency of the instruments. Twenty JHS science teachers who were not part of the study sample were used for the pilot test. A semi-structured interview schedule was used to collect qualitative data on JHS science teachers' perception, attitude towards improvisation of teaching and learning materials and the challenges they faced. The interview schedule was pilot tested with 2 JHS science teachers, 2 headmasters and 1 circuit supervisor to determine its trustworthiness. After the audio-recording, the tape was played back to the interviewees for them to confirm that it was their voices and what transpired. The transcripts were also given to the interviewees to confirm that they were the reflection of the audio-tape.

Data Collection Procedure

Three visits were made to each of the selected schools for the study. The first visit was used to obtain permission from the head teachers and also meet the participants to establish rapport with them. The second visit was used to administer the questionnaire to all the participants in the schools with the help of the head teachers. The final visit to each of the school was used to collect the questionnaires and interview 10 selected teachers, 10 head teachers and 5 circuit supervisors (at the District Education Office).

Data Analysis

The descriptive statistics function of Statistical Products for Social Solutions (SPSS version 20.0) was used to organize the data collected through the questionnaire into mean scores, standard deviations, frequency counts and percentages. The results were presented in tables and charts.

4.0 Results

The results were presented based on the research questions.

4.1 Research Question One: What is Junior High School science teachers' perception of improvisation of science instructional resources?

Subscales of the teachers' questionnaire, Science Teachers' Perception towards Improvisation of Science Teaching and materials (STPIM) consisting items 1-10 were used to gather the data to answer the research question. Descriptive statistics were used to organize the participants' responses into frequencies, percentages, mean scores and standard deviations.

A mean score that fell within or above 3 was considered as positive and below 3 as negative perception respectively while 3 was considered as neutral. The results are presented Table 1.

Table 1: Descriptive statistics of JHS Science Teachers' responses to items about their Perception towards improvisation of Science Teaching and learning materials

Variables	D	N	A	MS	SD
1. I think improvised materials are useful in science teaching because they enhance better understanding and retention.	9 (6.0)*	3 (2.0)	138 (92.0)	4.52	0.81
2. The use of improvised materials in teaching science will help students learn to relate real world situations to scientific theory.	7 (4.7)	5 (3.3)	138 (92.0)	4.45	0.92
3. Improvisation minimizes the absence of instructional materials.	6 (4.0)	1 (0.7)	143 (95.2)	4.44	0.76
4. I can improvise either through substitution or construction.	5 (3.3)	5 (3.3)	140 (93.4)	4.26	0.68
5. The use of improvised materials is a fun and easy way to introduce and visualize a scientific concept.	7 (4.7)	5 (3.3)	138 (92.0)	4.18	1.04
6. My experience and expertise determine the use of improvised resources.	10 (6.6)	3 (2.0)	137 (91.4)	3.99	0.77
7. Not all improvised materials can be used to meet curriculum expectation.	38 (25.4)	11 (7.3)	101 (67.3)	3.55	1.07
8. Improvised materials should be considered by the teachers as a solution to problem of shortage of standardized materials.	47 (31.3)	6 (4.0)	97 (64.7)	3.34	1.11
9. When I hear of improvised materials, I have a feeling of dislike.	71 (47.3)	6 (4.0)	73 (48.7)	2.86	1.35
10. I believe I can still teach well even when improvised materials are not available; so I don't see the need of them.	81 (54.0)	1 (0.7)	68 (45.3)	2.80	1.32
Overall mean				3.84	0.40

*percentage frequencies in parentheses

The mean scores ranged between 2.80 (SD= 1.32) and 4.52 (SD=0.81) with an overall mean score of 3.84 (SD = 0.40). Items 1 to 8 registered mean scores above 3.0 with values between 3.34 and 4.52. Therefore the teachers had positive perception towards improvisation of science teaching and learning materials. However, for items 9 and 10, the teachers exhibited negative perception towards the improvisation of science teaching and learning materials since they had mean scores of 2.86 (SD=1.35) and 2.80 (SD=1.32) for item 9 and 10 respectively. Out of the total maximum mean score of 5.0 which is the highest perception score and 1.0 being the least perception score, the respondents had an overall mean score of (MS = 3.84, SD = 0.40), indicating the teachers showed positive perception towards improvisation of science instructional resources.

The percentage frequencies of the teachers' responses to the questionnaire items indicated a similar trend as the mean scores. Majority of the respondents (138, 92.0%) thought that improvised materials were useful for science teaching because they enhance better understanding and retention. This suggests that JHS science teachers perceive improvisation of science instructional resources to be good. Majority of the respondents (138, 92.0%) agreed on the statement that the use of improvised materials in teaching science will help students learn to relate real world situations to scientific theory while 7 (4.7%) disagreed (item 2). Majority of the respondents (143, 95.2%) agreed that improvisation is one of the recognized and authentic ways of minimizing the absence of instructional materials. Majority of the respondents, (140, 93.4%) agreed that they can improvise either through substitution or construction while 5 (3.3%) of the respondents disagreed (item 4). Majority of the respondents (138, 92.0%) agreed that the use of improvised resources is a fun and easy way to introduce and visualize a scientific concept while 7 (4.7%) disagreed to it (item 5). Majority of the respondents (137, 91.4%) agreed that experience and expertise determine the use of improvised resources (Item 6). Moreover, (101, 67.3%) the respondents agreed that not all improvised materials can be used to meet curriculum expectation (item 7). It was also recorded that, the respondents (97, 64.7%) agreed on the statement "improvised materials should be considered by teachers as a solution to problem of shortage of standardized instructional materials" while 47 (31.3%) disagreed (item 8). However, less than half of the respondents (73, 48.7 %) agreed that when "they hear of improvised materials, they have a feeling of dislike" while 71 (47.3%) disagreed (item 9). Again, (68, 45.3%) the respondents believed that they could still teach well even when improvised materials were not available; so they didn't see the need for improvisation of them" while 81 (54.0%) disagreed (item 10).

Overall, it can be said that the JHS science teachers have acquired some knowledge on improvisation and so have positive perception towards improvisation of science instructional resources. If they are given the needed support and help they would likely improvise science instructional resources. This is an indication that the respondents having been exposed to improvisation in their various colleges of education need constant in-service training to ignite their practices.

Research Question Two: What are the attitudes of Junior High School science teachers towards the production of improvised resources?

The subscale, Science Teachers' Attitude towards Improvisation of teaching and learning materials (STATIM) was used to gather the data to answer the research question. The

participants' responses were re-categorized to facilitate interpretation of the data. 'Strongly disagree' and 'disagree' were categorized as 'disagree' while 'strongly agree' and 'agree' were categorized as 'agree'. Descriptive statistics were used to organize the teachers' responses into frequencies, percentages, mean scores and standard deviations and presented in Table 2.

The mean scores that fell within above or below 3 was considered as positive and negative attitude respectively while 3 was considered as neutral. In Table 2, the respondents' scores on the subscale for the first four items ranged from 3.13(1.31) to 3.89 (SD=1.05) indicating a positive attitude towards improvisation of science and learning materials. However, the respondents had mean scores between the range of 2.33 (SD = 1.15) and 2.78 (SD =1.25) for items 15, 16, 17, 18, 19, 20, 21, 22 and 23 indicating a negative attitude towards improvisation of science instructional resources. Also, an average mean score of 5.0 which is most positive attitude score and 1.0 being the least mean score, the teachers had an overall mean score (MS = 2.88, SD = 0.56) indicating that the teachers showed a negative attitudes towards improvisation of science instructional resources.

Majority of the respondents (116, 77.3 %) agreed that they have a good feeling towards improvisation of instructional resources while 23 (15.4%) of the respondents disagreed (item 11). This implies that JHS science teachers have the excellent desire for improvisation of science instructional resources. Majority of the respondents (123, 82.0%) agreed on the statement they try to do the best they can when improvising science teaching and learning resources while 22 (14.7%) disagreed (item 12). Two thirds of the respondents, (102, 68.0%) agreed that they would avoid looking for and preparing improvised materials because it is really tiresome for them while 42 (28.0%) of the disagreed (item 13). Again, the respondents, (82, 54.7%) agreed that when using improvised materials, they are afraid they might not get the expected results while 63 (42.0%) of the respondents disagreed (item 14).

Table 2: Descriptive statistics of JHS Science Teachers' responses on their Attitude towards improvisation of Science Teaching and Learning Materials

S/N	Item	D	NS	A	Mean	St.D
11.	I have a good feeling toward improvisation of science teaching resources.	23 (15.4)	11 (7.3)	116 (77.3)	3.89	1.05
12.	I try to do the best I can when improvising science teaching and learning resources.	22 (14.7)	5 (3.3)	123 (82.0)	3.81	0.98
13.	I would avoid looking for and preparing improvised materials because it is really tiresome for me.	42 (28.0)	6 (4.0)	102 (68.0)	3.42	1.08
14.	When using improvised materials, I am afraid I might not get the expected results.	63 (42.0)	5 (3.3)	82 (54.7)	3.13	1.31
15.	I don't do very well in improvisation of science teaching resources.	86 (57.3)	2 (1.3)	62 (41.3)	2.78	1.25
16.	I am not in complete control when I use improvised science materials.	88 (58.7)	2 (1.3)	60 (40.0)	2.69	1.16
17.	I will use improvised materials regularly throughout my science lessons.	95 (63.4)	3 (2.0)	52 (34.6)	2.67	1.17

18. I would not like to teach science using improvised materials because it wastes time.	92 (61.4)	2 (1.3)	56 (37.3)	2.67	1.21
19. Improvisation of science resources is something which I do only when there is a supervisor.	96 (64.0)	1 (0.7)	53 (35.3)	2.63	1.38
20. I need an experienced person nearby when I am preparing and using improvised materials.	96 (64.0)	8 (5.3)	46 (30.6)	2.59	1.04
21. It makes me nervous to even think about improvisation of science teaching resources.	98 (65.4)	0 (0.0)	52 (34.6)	2.57	1.25
22. I am not comfortable with the use of improvised materials, I am likely to encounter classroom management problems.	105 (70.0)	5 (3.3)	40 (26.7)	2.38	1.15
23. No matter how hard I try, I cannot improvise science teaching resources.	108 (72.0)	2 (1.3)	40 (26.7)	2.33	1.15
Overall Mean score/SD				2.88	0.56

*Percentage frequencies in parentheses

Less than half of the respondents (62, 41.3%) agreed that they don't do very well in improvisation of science teaching resources while (86, 57.3%) disagreed to it (item 15). The respondents (60, 40.0%) also agreed that they are not in complete control when they use improvised science materials while 88(58.7%) of the respondents disagreed to it (item 16). However, 95 (63.4%) of the respondents disagreed that they will use improvised resources regularly throughout their science lessons while 52 (34.6%) of the respondents agreed (item 17). It was also recorded that, minority of the respondents, (56, 37.3%) agreed on the statement that they would not like to teach science using improvised materials because they wastes time while 92 (61.4%) disagreed (item 18). Minority of the respondents (53, 35.3%) agreed that improvisation of science resources is something which they do only when there is a supervisor while 96 (64.0%) disagreed (item 19). Again, 46 (30.6%) of the respondents agreed that they need an experienced person nearby when they are preparing and using improvised materials while 96 (64.0%) disagreed (item 20). Minority of the respondents, (52, 34.6%) agreed that they become nervous to even think about improvisation of science teaching resources while 98 (65.4%) disagreed (item 21). Majority of the respondents (105, 70.0%) disagreed on the statement that they are not comfortable with the use of improvised materials because they think they are likely to encounter classroom management problems while 40 (26.7%) agreed (item 22). Majority of the respondents (108, 72.0%) disagreed that no matter how hard they try, they cannot improvise when the science teaching resources are unavailable while (40, 26.7%) agreed (item 23).

Based the results presented, it can be concluded that only few of the JHS science teachers show positive attitude towards improvisation of science teaching and learning materials. The rest who showed negative attitude, their reason was ascribed to inability to get the needed funds to purchase the few materials for improvisation. This findings is contrast with the findings of Olagunju & Abiona (2008) who reported that teachers have positive attitude towards improvisation of materials and that, they are highly interested in production and improvisation of biology instructional resources.

Testing of Hypothesis Associated with Research Question Two

Hypothesis

H₀: There is no significant difference in the attitude of the female and male teachers towards the improvisation of science instructional resources.

H₁: There is significant difference in the attitude of the female and male teachers towards the improvisation of science instructional resources.

Table 3: Levene's Test for Equality of Variances between the two groups (male and female)

Activity	Test for Equality of Variances	F-ratio	*p value
Attitude towards improvisation	Equal variance not assumed	13.84	0.00

*p < 0.05, n = 150

Table 3 presents the results of the Levene's Test for equality of variance between the two groups (male and female teachers) Junior High School Science Teachers' attitude towards improvisation of science teaching and learning resources. The result showed that (F = 13.84 and p= 0.00) is less than 0.05 alpha level of significance, which indicates that the assumption of equal variances has been violated therefore the two groups (Male and Female JHS Science Teachers) cannot assume equal variance for their attitude towards improvisation of science instructional resources in the study area.

The independent sample 2-tailed t-test was used to test the hypothesis at a p-value of 0.05 and the result is as follows: (overleaf).

Table 4: MS, SD and results of Independent t-test analysis on gender differences about JHS Science Teachers' Attitude towards improvisation of science teaching and learning resources

Sex of Teachers	N	Mean	S.D	Mean Diff.	t-ratio	d.f	*p. value
Male	103	2.95	0.61	0.19	2.17	124.24	0.03*
Female	47	2.76	0.43				

*p < 0.05, n = 150.

The descriptive statistics in Table 4.5 shows that the mean score of the male teachers (MS = 2.95, S.D= 0.61) was higher than their female counterparts (MS = 2.76, S.D = 0.43). The t-test analysis conducted on their mean scores showed that there was significant difference between the female and the male teachers' attitude towards improvisation of science teaching and learning material $t(124) = 2.17, p < 0.05$. Thus, the null hypothesis was rejected and the alternative accepted. The implication is that the male teachers in the JHSs had a more positive attitude towards the improvisation of science teaching and learning materials than their female counterparts.

Qualitative Data Analysis

The main aim of this phase of data collection was to validate the teachers' responses to the questionnaire items with the interview and consisted of semi-structured interviews. This was

used to validate the quantitative data. Face to face interviews were conducted and audio taped. The main respondents of the interview were made up of teachers and Head Teachers. The transcription of audio- taped interviews was presented in appendix B. The data obtained from the interviews was grouped according to the answers given to the same questions.

Teachers' Interview Analysis

Q1. Do you use Teaching /Learning materials in teaching science?

The response options were Yes or No.

The first question was posed to find out to find out whether the teachers use teaching and learning materials in their lessons. Majority of the science teachers forming about 70% interviewed were said they use them and 30% also said they don't use.

Q2. If no, why?

The second question was asked to probe further why the teachers don't use teaching and learning materials in their lessons. When probed the interviewees indicated that the teaching and learning materials were not adequate. This is expressed in the following excerpt

(T 4): Because they are few and my class is large too.

(T 7): If I have them, I will obviously use them, I don't see them in my school and no one has provided me with some.

Q3. Are you aware that science teaching and learning resources can be improvised when the actual ones are not there?

The response options were Yes or No.

This question was asked to find out the awareness of teachers on improvisation. All the teachers indicated that they were aware of improvisation.

Q4. In your own opinion what do you think improvisation is all about?

The interviewees were expressed similar opinions about improvisation. Some excerpts from their responses to the question are reported below:

(T6) It is the process of using local materials to teach to bring the same effect as the original one would have brought.

(T5) It is the process of sourcing, deployment and use of teaching/learning materials which are not easily accessible or inadequate.

(T4) Is like you are teaching and the materials are not there or not enough so you look for a replacement to serve the same purpose.

Q5. Were you taught how to improvise teaching and learning materials in college?

The response options were Yes or No.

This question was asked to find out whether the teachers were taught improvisation in college. Almost all (80%, 8) the interviewees said yes. Only 2 (20%) of them said, they were not taught improvisation in college. Based on their responses it can be deduced that most teachers were taught improvisation in college.

Q6. How were you taught improvisation of science teaching and learning materials in school?

This question was asked to find out the method used to teach the science teachers improvisation in college. Majority of the interviewees (70%) confirmed that they were taught theoretically while 30% said they taught both practically and theoretically.

Q7. Do you prepare the improvised materials yourself?

The response options were Yes or No.

This question was asked to ascertain whether science teachers prepare the improvised materials themselves. Majority (60%, 6) answered in affirmative while 40% (4) said they don't improvise. Based on their responses it be deduced that some the science teachers prepare the improvised materials themselves but only a few don't prepare it themselves.

Q8. If no how do you prepare improvised materials for your teaching?

Those teachers who answered no to question item 8 were probed further to find out why they don't prepare the improvised materials themselves. Those interviewees said they are comfortable with chalkboard illustration. Some also said they don't have the strategies. This may account for some of the responses to some of the questionnaire items eg.13 &14. 68% reported that, they would avoid looking for and preparing improvised materials because it is really tiresome for them. Again, 55% responded that when using improvised materials, they are afraid they might not get the expected results. See Table 4.3.

Q9. What are some of the major challenges you face when improvising science teaching/learning materials?

Almost all the teachers attributed the challenges to large class size, financial constraint, inability to identify materials and lack of strategies. This is supported by the following excerpt:

(T10) Time does not permit me to find the materials needed to prepare them. I find it difficult to access funds to purchase some of the materials. Sometimes, I have to improvise, but I don't know how to go about it.

(T6) I have a problem with class control, I am the science teacher and I have to go round and look at each pupils work.

(T7) I don't have any skill about what I want to do but I know there is something I need to do to let the pupils understand the concepts I want to teach. There are few materials I need to buy but no funds.

Head Teachers' Interview Analysis

Q1. Who is responsible for the provision of teaching/ learning resources in your school?

This question was asked to find out from the head teachers the one responsible for providing teaching/ learning resources in their schools. The head teachers came to consensus that it a collaborative effort of the head teacher through the district office and ministry of education to provide.

Q2. Please what do you do when these materials are not enough or unavailable?

This question was asked to find out from head teachers they do when there are no teaching and learning materials. Majority of the head teachers (8) indicated that they had to help the science teacher to find a substitute to use. One also said he would go to a nearby science resource center to acquire them. One other head teacher also said that it is the sole responsibility of the science teacher. This is an excerpt of what the interviewee (HT 3) said: *A teacher must be resourceful. So, I think the teacher has to provide the materials he/she needs in his/her lesson*

Q3. In your own opinion what do you think improvisation is all about?

The question was to inquire from the head teachers their views on improvisation.

A common response that they all gave was: *It is the process of searching or constructing alternative teaching materials when the original is absent.*

Q4. Who is responsible for assessing availability and use of improvised teaching/learning resources in your school?

Again, this question was asked to reveal from the head teachers the one responsible for assessing availability and use of improvised teaching/ learning resources in their schools. Majority (90%) of the interviewees expressed that it is both the science teacher and the head teacher. They indicated that the teacher has to inform the head for assistance and he will in turn release money to that effect. One other (10%) interviewee was of different opinion. This extract of what the interviewee (HT7) said: *The science teacher is the one on the field teaching, so he must look for what will help him/her to deliver the lesson well.*

Q5. Do science teachers in your school use improvised teaching/learning resources in their lessons?

This question was posed to find out from the head teachers the extent to which science teachers improvise teaching and learning materials in their schools. Majority (4) of the interviewees said sometimes, 3 of them said very often and 3 others also said not at all. The response given by the interviewees clearly shows that the science teachers in their schools improvise but not all the time. This contradicts the response to teachers' questionnaire item 17 (See Table 2). 34.6% (52) agreed that would use improvised materials regularly throughout their science lessons.

Q6. Please, what measures have you taken to deal with teachers who are reluctant to improvise teaching and learning resources?

Again, this question was posed to inquire from the head teachers what they do to deal with teachers who are reluctant to improvise teaching and learning resources. Majority (70%) of the interviewees retorted that they have to release funds for them to purchase few materials needed.

In addition, the interviewees said they had to invite the circuit supervisors and trained personnel who are experts in improvisation to offer the teachers some kind of in-service training. This contradicts the response to teachers' questionnaire item 20 (See Table 2). 30.6% agreed that they need an experienced person nearby when preparing improvised materials.

5.0 Summary of Findings

1. The quantitative data showed that majority of the JHS science teachers had negative attitude towards improvisation of science teaching and learning resources. However, the qualitative data did not actually show that the respondents had negative attitude towards improvisation of science teaching and learning resources.
2. The t-test data analysis also showed that the attitude of the male teachers towards improvisation of science teaching and learning resources in the study area is significantly different from the attitude of the female teachers. Hence, gender equality in the attitude of the teachers towards improvisation of science teaching and learning resources cannot be assumed.

6.0 Conclusion

The findings indicated that, even though the JHS science teachers had positive perception towards improvisation of science teaching and learning materials they had negative attitude towards them. The male science teachers had a better attitude compared to the female science teachers. Therefore the attitude of JHS science teachers towards improvisation of science teaching and learning material in the study area is gender related. Lack of funds to be used to purchase needed materials, unavailability of tools, limited time allocated for instruction, lack of exposure on improvisation and lack of skills and strategies on improvisation are the main problems the teachers face during improvisation of scientific teaching and learning materials in the study area. There are no support systems for improvisation available to teachers in the study area. However, improvisation will improve if support systems such as fund, in-service training on improvisation and motivation for teachers are available to science teachers in the study area.

7.0 Recommendations

Based on the conclusions of the study, the following recommendations were made for improvisation of science teaching and learning material in the Junior High Schools in the Gomoa East District:

1. Female teachers should be supported by their head teachers to improve their attitude towards the improvisation of science teaching and learning materials in the study area.
2. The District Directorates of Ghana Education Service (GES) in collaboration with the heads of school should put in place strategies to eliminate the challenges of lack of the funds to purchase needed materials, unavailability of tools, limited time allocated for instruction and lack of exposure on improvisation by teachers on scientific teaching and learning materials in the study area.
3. The supervision and training officers of the District Directorates of Ghana Education Service in collaboration with the Head teachers should organize on-hand mini workshops in the schools for the science teachers to improve their skills and strategies in improvisation of science teaching and learning materials.

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