

Classroom Practices of Senior High School Physics Teachers in the Hohoe Municipality

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Abstract: The purpose of the study was to investigate the activities and practices of physics teachers in terms of their pedagogical skills and assessment practices. The study was limited to physics teachers and students in eight (8) senior high schools in the Hohoe Municipality of the Volta Region, Ghana. Descriptive cross-sectional survey design was employed in carrying out the study. A total sample of 200 senior high school physics students and 2 physics teacher were involved in data collection. A questionnaire consisting mainly of closed ended items and observation schedule were used in collecting data from respondents. Data collected was analysed using simple frequencies, percentages, mean and standard deviation. It was found that, most of the physics teachers do not often respond appropriately to students' wrong answers and misconceptions. Most physics students also raised concerns about their physics teachers not often linking what they teach to their daily life occurrences. However, evidence from observation indicates that physics teachers possess and exhibited sufficient knowledge on diverse pedagogical skills. Physics teachers often use interactive formative assessments such as oral question and answer technique. Based on the findings, it was recommended that, physics teachers should carefully pay attention to and often address their students' wrong answers and misconceptions, make learning of physics interesting by making students appreciate the importance of what they teach.

Keywords: pedagogical skills, assessment techniques, classroom practices, physics teachers.

I. INTRODUCTION

Physics is the most fundamental natural science which involves universal laws and the study of the behaviour and relationships among a wide range of important physical phenomenon (Cutnell & Johnson, 2007). According to Onah and Ugwu (2010), Physics is considered as consisting of scientific facts, principles, laws and generalizations derived from scientific investigations. The principles and applications of physics cut across a broad spectrum of everyday activities like walking, lifting objects, seeing, taking photographs using electrical and electronic gadgets among others (CRDD, 2010). Despite the numerous significant roles physics plays in the development of every nation, physics as a subject in the Senior High School still remains one of the subjects perceived by students as difficult as a result of collection of equations used in solving problems which demands a firm grasp of the concept and the ability to reason. Physics is the most utilized basic science subject in most technology and technology related-profession but unfortunately it is a subject which most

students especially girls fear to pursue (Murphy & Whitelegg, 2006). One of the values of studying physics is that it is intrinsically challenging and therefore also extremely rewarding when a student understands it.

Ayeni (2011) defines teaching as a process that involves bringing about desirable changes in learners so as to achieve specific outcomes. To teach is to show somebody how to do something so that they will be able to do it themselves. Loughran (2006) writes that: Teaching and learning are seen as being related in powerful and important ways such that teaching purposively influences learning and vice versa. The primary purpose of teaching at any level of education is to bring a fundamental change in the learner (Tebabal & Kahssay, 2011). To effectively help bring about this desirable change, teachers apply in the classroom, appropriate teaching methods that best suite specific objectives. Teachers' classroom practices are diverse and vary from teacher to teacher. In physics teaching, teachers are expected to take advantage of the various teaching processes in order to make full impact on their students' learning. It is clear that when students are pleased with the classroom practices of their physics teachers, they are bound to give positive comments on their teachers' classroom practices and perform well too.

Research Questions

The study sought to answer the following research questions:

1. What are the pedagogical skills employed by physics teachers in teaching at the senior high school level?
2. What types of assessments do physics teachers use in teaching physics at the senior high school level?

II. LITERATURE REVIEW

Pedagogical Skills Employed in the Teaching of Physics

Learning depends heavily on the pedagogical approaches teachers use in the classroom. A variety of pedagogical approaches exist, but some of them are more effective and suitable than others. The effectiveness of pedagogy often depends on the particular subject matter to be taught, the diverse needs of different learners, on-the-ground conditions in the classroom as well as the surrounding context. In general, effective teachers believe in the capacity of their students to learn, and carefully utilize a range of pedagogical approaches to ensure this learning occurs. (UNESCO learning portal, 2020)

The apparent drop in students' interest in science and its related disciplines has been associated with the widely used traditional teaching approaches that are reinforced by teacher centred, transmissive pedagogy (Lyons, 2006). Findings from various literature indicates that many physics teachers continue to teach using the same old, ineffective, traditional, teacher-centred instructional approach (Angell, Guttersrud, Henriksen, & Isnes, 2004; Hackling, Goodrum, & Rennie, 2001; Vosniadou, 2007). The existence and practice of traditional approaches to teaching physics, often fail to promote adequate students' understanding of physics concepts (Angell et al., 2004; Hackling et al., 2001; Masika, 2011; Mulhall & Gunstone, 2008, 2012).

Unfortunately, majority of physics teachers are products of traditional teaching methodologies and may have developed beliefs that are consistent with the kinds of implicit messages about physics and learning physics described above. A review of various studies on teaching pedagogies employed in the classroom and its impact on students learning and academic is discussed in this study.

Buabeng, Ossei-Anto and Ampiah (2014) examined the activities that go on in physics classrooms in senior high schools in Ghana by investigating the pattern of interaction and instructional methods used for teaching physics and level of coverage of physics syllabus. Twenty-one physics teachers and 326 physics students in public SHS in Ashanti Region of Ghana were sampled for the study. The survey design was employed for the study in which a questionnaire was used for data collection. The outcome of the study revealed that classroom interactions seemed to be mostly teacher-centred and did not seem to support inquiry-based teaching and learning which is noted for promoting conceptual change and boost performance. The researchers suggested physics teachers should be exposed to efficient pedagogies of teaching and presenting information to learners. McDermott (2001) suggests that the focus of physics teaching should be on the students as learners. It was also suggested in the study that effective teaching should include close contact with students where teachers observed the struggles of students as they tried to understand important concepts and principles. A similar situation was reported in High Schools in Norway. Angell et al. (2004) administered questionnaires to 2,192 Senior High School physics students and 342 Senior High School physics teachers in Norway. This was followed by interviews. The outcome of the study revealed that, greater fraction of time in the physics classroom (about 60%), was spent with the teacher presenting new material on the blackboard/whiteboard. Physics classrooms were dominated by "chalk and talk instruction." Consistent with the above findings is that of a study carried out in Kenya where physics teachers were found to be autocratic and dominated their classrooms by talking only and sometimes talking with illustrations. (Masika, 2011)

An examination of students' experience by Buabeng (2015) in relation to what actually happens in their classroom with regards to the teaching approaches and how often they

would prefer the strategies to be applied revealed that students were relatively not satisfied with many of the instructions they received. The research findings indicated that generally, physics classroom dialogue tended not to support constructivist epistemology or inquiry based teaching and learning. Student-centred instructional approaches were not common in many physics classes. The researcher concluded that a focus on content knowledge and more 'traditional' teaching approaches tends to discourage students' progress. It is obvious that one of the most important factors that significantly affect students' achievement is the instructional strategy adopted by the teacher (Okoronka & Wada, 2014).

Azure (2015) examined senior high school students' perceptions of the teaching of Integrated Science in Ghana using a descriptive survey design. The study revealed that students are made to read textbooks while teachers explain some of the concepts. Whilst the curriculum suggests that students carry out project work for assessment, teachers teach without performing activities suggested in the curriculum. Also about, 70% of the rural students in the study indicated that they never carried out practical activities during Integrated Science lessons, while about 43% of the urban students indicated they never had the opportunity to do practical activities. Blanton (2003) observed that teachers of science often taught in the way they had been taught. If they were taught through lectures, they were likely to lecture, even if this type of instruction was inappropriate for their students. The findings in their study is an indication of the absence of teaching methods that give students the opportunity to observe, engage in, invent and discover knowledge as defined by the cognitive apprenticeship model.

It may be inferred from recent studies that teacher-centred instruction continues to be a widely used instructional strategy in senior high school physics classrooms. This has resulted in the challenge of promoting pedagogical change so that physics teachers teach for better students' understanding and learning.

Types of Assessment used by Teachers

Mikre (2020) is of the opinion that in assessment of students' learning progress and competence attained, there is the need to gather a variety of information and determine the degree to which students have attained the learning targets intended in the curriculum. Information of this nature is gathered using a variety of techniques such as formal and informal observation of students, paper-and-pen tests, laboratory work, performance on assignments, research projects and presentation. According to Airasian (2001), assessment includes the full range of information teachers gather in their classrooms which goes beyond just administering, scoring and grading paper-and-pen tests. The information obtained through assessment helps teachers to understand their students and monitor instruction.

This study reviews the various formal and informal forms of assessment employed by teachers in the classroom to

ensure that enough information and feedback is obtained to determine the degree to which students have attained the learning targets intended in the curriculum. The literature has identified various formative assessment techniques that are commonly used in the Ghanaian senior high school classroom. (Plybour, 2015; Andrade & Cizek, 2010). Question and answer technique, Peer-assessment, self-assessment, class exercises, homework and class tests are some of the commonly used formative assessment strategies to identify students' strengths and weaknesses (Plybour, 2015; Andrade & Cizek, 2010). These assessment practices are deemed relevant and good types of assessment to be used in classroom assessments (Popham, 2002; Weeden et al., 2002). In Ghana, formative assessment is well embraced and practised by teachers at all levels of Education (Asare, 2015; Amoako, 2018).

Peer-assessment

Peer assessment provides learners with the opportunity to take responsibility for analysing, monitoring and evaluating aspects of both the learning process and product of their peers (Bekoe, Eshun, Bordoh, 2013). In peer-assessment, students often assess other students' work compared to the criteria developed by the instructor, or both students and the class instructor. An important aspect of peer assessment is that it engages students in dialogue with their classmates, commenting on each other's work rather than a one-way feedback system from instructor to student. According to Black and Wiliam (2000) peer-assessment is an important component to self-assessment that helps to realise curricular targets for students' learning. Peer-assessment is also useful in placing the learning task in the hands of students thus making learning students-centred as proposed by the constructivist approach to learning. A study by Papinczak, Young and Groves (2007) revealed that peer-assessment enhanced students' willingness and ability to become active members of a group of learners. The findings of Eshun, Korwu and Appiah (2017) also confirmed the advantages associated with the use of peer-assessment in higher education instead of a teacher centred approach and reaffirmed the existing unequivocal views held by similar studies.

Self-assessment

Self-assessment is the act of a student to judge their own performance in order to take decisions about their academic abilities (Noonan & Duncan, 2005). Montgomery (2001) also provided a similar definition of self-assessment as students' appraisal of their own work or learning developments Herrera, Murry and Cabral (2007) are of the opinion that self-assessment is a valuable tool for learning and measurement. According to Herrera et al. (2007), when students are engaged in assessing their own work, they try to learn the criteria for high-quality performance provided by the teacher and experience a willingness to apply those criteria. Black and Wiliam (2004) also argued that, self-assessment

together with peer assessment help students develop an overview of the topic taught.

Class exercises, classroom tests and homework

Classroom exercises, tests and homework (assignments to be completed outside the classroom) are often commonly used by teachers to diagnose students' strengths and weaknesses, monitor each student's progress, determine teacher's own instructional effectiveness and help teachers to clarify their instructional intentions. Test advocates argue that regular classroom testing increases instructional effectiveness and inspires students to study more often. Frequent testing also provides opportunities for teachers to correct students' errors, to reward good performance, and to give students a good indication of what they were expected to learn. On the other hand, opponents of regular testing are of the view that frequent classroom testing could take away instructional time (Taale, 2012).

Empirical evidence of the use of formative assessment by teachers

In a study conducted by Plybour (2015), findings indicate that peer assessment was regularly used in formative mode at the beginning of lessons, especially during classroom discussion of homework. Teachers gave students the opportunity to grade and comment on a peer's work. However, about 62% of student respondents raised concerns about the quality of peer feedback and comments. The study concluded that the integration of formative assessment system into instructional design results in higher learning gains in physics than a conventional summative system. In a similar study, Akyina and Oduro-Okyireh (2019) investigated senior high school teachers' formative assessment practices in the Mampong Municipality of Ghana. Teachers were asked to indicate the extent to which they used formative assessment strategies in facilitating learning in their classrooms. It was revealed that teachers use question and answer technique, encourage students to do self and peer assessment during lessons in the classroom. The use of class exercises was more prominent among the formative assessment techniques used. Similar to the findings Akyina and Oduro-Okyireh (2019) test, assignment, students' note and quiz were sampled as assessment methods often used by teachers of secondary schools in Osun State, Nigeria (Faleye & Adefisoye, 2016).

Another related study conducted with the primary purpose of describing assessment practices that secondary physical education teachers use in Ghana indicated that teachers used knowledge test, individual project and essay in their theory lessons as means of assessing their students. The deductive analysis indicated that about 81% of teachers reported knowledge test as the most frequently used assessment practice in their theory lessons. Most of the teachers in this study used assessment for documenting learning, rather than for accountability purposes (Sofu, Ocansey, Nabie, & Asola, 2013). Mintah (2017) in a similar study also found that, teacher observation, demonstration, peer

observation, and checklist were the commonly used authentic assessment techniques among public school physical education teachers in Ghana. Anecdotal record and parental report were the least used techniques. It was further revealed through the study that, physical education teachers perceived authentic assessment as having positively enhanced students' motivation, self-concept, and skill achievement. Similarly, Amoako (2018) examined formative assessment procedures commonly used by Distance Education tutors in Ghana and found 'observation', 'oral questioning', 'peer-assessment', 'student self-assessment' and 'tutor made test' as the current formative assessment practices of on-site course tutors of Distance Education in Ghana. It was also found that majority of the tutors made use of multiple formative assessment procedures. (Amoako, 2018).

On the contrary, a study was conducted in junior secondary schools in the Winneba Educational District to investigate the types of assessment used by teachers specifically to assess the problems faced by science teachers in organising the continuous assessment. It was found that science teachers barely apply their knowledge of continuous assessment even though they appeared to have understood the philosophy of the continuous assessment. (Amedeker, 2000). To ascertain the formative assessment techniques tutors use to assess teacher trainees' learning in social studies in colleges of education in Ghana, Bekoe, Eshun and Bordoh (2013) found out that due to the hasty nature in formulating formative assessment and scoring, tutors laid emphasis on cognitive domain to the neglect of affective and psychomotor domains. This make students go through the academic system without acquiring needed skills, values and attitudes that will enable them to right the wrong in society using appropriate tools. It was observed in a classroom setting that tutors asked questions in open discussion, use questions and answers to introduce their lesson and students were called to summarise what they learnt after the lesson. Tutors agreed that interactive formative assessments promoted learning outcomes through questioning in a form of dialogue (Bekoe, Eshun & Bordoh, 2013).

Literature (Akyina & Oduro-Okyireh, 2019; Amoako, 2018; Faleye & Adefisoye, 2016; Mintah, 2017) has revealed that teachers often observe, use tests and make room for self and peer assessment in order to gather vital information concerning students' academic progress. The use of classroom test is the commonly used technique. According to Akyina and Oduro-Okyireh (2019) classroom assessment has the benefit of providing immediate feedback to improve teaching and learning when it is used appropriately and effectively. Also, the feedback and comment provided during the assessment process are very important to strengthen self-efficacy and motivate students for learning (Mikre, 2020).

III. METHODOLOGY

Descriptive survey design specifically, cross-sectional survey was employed in carrying out the study.

According to Cohen, Manion and Morrison (2018), surveys gather data at a particular point in time with the intention of describing the nature of existing conditions. Wisker (2001) indicated that descriptive survey design enables researchers to find out more about a phenomenon without manipulation of variables and captures it with detailed information. Orodho (2009) is also of the view that, descriptive survey design is used in preliminary and explorative studies to allow researchers to gather information, summarise, present and interpret them for the purpose of clarification.

Cross-sectional survey design guided the researcher to carefully observe and record data as the phenomenon naturally occurs at the time the study was conducted. Cross-sectional designs are effective for examining current attitudes, beliefs opinions or practices. Practices are the actual behaviours of the research subjects (Creswell, 2012). This design also has the advantage of providing data relatively quickly.

In this study, the target population involved all senior high school elective physics students and teachers in the Hohoe Municipality in the Volta Region of Ghana. Sample for the study consisted of 25 randomly selected second year elective physics students from each of the 8 Senior High Schools in the municipality and 2 elective physics teachers in 2 randomly selected senior high schools in the municipality. Data for the study was collected during the first wave of Covid-19. During the period, Ghana Education Service had directed senior high schools to have not more than 25 students in a class to allow for social distancing. The researcher therefore randomly selected a class of 25 from each of the schools involved. A total number of 200 elective physics students and 2 Physics teachers took part in the study. Questionnaire and observation schedule were employed to collect data for the study.

The instruments were validated through content validity using expert judgement. Cronbach's alpha coefficient was used to check the reliability of the items on the questionnaire. According to DeVellis (2003), Cronbach's alpha coefficient of a scale should be above 0.7. A sample size of 21 students from the pilot study yielded a Cronbach's alpha coefficient value of 0.806.

Questionnaires were given to students to respond to while the researcher also observed and recorded activities of physics teachers in the classroom during a physics lesson in 2 selected schools. The note books and exercise books of physics students taught by the two teachers who were observed were also reviewed to ascertain the pedagogical skills and types of assessment physics teachers often use in teaching their students.

Demographic Data of Respondents

The study involved a total of 200 second year senior high school elective physics students in the Hohoe Municipality of the Volta Region. These students were

selected from 8 different senior high schools. The details of the age distribution of student respondents are presented in Table 1.

Table 1: Demographic data of student respondents

Demographic Data	Frequency	Percentage (%)
Age(in years)		
13-15	6	3.0
16-18	157	78.5
19-21	33	16.5
Above-22	4	2.0
Sex		
Male	163	81.5
Female	37	18.5

Field Data, 2021.

Out of the 200 respondents, 163 (81.5%) were males and 37 (18.5%) were females. Majority 157 (78.5%) of the student respondents are between the ages of 16 to 18 years, 33 (16.5%) are in the 19 to 22 years age range while six of the student respondents are in the 13 to 15 years age range. A total of 137 second year students and 63 third year students were involved in the study.

IV. RESULTS

Research Question 1: What are the Pedagogical Skills Employed by Physics Teachers in Teaching at the Senior High School Level?

The answer to the above question was obtained through a students' questionnaire and their responses are shown in Table 1 in terms of number and percentage of students at each item.

Table1: Pedagogical skills employed in the teaching of Physics

Items	AL n(%)	O n(%)	N n(%)	S n(%)	R n(%)	Mean	SD
1. Cites examples from daily life	7(3.5)	63(31.5)	3(1.5)	31(15.5)	96(48)	2.27	1.417
2. engages all of us during each lessons	12(6)	46(23)	8(4)	34(17)	100(50)	2.18	1.406
3. goes very fast when teaching	25(12.5)	14(7)	52(26)	79(39.5)	30(15)	3.38	1.196
4. Speaks clearly and loudly	2(1)	35(17.5)	4(2)	27(13.5)	132(66)	1.704	1.187
5. Correct our mistakes when we answer questions wrong	6(3)	24(12)	8(4)	37(13.5)	135(67.5)	1.70	1.174
6. Put us in groups and asks us to teach one another	34(17)	54(27)	68(34)	19(9.5)	25(12.5)	3.27	1.217
7. gives exercises which are marked and returned to us	35(17.5)	39(19.5)	30(15)	20(10)	76(38)	2.70	1.579

Field Data, 2021. Key: Always (AL), Often (O), Never (N), Sometimes (S), Rarely (R)

Interpretation of Results

According to the students, their physics teachers performed averagely with regards to the pedagogical skills employed in teaching physics. Quite a high percentage of the students (34%) were of the view that their physics teachers do not encourage cooperative learning. Most students 135 (67.5%) pointed out their teachers rarely correct their mistakes when they answer questions wrongly during lessons whilst quiet a number of them 37 (13.5%) indicated their teachers only do so sometimes. (Mean = 1.70, SD = 1.174). Students were also asked if their physics teachers make physics lessons interesting by citing lots of examples from daily life. Unfortunately, only seven (about four percent) students agreed their teachers always do so. Majority of the students 96 (48%) revealed their teachers rarely cite examples from daily life while teaching and this does not make physics exciting to study. (Mean = 2.27, SD = 1.417) when students were asked if their physics teachers speak clearly and loudly enough while teaching, only 35(17.5%) of the student respondents indicated their physics teachers are often audible. Also, 132(66%) of the students pointed out that they rarely hear their physics

teachers in class. With regards to physics teachers pace of teaching, quite a number of students 79(39.5%) are of the view that their teachers go very fast when teaching as shown in Table 2. *Key findings 1:*

- i. About 67.5% of the physics teachers do not display knowledge of their students' wrong answers and misconceptions
- ii. Majority of physics teachers (48%) do not display adequate knowledge of subject matter. They are therefore not able to often link what they teach to the daily life occurrences of their students
- iii. About 50% of the physics teachers do not display knowledge of general pedagogy especially in ensuring that they engage majority of their students whilst teaching.

4.3 Research Question 2: What Types of Assessment are used by Teachers in the Teaching of Physics at the Senior High School?

The answer to the research question 2 was obtained using a students' questionnaire and other instruments

(classroom observation checklist, interview schedule and checklist list for inspecting students' notebooks and exercise

books). Presented in Table 2 are the result obtained using the students' questionnaire.

Table 2: Assessment of techniques used by teachers in the teaching of Physics

Assessment techniques	Al n(%)	O n(%)	N n(%)	S n(%)	R n(%)	Mean	SD
1. Oral question and answer	100(50)	72(36)	5(2.5)	15(7.5)	8(4)	4.50	1.072
2. Home work	14(7)	80(40)	10(5)	73(36.5)	23(11.5)	3.00	1.229
3. Class Exercise/Class test	113(56.5)	80(40)	0(0)	7(3.5)	0(0)	5.00	0.680
4. Peer-assessment	9(4.5)	14(7)	17(8.5)	133(66.5)	27(13.5)	2.00	0.927
5. Self-assessment	18(9)	24(12)	13(6.5)	119(59.5)	26(13)	2.00	1.137

Field Data, 2021. Key: Always (Al), Often (O), Never (N), Sometimes (S), Rarely (R)

Interpretation of Results

Table 2 reveals that teachers most often employ oral questioning (Mean = 4.50, SD = 1.072), home work (Mean = 3.00, SD = 1.229) as well as class exercise and class test (Mean = 5.00, SD = 0.680). According to most of the student respondents (96.5%), class test and exercises are commonly used formative assessment employed by their physics teacher to ascertain the extent to which students have acquired knowledge impacted. Giving of trial examples (homework) to be solved by students after classes is also a popular means of measuring students' understanding of what has been taught. Also, self and peer-assessment are the least used formative assessment technique used in assessing students. Only seven percent of students indicated they often use peer assessment whilst about five percent of them said they always do so. Majority of the students (59.5%) also mentioned that they rarely engage in self-assessment.

Key findings 2:

- i. Interactive formative assessments through questioning in a form of dialogue is often used by majority of physics teachers
- ii. knowledge test and teacher made test to be completed inside or outside the classroom by students are commonly used formative assessment practices of physics teachers
- iii. Formative assessment techniques which enables students assess their own work or that of their peers

using criteria developed by the instructor are rarely used by physics teachers

Results from Classroom Observation

Two physics teachers in different schools were observed during a physics lesson on three different occasions in a week. During the classroom observation, pedagogical skills and assessment techniques employed by the physics teachers were noted and graded using a well-structured observation schedule. The researcher also observed the note books and exercises books of physics students. Below is a presentation of the result of the classroom observation. The total marks obtained by each teacher for all the items is calculated and the values obtained for the three days are added up and compared with the total mark that would have been obtained by the teacher if he had scored the highest mark in all cases.

Presented in Table 3 are the results obtained during the classroom observation of the pedagogical skills of two physics teachers using classroom observation checklist to enable the researcher answer research question 1. Each of the statements in Table 3 were responded to using the following scale: **5 = Very Good, 4 = Good,**

3 = Satisfactory, 2 = Unsatisfactory, 1= Poor , 0 = Not observed.

Table 3: Observation of physics teachers' pedagogical skills in the classroom

Pedagogical Skills Used by the Physics Teacher	Teacher 1				Teacher 2		
	Day 1	Day 2	Day 3	Total %	Day 1	Day 2	Day 3 Total %
1. Explain major/minor points with clarity.	5	4	5	93.3	4	5	5 93.3
2. Define unfamiliar terms, concepts and principles.	5	4	5	93.3	4	5	4 86.7
3. Use good examples to clarify points.	4	3	3	66.7	5	5	4 93.3
4. Vary explanations for complex or difficult concepts.	4	5	2	73.3	3	3	4 66.7
5. Emphasize important points.	4	4	2	66.7	3	5	5 86.7
6. Integrates materials (examples, cases, simulations) from "real world".	4	3	2	60.0	5	1	5 73.3
7. Encourages collaborative and cooperative learning	5	4	2	73.3	4	1	5 66.7
8. Ask questions to monitor student understanding and actively encourage student questions	4	2	3	60.0	5	3	2 66.7
Total marks obtained.	35	29	24	73.3	33	28	34 79.2

Field Data, 2021 Key: 5 = Very Good, 4 = Good, 3 = Satisfactory, 2 = Unsatisfactory, 1 = Poor, 0 = Not observed.

The physics teachers observed employed good pedagogical skills and performed very well especially in their ability to define unfamiliar terms, concepts and principles and explain major/minor points with clarity (Teacher 1: 93.3%, 93.3%; Teacher 2: 93.3%, 86.7%). The physics teachers' abilities in varying explanations for complex or difficult concepts (Teacher 1: 73.3%; Teacher 2: 66.7%), their use of good example from the real world to clarify points and explain difficult concepts (Teacher 1: 60.0%; Teacher 2: 73.3%) as well as actively encouraging students' questions needs improvement (Teacher 1: 60.0%; Teacher 2: 66.7%). Also worth noting is the fact that teachers laid emphasis on collaborative and cooperative learning during teaching (Teacher 1: 73.3%; Teacher 2: 66.7%).

Key findings 3:

- i. Contrary to findings from students (through the use of questionnaire) evidence from observation indicates that physics teachers possess and exhibited sufficient knowledge on diverse pedagogical skills.
- ii. Physics teachers exhibited good knowledge on subject matter. This is evident in their ability to use good example from the real world to clarify points and explain difficult concepts

Table 4 displays the results obtained during the classroom observation of the assessment practices of two physics teachers using classroom observation checklist to enable the researcher answer research question 2.

Table 4: Classroom observation of Physics teachers' assessment practices

Assessment Techniques Used By Physics Teachers	Teacher 1			Teacher 2		
	Day 1	Day 2	Day 3	Day 1	Day 2	Day 3
1. Oral questioning and answer	√	√	√	√	√	√

2. Home work	√	×	√	√	×	√
3. Class exercise/class test	×	×	×	×	×	√
4. Observation of students' participation and progress	×	×	√	×	×	×
5. Peer-assessment	×	×	×	×	×	×
6. Self-assessment	×	√	×	×	×	×

Each of the statements were responded to using the following √ = Present/Used, × = Absent/Not used

Through the 3-days classroom observation of two physics teachers, it was evident that physics teachers often assess students through oral questioning. Physics teachers usually throw general questions to their students and solicit answers from different students. Teachers comment on students' answers by indicating whether they are right or wrong or make corrections in their submission where necessary. Also, trial question on topics taught are given to students as assignment (Homework). Class exercises and test are occasionally conducted. In grading the trial questions or class exercises completed by students, teachers sometimes allow students to comment on and grade their own work or that of their peers based on laid down scoring rubrics.

Key findings 4:

- i. Majority of physics teachers often employ interactive formative assessments such as question and answer technique which usually occur in the form of a dialogue between teachers and students.
- ii. Physics teachers rarely allow students the opportunity to grade and comment on their own work and that of their peers when assessing students' progress in physics

VI. DISCUSSION OF FINDINGS

Research Question 1: What are the Pedagogical Skills Employed by Physics Teachers in Teaching at the Senior High School Level?

Pedagogical skills employed in teaching physics.

Instructional strategy adopted by the teacher is known to be one of the most significant factors that affect students' achievement. (Okoronka & Wada, 2014). It has also been established in previous studies that the best teacher is one that carefully utilizes a range of pedagogical approaches to ensure understanding and effective student's learning (Conn, 2014; Kremer & Holla, 2009). However, findings in this study revealed that physics teachers did not display adequate knowledge of general pedagogy and were also deficient in knowledge on diverse pedagogical skills and technological knowledge. This resulted in physics teachers' inefficiency in varying explanations for complex or difficult concepts and in ensuring that they engage majority of their students whilst teaching. The dire consequences are that students will have less understanding of most physics concepts leading to ineffective students' learning and decrease in students' motivation to study physics. Buabeng, Ossei-Anto and Ampiah (2014) suggest physics teachers should be exposed to efficient pedagogies of teaching and presenting information to learners through professional development programs. It is evident from findings in this study that majority of physics teachers did not display adequate knowledge of the subject matter resulting in their inability to identify and address their students' wrong answers and misconceptions. They were also not often able to link what they teach to the daily life occurrences of their students. The negative effects of this is manifested in physics students' lack of appreciation for the subject.

It was also confirmed through observation of classroom practices that physics teachers exhibited good pedagogical skills in their ability of properly defining unfamiliar terms, concepts and principles and explaining major or minor points with clarity. On the contrary, physics teachers' use of good example from the real world to clarify points and explain difficult concepts, as well as actively encouraging students' questions needed improvement. These findings confirm the existence and practice of traditional approaches to teaching physics reinforced by teacher centred, transmissive pedagogy which often fail to promote adequate student understanding of physics concepts (Angell et al., 2004; Hackling et al., 2001; Masika, 2011; Mulhall & Gunstone, 2008, 2012). Physics teachers also did not lay much emphasis on cooperative learning during teaching. Through cooperative learning, students have the opportunity to share ideas and learn from each other. As suggests by McDermott (2001) that the focus of physics teaching should be on the students as learners. He further maintained that effective teaching should include close contact with students where

teachers observed the struggles of students as they tried to understand important concepts and principles.

Findings from the study suggests that physics students are constantly longing for opportunities that will enable them better understand complex concepts and experience the practical use of the physics concepts and principles they study in the classroom. All these could be achieved through logical presentation of lessons at a good pace, teacher demonstration, laboratory practical and visiting of industries where physics concepts, ideas and principles are applied. All these activities will make learning of physics interesting to students and help them to better understand and appreciate what they learn in the classroom.

Research Question 2: What Types of Assessment are used by Teachers in the Teaching of Physics at the Senior High School?

Types of assessment used by physics teachers

Mikre (2020) laid emphasis on the need to gather a variety of information and determine the degree to which students have attained the learning targets intended in the curriculum. This study discloses that physics teachers make use of a variety of formative assessment techniques to enable them understand their students and monitor instruction. Findings in this study revealed that physics teachers most often employ interactive formative assessments through questioning in the form of dialogue as well as class exercise and class test to determine if students have attained the learning targets intended in the curriculum. In a related study, tutors agreed that interactive formative assessments promoted learning outcomes through questioning in a form of dialogue (Bekoe, Eshun & Bordoh, 2013). This practice has the benefit of providing immediate feedback to improve teaching and learning (Akyina & Oduro-Okyireh, 2019). Findings in this study also indicated that knowledge test and teacher made test to be completed by students inside or outside the classroom are commonly used formative assessment employed by their physics teacher. In a related study, Akyina and Oduro-Okyireh (2019) also found that the use of class exercises was more prominent among the formative assessment techniques used. Classroom test and assignment were sampled as assessment methods often used by teachers of secondary schools in Osun State, Nigeria (Faleye & Adefisoye, 2016).

Contrary to the findings of Plybour (2015), which divulges that peer assessment was regularly used in formative mode at the beginning of lessons, especially during classroom discussion of homework. Findings in this current study revealed that physics teachers rarely allow students the opportunity to grade and comment on their own work and that of their peers when assessing students' progress in physics. Despite the relevance of Peer and self-assessment to provide learners with the opportunity to take responsibility for analysing, monitoring and evaluating aspects of both the learning process and product of their peers (Bekoe, Eshun, Bordoh, 2013), physics teachers rarely use them. Concerns has

however been raised about the quality of peer feedback and comments (Plybour, 2015). The quality of peer feedback could possibly be a deterring factor that could explain why physics teachers often resort to the use of other modes of assessment. Much time is needed for teachers to prepare students to be able to assess their own work and that of their peers because there is a need for more detailed criteria to be developed by the instructor to guide the student effectively carry out the assessment process.

It was also evident in this current study through observation of teachers' classroom practices and the exercise books of physics students that oral questioning and answer, giving of home work and class exercise are among the major formative assessment techniques often used by physics teachers. A similar observation was made in a classroom setting that tutors asked questions in open discussion, use questions and answers to introduce their lesson and students were called to summarise what they learnt after the lesson (Bekoe, Eshun & Bordoh, 2013). Bekoe et. al. concluded that interactive formative assessments through questioning in the form of dialogue promotes learning outcomes. The practice of oral questioning of students before lesson begins, during or at the end of lessons coupled with the use of other classroom formative assessment techniques such as giving class exercises and test as well as giving assignments has the benefit of providing immediate feedback to improve teaching and learning when it is used appropriately and effectively (Akyina & Oduro-Okyireh, 2019) hence it is often used by physics teachers and teachers of other subjects as well.

VII. CONCLUSION

The findings of this study has revealed physics students' concerns about their physics teachers' not often applying some important pedagogical skills such as linking what they teach to their students' daily life occurrences and not often responding appropriately to students' wrong answers and misconceptions. However, evidence from observation indicates that some physics teachers in the Hohoe municipality possess and exhibited sufficient knowledge on diverse pedagogical skills. These findings should therefore draw other physics teachers' attention to the frequency with which they apply these important pedagogical skills in the classroom.

The frequent use of interactive formative assessments such as oral question and answer technique that usually occur in the form of a dialogue between physics teachers and students in the Hohoe municipality is a step in the right direction and should be encouraged. The attention of physics teachers in the Hohoe municipality should however be drawn to other equally important assessment technique such as self and peer assessment. These assessment techniques give students the opportunity to learn the criteria for high-quality performance and experience a willingness to apply those criteria. They also enhance students' willingness and ability to become active members of a group of learners.

Even though the researcher had wished there were more physics teachers involved in the study, the difficulty in getting access to the schools involved due to Covid-19 and the hesitancy with which physics teachers accepted to be observed result in the few teachers being involved. The researcher however believe that it does not have much effect on the generalisation of the findings in the municipality where the study was carried out. This is because, students who are under the direct tutelage of the physics teachers in the municipality were well represented in all the schools and have given lots of information about the classroom practices of their physics teachers.

Summary of Key Findings

A number of findings were revealed through the studies but significant and worth noting among them are summarised as follows:

1. According to most of the physics students (67.5%), their physics teachers do not often respond appropriately to their wrong answers and misconceptions. A number of physics students (48%) also raised concerns about their physics teachers' not often linking what they teach to their daily life occurrences.
2. Contrary to findings from students (through the use of questionnaire) indicating that their physics teachers do not often employ certain pedagogical skills, evidence from observation indicates that physics teachers possess and exhibited sufficient knowledge on diverse pedagogical skills.
3. Physics teachers often use interactive formative assessments such as oral question and answer technique that usually occur in the form of a dialogue between teachers and students and has the benefit of providing immediate feedback.
4. Knowledge test and teacher made test to be completed inside or outside the classroom by students are commonly used formative assessment practices of physics teachers.
5. Formative assessment techniques such as self and peer assessment which enables students assess their own work or that of their peers using criteria developed by the instructor are rarely used by physics teachers.

VIII. RECOMMENDATIONS

Based on the key findings and the conclusions drawn from the study, the researchers would like to make the following recommendations.

1. Physics teachers should carefully pay attention to and address their students' wrong answers and misconceptions.
2. Physics teachers should try their possible best to make learning of physics interesting by making students appreciate the importance of what they study, show

interest in the overall success of their students and often encourage students to study physics.

3. Physics topics learnt should be linked to daily life activities of students and physics teachers should often cite examples from students' daily life while teaching.
4. Physics teachers should give students the opportunity to be actively involved in the assessment process through the use of self and peer assessment.

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