UNIVERSITY OF EDUCATION, WINNEBA

JUNIOR HIGH SCHOOL INTEGRATED SCIENCE TEACHERS' ASSESSMENT PRACTICES IN THE BIA WEST DISTRICT IN THE WESTERN REGION OF GHANA

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DECLARATION

STUDENT'S DECLARATION

I Johnson Ndonyun declared that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and that it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE……..

DATE……..

SUPERVISORS' DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of dissertation laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: Professor JOHN K. EMINAH

SIGNATURE……

DATE……..

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I dedicate this work to my father Ndonyun Gyato and my wife, Waja Monica and to the entire family and all those who in diverse ways, contributed to my upbringing, growth and development.

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ABSTRACT

This study investigated the instructional assessment practices of junior high school integrated science teachers, the pattern, techniques and challenges in Bia West District of the Western region with a view to providing a baseline data on the state of the art of this important aspect of science teaching. A total of 54 science teachers and 250 pupils were drawn from nine circuits consisting of 68 public junior high schools in Bia West District constituted the participants in the study. The descriptive survey research design was adopted for this study. The researcher collected data on certain characters among the randomly selected sample from the target population in the study area. The self – report data obtained by a survey questionnaire revealed that teachers used similar instructional assessment practices regardless of sex, teaching experience, professional qualification, and academic qualification. Teachers reported using collaborative and formative assessment practices most often although the techniques they reported to use did not greatly reflect this. Solutions to their systemic challenges did not reflect the teachers' claim of using collaborative assessment practices. Based on the findings, it was recommended that teachers will benefit from professional development activities that promote reflection and collaboration in addressing their instructional assessment challenges on a practical level. Further research is necessary to look into the influence of teacher beliefs and attitudes on their instructional assessment practices.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter deals with the background to the study, statement of the problem, and the purpose of the study; the objectives of the study, research questions, significance of the study, delimitation of the study and organization of the study are also presented.

1.1 Background to the Study

The teaching and learning of science is to adequately equip students with the requisite knowledge and skills in order to understand science concepts. Science explains the natural existence of man and his activities. It could be seen as problem solving in order to improve the living standard of man. By definition, science is the knowledge acquired through observation, inquiry, experiment and evaluation of information gained. The knowledge of science is gained by a continuous process of investigation and experimentation to solve problems and to project the understanding of the natural world (Quansah, 2006)

Monsary (2003) defined science as an integrated part of human activities. It is seen as a dynamic human activity concerned with the manipulation of materials. It is also seen as knowledge covering general truths and laws, obtained and tested through the scientific method. Science can be seen as the bedrock of national development. It is used by humans to solve daily problems and to control the environment (Monsary, 2003). The usefulness of science cannot be under-rated. Science opens students' minds in order to acquire in-depth knowledge about phenomena in day to day affairs and the world in which they live.

The influence and the impact that science has on the environment as well as life in general, places a great task on the educational system of the country. It is in view of this that science was enshrined in the school curriculum right from the basic level up to the tertiary level of education to help expose all students to the basic facts and knowledge of science (Monsary, 2003).

The application of science ideas to practical situations and problems in the areas of technology have grown significantly. The teaching of science at all levels of the educational ladders helps students acquire scientific concepts and principles to solve problems on their own. They also acquire skills in the manipulation of scientific apparatus equipment and materials and are able ability to interpret scientific information and findings in order to draw valid inferences. The learners become proficient skills in handling and interacting with things in the environment. They become curious and adopt investigative attitudes towards the study of science as a whole (Mbajiorgu, 2003; Blough & Schwartz, 1990).

The importance of integrated science is so much that it needs to be taught with assessment at heart. To better serve students and to address the heightened call for accountability in higher education, institutions must engage in a comprehensive campus-wide discussion on the specific components of critical thinking, problem solving, writing, and the methods to assess these skills (Maki, 2001).

Allen (2004) defined educational assessment as the systematic process of documenting and using empirical data on the knowledge, skill, attitudes, and beliefs to refine programmes and to improve pupil learning. Assessment data can be obtained by directly examining the pupils work to assess the achievement of learning outcomes or can be based on data from which one can make inferences about

learning. Assessment is often used interchangeably with testing but not limited to tests. Assessment can focus on the individual learner, the learning community (class, workshop, or other organized group of learners), a course, an academic program, the institution, or the educational system as a whole. According to Nelson *et al...* (2014), the word 'assessment' came into use in an educational context after the Second World War.

As a continuous process, assessment establishes measurable and clear pupil learning outcomes for learning, provisioning a sufficient amount of learning opportunities to achieve these outcomes, implementing a systematic way of gathering, analyzing and interpreting evidence to determine how well student learning matches expectations, and using the collected information to inform improvement in pupil learning (Suskie & Linda, 2004).The final purpose of assessment practices in education depends on the theoretical framework of the practitioners and researchers, their assumptions and beliefs about the nature of human mind, the origin of knowledge, and the process of learning. It is now well understood that pupils are by nature curious and eventually build upon their own repertoire of concepts in science (Gyimah, 1986). Genesee and Upshur (1996) stated that classroom assessment and evaluation is concerned primarily with improving instruction so that pupil learning is enhanced. Classroom teachers in educational system, more than anyone else, are actively and continuously involved in assessment and evaluation. Pupils can also be active participants in assessing their own achievements and in planning how they will study and learn during science lessons. It is because of this background that researcher wanted to undertake this study to find out integrated science teachers' assessment of pupils in the Bia West District.

1.2 Statement of the Problem

Over the years, personal interactions with some teachers and pupils have shown that pupils' performance in integrated science at the BECE has fallen. Considering the Junior High School science programme, the contact hours for integrated science is quite inadequate, so most teachers mostly use the lecture method in imparting knowledge, hence most pupils have shown little competency in mastering the application of concepts taught in the classroom. Genesee and Upshur (1996) stated that it is necessary to consider classroom practices separate from plans because what is planned may not always occur in the classroom. Teachers may not implement instructional plans as prescribed for a variety of reasons (e.g. they did not understand them well; the plans were poorly described and thus, could not be implemented unambiguously, etc). Moreover, classroom practice may not proceed according to plan because the pupils themselves did not react as expected. So, it is important that classroom assessment and evaluation take into account what actually happens in class rather than simply what is supposed to happen. It is unfair to assess pupil achievement with reference to instructional plans, including objectives, if these do not adequately represent what actually takes place in class. The researcher has taught for a number of years in some junior high schools and had visited a number of junior high schools as a resource person. Through these experiences, the researcher observed that most teachers in junior high schools did not fully make use of instructional assessment in the teaching of integrated science. This neglect of the effective use of the instructional assessment in the teaching and learning of integrated science (common to both the trained and untrained teachers) affected the successful academic performance of pupil in integrated science in junior high schools. Most of junior high schools could not meet up with the hands-on requirements of this subject as they lacked effective instructional assessment for

adequate teaching and learning of the subject. Teachers normally avoided the use of assessment in instructional delivery in most of their teaching topics. The appropriate utilization of instructional assessment in the teaching of integrated science by experienced and qualified teachers may probably be the main solution for the poor performance of junior high school pupils in integrated science. It is because of this background that the researcher undertook this study to find out junior high school integrated science teachers' assessment practices in the Bia West District of the Western Region.

1.3 Purpose of the Study

The purpose of this study was to determine junior high schools integrated science teachers' assessment practices in the Bia West District of the Western Region.

1.4 Objectives of the study

The study sought to:

1. Identify the types of instructional assessment being used for teaching in order to improve pupils' academic performance in integrated science.
2. Determine the characteristics of instructional assessment that can be used to influence pupils' academic performance in integrated science.
3. Determine the importance of the use of instructional assessment in enhancing pupils' academic performance in integrated science.
4. Examine the factors affecting the use of instructional assessment to enhance the academic performance of pupils in integrated science.

1.5 Research Questions

The following research questions were answered in the study.

1. What instruments do the junior high school integrated science teachers use to assess their pupils?
2. How often do the teachers assess the pupils?
3. What type feedback do they give to the pupils on the various assessment tasks?
4. What types of assessment record-keeping are practiced in the schools?
5. What difficulties do the teachers encounter in constructing assessment items?
6. What are the views of the pupils on the assessments conducted by their science teachers?

1.6 Significance of the study

The findings of this study will be of immense benefit to the stakeholders concerned with policy making in education delivery in the various schools in Ghana. The findings will reveal the need for policy makers and philanthropists to see the urgency in allocating funds to science, since science is the backbone of every country's growth and development. These findings will also increase the awareness of Parent Teacher Associations and Board of Governors of some of the challenges teachers face while teaching and learning in science. The findings will serve as a guide to teachers as to how they can improve upon their methods of assessments. The findings from the study will help integrated science teachers in choosing appropriate instructional assessment instruments capable measuring towards the subject thus improving students' academic performance in integrated science. It will motivate integrated science teachers to develop interest towards utilizing suitable teaching assessment that will be a possible means towards reducing failure in the teaching and learning of integrated science. Findings of this study will help clarify among the teachers the need for continuous and

regular improvisation of suitable instructional assessment for teaching and learning of integrated science.

1.7 Delimitations

The study was restricted to the impact of instructional assessment on the academic performance of pupils in integrated science at the Bia West District. This research work is delimited to the types of instructional assessment available for use to influence academic performance of integrated science pupils, characteristics of instructional assessment, importance and uses of instructional assessments and factors affecting instructional assessment usage.

1.8 Limitation(s)

There are 68 junior high schools in the District (Bia West) in the Western Region. The study is however, limited to only 45 junior high schools in the District. This limitation is due to the fact that the researcher could not tour beyond the District due to extra curricula schedules and financial constraints. Yet, the outcome of the study is applicable to other junior high schools in the country as they all use the same curriculum or course syllabus and other instructional assessment and also have teachers who almost have the same qualification. Also, the junior high schools are located in the same geographical area, Ghana.

1.9 Organization of the study

The study is organized into five chapters. The chapter one focused on the general introduction and background to the study. It projected the statement of the problem, purpose and objectives of the study, research questions, significance of the study, delimitation of the study and organization of the study. Chapter two on the other hand dealt with the review of the literature related to the study, highlighting theories made

by other researchers. The chapter three focused on the methodology, tackling the research design, population, sampling and techniques, research instrument, data collecting procedure, pre-intervention, post intervention and limitations. Chapter four is the presentation and analysis of results, and chapter five discussed the summary of finding, gave recommendations and conclusions.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Overview

The literature was reviewed under the following sub-headings.

- Theoretical framework
- Constructivist theory (approach) of learning
- Science Education in Ghana
- Science education integration, content and structure
- A history of integrated Science education
- Concepts and Forms of Classroom Assessment
- Classroom assessment and Science Education
- Teachers' Assessment Practices and Competencies
- Attitude of teachers to assessment practices.

2.1 Theoretical Framework

This study adopted the constructivist theory. This theory primarily focuses on pupils being the pivot in the learning environment. The theory was to derail any misconceptions which pupils have on the study of science concepts at Bia west District.

2.1.1 Constructivist theory (approach) of learning

This research was conducted in line with the constructivist theory of learning science. This learning theory is one of the most influential theories in education and learning theory.

Clement and Battista (1990) defined constructivism as an epistemology, which follows the basic tenets that:

1. Knowledge is actively created by the pupils
2. New knowledge is created by reflection on physical and mental action.
3. There is no one reality, each person has their own reality based upon their interpretation.
4. Learning is a social process.
5. Pupils learn when they are allowed to explore.

Constructivist theory is premised on the active nature of learning as proposed by Brunner (1960). This is in agreement with the Educational Broadcasting Corporation (2004), that constructivism is basically a theory based on how people can learn on their own with little guidance.

According to constructivism, the underlying knowledge resides in the individual learner and, as such, learning is a process through which the individual tries to make sense of what is taught by tying to fit into his or her existing knowledge structure prior to experience. Learning becomes meaningful only after the new materials are well connected with the existing related knowledge or schema. For instance, when we encounter something new, we have to reconcile it with our previous ideas and experience, changing what we believe or maybe discarding the new information as irrelevant.

From the constructivist view of point, we are active creators of our own knowledge for effective learning. Therefore, the learner needs to attain cognitive equilibrium by seeking stability through assimilation and accommodation. Hence, it is important to help students build their own schema by letting them learn more specific and general knowledge before moving onto higher order of problem-solving which requires the

ability to connect ideas. It is on this basis that Smith (1999) emphasizes that a new learning material must fit with whatever the learner already knows if it is well understood. This means that a teacher either will help the pupils to build relevant prerequisite knowledge or refresh their knowledge before they are exposed to new materials. The constructivist view of learning is reflected in the developmental theories of Dewey (1997) and Vygotsky (1978) among others.

2.2 Science Education in Ghana

In Ghana, school science is compulsory at basic education level (the primary and the junior high education levels). Science is compulsory at the various levels of education, and has different names. It is called integrated science at primary level, general science at junior high level and back to integrated science at the senior high level. The integrated science at the senior high level is a core subject for all pupils at that level. Though the science carries different names at different levels, its components are similar. The components are mainly the traditional science subjects. Junior high school pupils are expected to pass the general science at the Basic Education Certificate Examination (BECE) to gain admission to the middle-level education.

Science as a unit (physics, chemistry, biology, ICT and agriculture combined) was made compulsory at all levels of pre- tertiary education. Some training colleges were designated as science colleges to train science teachers for the basic level of education in order to increase access to science learning at that level. Many other initiatives have been instituted to boost the teachers and learning of science. After many years of independence and despite the various actions, such as policies and initiatives by successive governments, not very much has been achieved in our effort at developing the nation through Science and Technology Education.

Ghana still faces the problems of underdevelopment. The status of science education and application of modern technology for industrial and agricultural purposes have increased, but not to the expected levels when compared to some Asian countries, like Malaysia, who had independence around the same time as that of Ghana; though, there may be other contextual factors that might have contributed in propelling Malaysia into an emerging industrial country. Incidence of diseases, unsanitary conditions, and environmental degradation are common occurrences. It is clear to deduce that the introduction of science and technology education as a vehicle to facilitate Ghana's development has not been very much successful.

Many Ghanaian science education researchers have elaborated on the causes for the present state of science education (Anamuah –Mensah, 2010). Prominent among the causes are the neglect of the indigenous culture in the development of science curriculum and in instruction. Anamuah-Mensah writes:

Science (like the traditional culture) has its own values, norms, practices, and beliefs and is therefore a culture in its own right. However, the scientific culture has been presented to the African child as part of the Euro-American culture and the African is therefore required to imbibe the western culture when learning the scientific culture.

Aikenhead (1997), for example, also argues for a cross-cultural science curriculum that permits pupils to move between various cultures and subcultures (e.g. the culture of the nation, the subcultures of science and school science). And those teachers who hold beliefs enabling them to take a cross-cultural perspective towards the curricular and instructional environment will ultimately be able to assist pupils as they encounter different cultures and subcultures. Another area of concern is the teaching methodology. The teaching methodology in Ghana appears to consist more of straight

lectures or direct-teaching which requires the students to listen attentively throughout the duration of the instruction. It is likely that the students' interest might not be stimulated enough to enjoy science as a form of knowledge construction but function more as a validation of a given knowledge (Fredua-Kwateng & Ahia, 2005). The result is that science learning is reduced to rote learning and memorization. This form of science education in Ghana only reproduces and reinforces our Economic and Technological underdevelopment. Looking at the range of problems that confront Ghana, the most appropriate science pedagogy must be knowledge construction for problem-solving and problem-posing. Another area which has affected the country's science and technology efforts, relates to coordination of these activities. Essentially, there was no coordination mechanism to make it possible.

2.3 Science education integration, content and structure

The word integration in the Swedish National Encyclopaedia (Nationalencyclopedia, 2002) is defined as a fusion into a whole, or an arrangement as a natural part of a whole. It comes from the Latin word 'integrare,' which means to restore to an unspoiled whole. Integrated curricula have a long history in Anglo-Saxon educational research. It has been possible to search for this keyword in the ERIC thesaurus since 1966. According to ERIC, integration is a'systematic organization of curriculum content and parts into a meaningful pattern.' A related term, unified studies curriculum, was registered as a keyword in 1980 and is defined as 'Curriculum designed to integrate an educational program by eliminating the traditional boundaries between fields of study and presenting them as one unified subject'. The modern idea of integrated education is rooted in ideas from Dewey (1938) about democratic education; the idea was further developed by Hopkins (1940) and by many others. What is the aim of integrated education? Are subjects integrated? Is the school day

integrated? Is the school schedule integrated? There have been some attempts at integrating the school day in Sweden, primarily integration of the school schedule (Westlund, 2003). Westlund demonstrated in a thorough study how schedules scatter time in schools (Westlund, 1998). But is time or the schedule the core issue of integration? Or is it the individual pupil's integration of knowledge within himself or herself? Is the goal of integrated education a special way of working, the student's process or is it the pupil's general competency? Is the aim of integrated education a combination of general processes or competencies from several subjects? This is further developed in section 1.1.4. Andersson drew a distinction between different ways wholeness may be created in a Science classroom (Andersson, 2002, p 28-29). Wholeness can be created by teaching pupils, parts that connect to a whole; alternatively, the student's wholeness can interact with the overall wholeness; or students may themselves create wholeness without a clear intent from the teacher. Andersson discussed different kinds of integrated education possible in the Science classroom. Education may be integrated at the individual, content and/or context level in his model of integrated education. Integrated education cannot take place if no one is integrating, according to Andersson. This thesis will investigate ideas about the current validity of integrated Science education. The theory of curriculum studies in Science and the main ideas discussed in this field are presented. The first part of this thesis discusses ideas about integrated Science education that flourish in the literature, with an eye towards distinctions between different views of integrated Science education. Differences between student results in Scientific literacy and attitudes to Science will be investigated for different groups of students with different Science educational organisations, i.e. integrated and subject-specific Science

education. On the basis of these findings, differences between Science educational organisations are discussed.

2.4 A history of integrated Science education

The 20th century in the USA has witnessed a continuous discussion about integrated science education (Hurd, 1986). Intertwined with this discussion has been a discussion of progressive education based on Dewey's ideas (Gilbert, 2005). The demand for integrated education reached its climax in 1970 when the U.S. Advisory Committee for Science Education of the National Science Foundation recommended a curriculum that related Science and Technology to human and social affairs (Hurd, 1986, p.356). During the same time period, two large international organisations started a continuous mapping and development of integrated Science education. One of these organisations is UNESCO, which publishes the report series 'New trends in integrated Science teaching' and the other is ICASE, the International Council of Associations for Science Education, an association of teacher organisations with the goal of integrating Science education. One of the first steps in mapping and developing integrated Science education was to find a model for integrated Science. Blum created a two-dimensional model consisting of scope and intensity. Scope deals with the disciplines that are integrated. Intensity has three levels: full integration (amalgamation), combination and coordination. He uses this model to categorize curricula in different parts of the world (Blum, 1973). By 1979, the variety of curricula with integrated Science had grown to such an extent that it became almost meaningless to talk about integrated curricula. Haggis and Adey described the occurrence of integrated Science curricula (Haggis & Adey, 1979a); they also analysed and discussed implementation trends in different countries for integrated science curricula (Haggis & Adey, 1979b); At the same time, Brown wrote about the meaning of integrated

education and argued in favour of integration (Brown, 1977). She analysed four themes in the light of a dispute between two writers, Bernstein and Pringe, regarding the differences between and within collected and integrated curricula: 'unity of all knowledge', 'unity of the conceptual structures of Science', 'unified process of scientific enquiry', and 'interdisciplinary study'.

During the 1980's, research into integration in Science education occurred at the same time as research into STS1. The meaning of integration did not appear to change with the change of words used to describe the phenomena. Aikenhead richly described the emerging field of STS (Aikenhead, 2003). In the USA, there has been a discussion about scientific literacy that involves Science teaching more than integrated Science education (de Boer, 2000). de Boer discusses at least nine separate goals for Science education for the public where STS is one component of the public's interface with Science. He concludes that the important thing about Science education is that pupils continue to find Science interesting and applicable to things they experience both in and outside of school. Regarding the debate about scientific and Science literacy, Roberts presents two visions of the aims of Science education: the first vision is that some students will become Science professionals and they acquire Science skills for this purpose; the second vision is that all pupils need scientific literacy to become fully fledged citizens able to work with and learn about science related matters in their professional and private spheres (Roberts, 2007). This is an echo of earlier writers, e.g. Fensham (1985). STS is an acronym for Science, Technology and Society.

2.5 Concepts and Forms of Classroom Assessment

Assessment labeled as the outcome of the 20th century, has been defined variously in the literature. Among the many, Linn and Miller (2005); define assessment of pupils learning as a systematic process of collecting information about pupil progress towards the learning goals. Similarly, Dhindsa et al. (2007) characterize assessment as a key component of teaching and learning, "a systematic process of data gathering" about students' progress (p. 1261). They maintain that students' performance can be measured in various ways, including "traditional paper and pencil tests, extended responses (essays), performance of authentic task, teacher observation, and student self-report" (Linn & Miller, 2005, p. 26;). In addition, the authors distinguish between two other terms aligned with assessment: 1) test "an instrument for measuring a sample of behavior" and 2) measurement, "the process of obtaining a numerical description of the degree to which an individual possesses a particular characteristic" (Linn & Miller, 2005, p. 26;). In the Western countries at present, pupils are encouraged to fully participate in classroom activities. According to Herrera, Murry and Cabral (2007), pupils are now being asked to use their "cognitive development, academic knowledge, and language skills to read, comprehend, synthesize, analyze, compare, contrast, relate, articulate, write, evaluate and more" (p. 23). This encouragement builds the foundation for alternative forms (formative) of assessment to be used in the classrooms so that the instructors can "measure incremental gains" (Herrera, Murry & Cabral 2007, p. 22). Although various definitions are given about alternative assessment in the literature, Crawford and Impara (2001), Cooper (1999), Diaz-Rico and Weed (2006), Linn and Miller (2005) and Hancock (1994) maintain that alternative assessments:

- Are generally developed directly from classroom instruction, group work, and related classroom activities and provide an alternative to traditional assessment.

- Can be considered valid and reliable in that they genuinely and consistently assess a student's classroom performance.

- Facilitate the pupil's participation in the evaluation process.

- Include measurements and evaluations relevant to both the teacher and the pupil. Emphasize real-world problems, tasks, or applications that are relevant to the student and his/her community (cited in Herrera, Murry & Cabral, 2007, p. 23). Wiliam and Thompson (2008) introduce a shift from traditional assessment forms to a newer paradigm, alternative assessment. Particularly, the emergence of formative and summative assessment as two different formats has attracted educators' attention in the current literature (Wiliam & Thompson, 2008). The authors argue that the use of assessment for student learning is the main feature of formative assessment. According to Wiliam and Thompson (2008), Scriven (1967) and Bloom (1969) proposed the terminology "formative" and "summative" assessment, given the reason to differentiate the role of evaluation. Formative assessment is introduced as an ongoing process of evaluating students' learning, providing feedback to adjust instruction and learning, improving the curriculum (2008). Summative assessment, on the other hand, is bound to administrative decisions and assigning grades to the tests. Bloom (1969) asserts that when assessment is aligned with the process of teaching and learning, it will have "a positive effect on pupils' learning and their motivation" (cited in Wiliam, 2008, p. 58). Assessment in general accounts for "supporting learning (formative), certifying the achievement or potential of individuals (summative), and evaluating the quality of educational institutions or programs (evaluative)" (Wiliam, 2008, p. 59). Black and Wiliam (2004) put more emphasis on the use of assessment to support learning; however, they also 8 acknowledge the importance of using assessment for certification

and evaluation. In addition, there is a rising consensus among educators that assessment should be used to diagnose students' achievement, measure their performance, sort students, etc. However, others argue for the use of assessment to enhance student learning and performance (Delandshere, 2002). Current literature on assessment and instruction view assessment as a longitudinal process that occurs during instruction and supports lifelong learning. According to Dochy (1997), the concept of lifelong learning arose from the business and industry sector, when people began arguing that the labor force needed to be adaptable to "new technology and acquire new skills throughout their working lives" (p. 3). Birenbaum (1996) makes a distinction between testing and assessment, in which testing measures achievements, mainly cognitive skills such as memorizing factual-information, and is considered separate from instruction. However, the new paradigm of assessment offers an alternative for testing culture which is "characterized by so called objective, such as standardized tests that focused on atomized bits of knowledge at the expense of more complex, higher-order knowledge and skills", assessment an integrated part of instruction (Gulikers, Bastiaens, Kirshner & Kester, 2006, p. 382;). Although interpretations of formative assessment vary widely, according to Wiliam and Thompson (2008), "formative assessment is used to provide information on the likely performance of students" and "to describe and feedback given to students... telling them which items they got correct" (p. 60). This oppose the way selected responses measure pupils' achievement, given pupils' scores instead of feedback. Formative assessment, according to Wiggins and McTighe (2007), occurs during instruction, as part of instruction rather than a separate activity. It has both formal and informal formats including ungraded quizzes, oral questioning, self-reflection, peer feedback, think-aloud, etc. A distinction is made between 9 assessments for learning which describes the process, assessment as a support for learning,

compared to assessment of learning that describes the nature of assessment or the product (Wiliam & Black 1998; Wiliam & Thompson, 2008). Similarly, other researchers agree that the core features that characterize formative assessment are that it impacts the quality of teaching and learning, and it engages students in self-directed learning environment (Chappuis & Stiggins, 2004). The literature on assessment and teaching expounds on the importance of formative assessment and its implications for instruction and its ultimate goal, that "assessment… feed into actions in the classroom in order to affect learning" (Wiliam & Thompson, p. 63). Similarly, Wiggins and McTighe (2007) argued that by embedding formative assessment in "curriculum documents, and advice on how to use their results to adjust curriculum, a school…signals that such practices support effective teaching" (p. 103). Along with this theory, the term "big idea" is introduced as a key component of formative assessment, which goes along with the strategies that describes the role of instructor, learner, and peer as in Figure.1 (Wiliam & Thompson, 2008; Black & Wiliam, 1998; Herrera, Murry & Cabral, 2007). Although a variety of definitions are presented for the term big idea, among them some authors see it in terms of its implications on assessment. Big idea is "evidence about student learning used to adjust instruction to better meet student needs", in other words "that teaching is adaptive to the pupil's learning needs" (Wiliam 2008, p. 64). Moreover, Black and Wiliam (1998) raise the "scrutiny issue" of developing tests to collect relevant evidence of pupil progress: "good questions are hard to generate and teachers should collaborate, and draw—critically—on outside sources, to collect such questions" (p. 8). 10 Framework Relating Strategies of Formative Assessment to Instructional Processes Where the learner is going Where the learner is right now How to get there Teacher Clarifying and sharing pupils learning intentions and criteria for success Engineering effective classroom discussions and

tasks that elicit evidence of learning Providing feedback that moves learners forward Peer Understanding and sharing learning intentions and criteria for success Enabling students as instructional resources for one another Learner Understanding learning intentions and criteria for success Activating students as the owners of their own learning Table.1 (Adapted from William & Thompson, 2008, p. 63) William and Thompson (2008) presented this matrix describing the role of pupil and teacher in an ongoing classroom assessment model. Given the above criteria, formative assessment has facilitated a change in the practices of some instructors who are encouraged to develop their own assessment formats or to adapt the forms of assessment that help them gather helpful information about their pupils' progress. The reason that alternative assessments are considered more authentic compared to the traditional forms is that they hold approaches to "measure pupils' learning that embeds both quantitative and qualitative features" (Herrera et al. 2007, p. 25). Although the term "assessment for learning" is used interchangeably with "formative assessment" among many writers, Black, Harrison, Lee, Marshall, and Wiliam (2003) make a clear distinction between the two. They argue, "assessment for learning is any assessment for which the priority in its design is to serve the purpose of promoting pupil's learning, compared to an assessment design that serves... to provide information to be used as feedback, by the teachers and pupils, in assessing themselves... to modify the teaching" (Black et al. 2003, p. 8). Wiliam and Thompson (2008) observe, "an assessment is formative to the extent that information from 11 the assessment is fed back within the system and actually used to improve the performance of the system in some way" (p. 61).

2.6 Summative Assessment and the New Paradigm (Formative)

Assessment in the context of education has been used primarily "in deciding, collecting and making judgments about evidence relating to the goals of the learning being

assessed", which makes no reference to how the information being collected and could be used (Harlen, 2006, p. 103). Assessment of learning, identified as summative assessment in the current literature, is deeply rooted in education and what has emerged along with it is the new paradigm, assessment for learning (formative assessment). In addition, Harlen (2006) justifies changes in assessment practices, to be used in four purposes: diagnostic, formative, summative, and evaluative. The transformation of assessment practices, according to Herrera et al. (2007), is that "assessment of achievement has become increasingly standardized, norm referenced and institutionalized" (p. 13). Another change that emerged is regarding assessment of achievement (summative assessment) and its negative effect on teaching and classroom climate and assessment (Firestone & Mayrowetz, 2000). Herrera et al. (2007) state that while they have many uses, standardized tests nevertheless:

- Limit and negatively affect the quality of content-area instruction;
- Prompt teachers to narrow the curriculum taught in classrooms;
- Encourage "teaching to the test";
- Push students out of the system;
- Divert classroom instruction to an emphasis on low-level content and basic skills;
- Increase the redundancy of instruction (Herrera, Murry & Cabral 2007, p. 13).

The new form (alternative assessment) provides more opportunities for the instructor to regularly observe students' skills and capabilities and to adapt the lesson based on their needs. According to Harlen (2006), the formative assessment functions as a cycle of events, which 12 identifies the learner's position and his or her targeted goal (see Figure. 2). Students are viewed as active members of the class as opposed to the old

version of assessment in which pupils were simply receivers of information. Chappuis and Stiggins (2004) agreed that students were perceived to be passive actors in the traditional form of assessment rather than active learners in the new forms (formative assessment) and acquire ownership of their learning. This meant that students were given the chance to have a stake in their own progress, assess their own work and that of their peers, and collaborate with their instructor in developing criteria and norms for their work.

Another issue that undermines the purpose of using assessment is the prediction made by the instructor that some " pupils will fail in the state-mandated test" (Wiliam & Thompson, 2008, p. 61). Black and Wiliam note the negative aspect of grade marking, considering that if a Student Judgment of achievement (Criterion referenced) Next steps in Evidence learning A B C Collection of evidences relating to goals Interpretation of evidence Decision about next steps Decisions about how to take next steps Pupils' activities (steps in learning) 13 pupil gets lower scores in one or two terms, it creates a shared belief between the pupils and the teacher that she or he lacks high learning skills or is not intelligent enough. In addition, a consensus exists among educators that, if tests occur only at the end of cohort or term, the result can hardly be used to adapt instruction and to improve learning (Wiggins & McTighe, 2007; Black & Wiliam, 1998; Herrera, Murry & Cabral, 2007). Wiliam and Thompson (2008) distinguish between different terms used along with the term "formative assessment": Another way of thinking about the distinction being made here is the terms of monitoring assessment, diagnostic assessment, and formative assessment. An assessment monitors learning to the extent that it provides information about whether the student, class, school or system is learning or not; it is diagnostic to the extent that it provides information about what is going wrong; and it is formative to the extent that it provides information about what

to do about it (p. 62). The literature on assessment and evaluation put emphasis on the formation of assessment tools and activities corresponding to the instruction that displays effectiveness, as opposed to poor assessment format which reduces "pupils' motivation for learning, inadequately linked to instruction, and incorrect evaluation of effectiveness of instruction" This means that within a student centered classroom, students are perceived as thinkers and active members, opposed to traditional approaches that see pupils as receivers of information and blank slats (Brooks and Brooks, 1999). One main feature of high order assessment is high level instruction, making instruction and assessment complement of each other. This means that the alternative assessment is instruction-driven, given the assumption that it will have a positive impact on instruction, making the instruction real and authentic. Along with other authors, Herrera et al. (2007) argue that the traditional forms of assessment, such as standardized tests, teacher-made tests, multiple choice, fill in the blanks tests, etc., dominated schools and colleges through which the instructors could barely use the information provided by these tests to improve instruction. However, these authors recognize that the old forms of tests are useful in comparing students, programs, and schools through quantitative representation. As Birenbaum (1996) asserts, the role of the instructor in the modern form of assessment corresponds to the constructivist approach to education, viewing the instructor as a facilitator and mentor who provides opportunities for students to construct their own meaning (Brooks & Brooks, 1999). In the constructive approach, learning is considered to be a process; that students (learners) create their own meaning of a lesson or concept, primarily, they rely on their prior knowledge, skills, and ability to critically analyze a context and resolve problems (Black & Wiliam, 1998; Brooks & Brooks, 1999).

2.7 Feedback—Key Characteristic of Alternative Assessment

The literature raises the issue of formative feedback by closely examining teachers' responses to pupil's work. For example, if the teacher asks students to provide more details about a written work, the practice is characterized as formative; however, a concern arises as to whether the student know what the instructor meant when he or she asks for elaboration and more details (Wiliam & Thompson, 2008). Formative feedback contradicts the traditional 15 evaluative comments teachers frequently use, such as well done, good, or great work and more. Chappuis and Stiggins (2004) argue that judgmental feedback not only holds less for value for improvement and pupils learning, but it also discourages pupils from learning. Black and Wiliam (1998) assert that formative feedback illuminates' students' strengths and weaknesses, provides some suggestion for improvement, and avoids comparing one student with his or her peers. There are various definitions presented about feedback in the literature; among the authors, Ramaprasad (1983) describes feedback as a tool that provides information that has an impact on the performance, stating, "feedback is information about the gap between the actual level and the reference level of a system parameter which is used to alter the gap in some way" (p. 4). In addition, Black and Wiliam (1998) point out the importance of oral feedback provided by the teacher, enabling pupils to reflect on their learning. They write, "the dialogue between pupils and a teacher should be thoughtful reflective, focused to evoke and explore understanding… so that all pupils have an opportunity to think and to express their ideas" (p. 8). Given the definitions and characteristics of formative feedback, it is an important component of instruction that occurs while the instruction occurs and enables the instructor to adjust instruction based on students' suppositions respectively. In addition, the literature advocates for appropriate use of assessment aiming to improve learning and enhance the instruction

(Dochy, 1997; Nitko 1989, Birenbaum, 1996). In educational assessment approach, called formative assessment, the instructor provides descriptive feedback for the student—indicating progress and guidance for future performance or remedial form, detailed so that students could improve their older work (Black & Wiliam 1998, Birenbaum & Dochy 1996). 16 Pupils involvement in the process of assessment has been discussed as an influential tool in augmenting student learning. Wiliam and Thompson (2008) indicate that, contrary to the traditional forms, learners and their peers play a considerable role in assessment process in formative assessment. Chappuis and Stiggins (2004) reinforce the above point, stating, "classroom assessment that involves pupils in the process and focuses on increasing learning can motivate rather than merely measure students" (p. 40). However, a concern remains as to whether the pupils have acquired sufficient skills and a clear picture of the targets of their learning. Assessment for learning, when accompanied by students' involvement in the process of development and implementation, appear more similar to teaching than to measurement (Davis, 2000). Along with other authors, Chappuis and Stiggins (2004) emphasize the importance of pupil involvement in assessment, helping them to project their future plans and learning goals. They explain, "Student involved assessment means that pupils learn to use assessment information to manage their own learning" (p. 41). Furthermore, Black and Wiliam (1998), and Birenbaum (1996) observe that involving pupils in the process of assessment not only reduces the burden of work for the instructor, but also assures pupils that they are viewed as active members who are responsible for their own progress. Validity and reliability of assessment are two important issues in the field of education. They are perceived as core principles that modify assessment forms and practices. The concept of validity in formative assessment according to Herrera et al. (2007), "refers to the ability of an assessment,

process, or product to measure the knowledge or skills it is intended to measure". However, validity in summative forms of assessment is defined as the appropriate interpretation of assessment result, which deals with quantitative data (Linn & Miller, 2005). The reliability in assessment, according to Herrera et al. (2007), "is understood as the power of an assessment to gather consistent evidence of skills, regardless of the examiner, time, place or other variables related to its administration" (p. 25). Linn and Miller (2005) define reliability as consistent assessment results that yield from a test. In addition, the literature refers to the main characteristic of reliability of authentic assessment, as well-defined criteria and detailed training for teachers and pupils in how to rate pupils' work based on criteria (Black & Wiliam, 1998; Herrera et al., 2007).

2.8 Formative Assessment (Alternative): Different Forms

Most of the current literature uses the terms formative, alternative, and authentic assessment interchangeably; however, some disagreements still exist. Some authors use the term "authentic assessment" as a part of formative assessment that happens during the learning process whereas summative assessment is considered to occur at the end. However, Herrera et al. (2007), include formative and summative assessment along with other types of authentic assessment, such as performance-based assessment, portfolios, self-assessment and peer assessment, interview-based assessment, play based assessment, cooperative groups assessment, dialogue, journal, and scaffold essays. Considering the many different forms of formative assessment, an illustration of each may allow the reader to distinguish more easily among them. In addition, it should be noted that the following classification of different forms of assessment is primarily based on the work of Herrera et al. (2007).

2.9 Diagnostic Assessment

Although some authors view diagnostic assessment separately from formative assessment, the intention is that diagnostic assessments are used for formative purposes. Diagnostic assessment or pre-assessment is used to collect information for planning instruction 18 and acknowledging learners' needs. Wiggins and McTighe (2007) assert that pre-assessments "include checks of prior knowledge and skill levels and surveys of interests or learning-style preferences" (p. 101). The authors maintain that, given the literature, a great number of pupils come to school with a misconception that they are not talented enough to perform a certain task, such as drawing a picture or writing an analytic memo (Wiggins & McTighe, 2007). Given this scenario, a teacher is responsible for recognizing these misconceptions and finding ways to confront them.

2.10 Portfolios

Portfolio development is not a new concept in the history of education. According to Wiliam and Thompson (2008), gathering purposeful examples of pupils' work that demonstrate their effort, progress, and level of understanding over a period to time, compose the main features of portfolio. However, what has changed through the course of time is the format and content, making portfolios meaningful and purposeful. Wiggins and McTighe (2007) maintain that unlike the traditional forms of assessment that take a "snapshot" of pupils at one point in time, portfolios "function like a photo album containing a variety of photos taken at different times and different contexts" (p. 85). Similarly, Herrera et al. (2007) assert that the content of portfolios, which incorporate a collection of student work, "some indications that how student rated him/herself on the process and product included and the evidences of how those products met the established criteria" (p. 29). Investigators emphasize the importance of considering the intended purposes for developing portfolios. By establishing the

targets for a portfolio, an instructor can decide what kind of student work to incorporate, who should manage it, how often to review it, and more (Wiggins and McTighe, 2007). The instructors regularly assign pupils to include writing 19 samples, reflections, drawings, reading logs, pupil self-evaluation, and progress notes, visuals and audio clips, among the many. According to Herrera et al. (2007), the common forms of portfolios contain best examples of pupils' work that illustrate their learning and progress. In addition, portfolios are considered a good alternative to traditional forms of assessment because they incorporate the perspective of pupils and teachers about learning and assessment. Another significance of a portfolio is that unlike the traditional synoptic evaluations, such as the final exam or any standardized test that happens once, portfolios provide a longitudinal observation of pupil progress as they show incremental gains in knowledge, skills, and proficiencies (Herrera et al., 2007). Portfolios are also authentic because they are driven by classroom activities; in most cases, they reflect "in-process adaptations to instructional methods and assessment", and they assess learning which motivates students (Herrera et al., 2007, p. 32).

2.11 Self-Assessment

Self-assessment is a valuable tool for learning and measurement. For example, when pupils' are engaged in assessing their own work, they try to learn the criteria for high-quality performance, and they experience a willingness to apply those criteria (Herrera et al., 2007). However, Black and Wiliam (1998) remain concerned about pupilt readiness to self-assess or evaluate peers.

They propose that once pupils acquire a clear picture of the outcome or purpose, "they become more committed and more effective as learners: their own assessment become an object discussion with their teachers and with one another" (p. 7). However, agreements exist among educators, in which they recognize the value of self and peer-

assessment which helps pupils exert control over their learning (Chappuis and Stiggins 2004). Initially, some teachers provide rubrics for pupil so that they can assess their progress. The rubrics incorporate the criteria that provide the opportunity for pupils to reflect 20 on the extent to which they have made progress. Atkin, Black, and Coffey (2001) illustrate a feature of alternative assessment that asks learners to ask three questions as they assess themselves: "where am I trying to go? where am I now; and how do I close the gap" (cited in Chappuis & Stiggins, 2004, p.43).

2.12 Peer-Assessment

Similar to self-assessment, educators consider peer-assessment advantageous, as it furthers opportunities for pupils to identify targeted learning goals (Herrera et al., 2007; & Chappuis & Stiggins, 2004). In peer-assessment, pupils often assess other pupils' work compared to the criteria developed by the instructor, or both pupils and the class instructor. An important aspect of peer assessment is that it engages pupils in dialogue with their classmates, commenting on each other's' work rather than a one-way feedback system from instructor to student. To enrich peer-assessment and use it productively, Black and Wiliam (1998) propose that pupils be trained to assess their peers purposefully, with the goal of improving learning. As pupils comment on their peers' work, they use informal language which is understandable to them. In addition, according to Herrera et al. (2007), given the concept of peer-assessment, pupils compare other pupils' work to the accepted criteria, which "enables them to discern outstanding elements of both their own and their classmate's performances and products" (p. 34).

2.13 Performance-Based Assessments

Linn and Miller (2005) explain performance-based assessment as "snapshots of pupils learning in time, which provide a longer exposure with panoramic lens, or real-time

video" (p. 7). The idea that knowledge is constructed during the learning process and that a pupil discovers knowledge for him/herself, rather than receiving knowledge, inspires the notion of 21 performance-based assessment. This approach facilitates both the way pupils take information and the way they store and apply this information to deal with novel situations (Herrera et al., 2007). This means that, in addition to eliciting constructed responses, performance-based assessment incorporates authentic tasks that need higher level of thinking and application of skills. Herrera et al. (2007) interpret performance-based assessment as an opportunity that "tap[s] into the depth and breadth of pupils' learning" (p. 28).

2.14 Questioning

The concept of questioning has a long history in the area of classroom assessment; however, what has changed over the course of time is a shift from close-ended questions to more informative, open-ended formats. Black, Harrison, Lee, Marshall, and Wiliam (2003) encourage teachers not only to develop more effective questions but also to facilitate an environment where must think analytically and provide their own answers to their questions. The change that these authors introduce is as, "'some people describe friction as the opposite of slipperiness. Do you agree or disagree?' was quickly changed to 'some people describe friction as the opposite of slipperiness. What do you think?'" (Black et al., 2003, p. 34). In addition, Black et al. (2003) argue that formative questions challenge "common misconceptions, to create some conflict that requires discussion" which encourages students to think of a response or an idea from different angles (p. 39). To develop more formative questions, Black et al. (2003) encourage classroom teachers to organize their questions considering three themes: "frame questions" around the big idea that are worth asking; increasing the "wait time" so that pupils can think

and express their responses; and facilitating "follow-up" questions or activities to ensure students understand (p. 42).

2.15 Interview-Based Assessment

Interview-based assessment is another form of alternative assessment the teachers use to gather data about pupils' experiences, interests, background, thoughts, beliefs, activities etc. Teacher-student interviews vary from highly structured to informal conversations. Herrera et al. (2007) agree that unstructured detailed interviews with pupils help teachers to adapt the lesson based on the information gathered from pupils. These authors note that, through a teacher's interview held with a student, the instructor realized that "linguistic differences can interfere with the development of deeper connections with pupils" (Herrera et al., 2007, p. 36).

2.16 Play-Based Assessment

Play-based assessment is a valuable assessment form that teachers can use at different grade levels. Examples include pre-school children who are learning the names of objects, language learners who can just barely explain things in the new language, and upper grade levels who role play or dramatize concepts from the literature, history, concurrent life situations, and politics (Herrera et al., 2007). In addition, Herrera et al. (2007) indicate that assessment can take place in any manner but it does not mean that authentic assessment merely happens in nontraditional ways. Goodwin (2000) agrees "authentic assessment begins with teachers making it their business to purposefully watch, listen to, talk with, and think about the children in their classrooms" (p. 6). Some teachers reflect on who these children are, the extent of what they know, and the way they learn, based on the evidence that they observe in the role-play (Herrera et al., 2007).

2.17 Co-operative Group Assessment

The concept of group work or team work varies, depending on the context. In the West, particularly in the United States, an individual's success attracts more attention than the 23 accomplishments of team work, such as in sports, (Herrera et al., 2007). However, recent recognition of collaborative or team work is increasing among educators, realizing that strengths and skills of some pupils are well-defined when they are engaged in group activities such as cooperative learning or assessment. Herrera et al. (2007) observe that "collaborative or group activities often culminate in projects or experiments that may or may not require oral or written reporting" (p. 38). Slavin (2006) argues that planning for group assessment requires educators to consider both group efforts and individual liability. Herrera et al. (2007) note the complexity of assessing a cooperative group activity, in particular distinguishing an individual pupil's effort and the contribution he or she makes performing a group activity or project. Teachers often document the thought and action of individual pupils in the process of performing an activity as they learn from cooperative activities and the dialogue that occurs among the students.

2.18 Dialogue Journals and Scaffolded Essays

Accommodative or scaffolded authentic assessment may take various forms, including dialogue journals requiring students to write their thoughts about certain topics, or stories. Another form, scaffolded essays, allows the instructor to simplify a complex essay question by breaking it down into short answer questions. This is especially useful when assessing content information, because it reduces the stress of students who may assume that they will have to answer questions in an essay format (Berkowitz, Desmarais, Hogan, & Moorcroft, 2000). Aligning the other forms of authentic assessment, teachers collect useful "information about student learning through

accommodated and scaffolded assignments" (Herrera et al., 2007, p. 39). The literature characterizes one goal of authentic assessment as finding out what pupils are capable of doing. In this assets-based approach, less value is placed on the deficit-based view of what pupils are not capable of (Black & Wiliam, 2005; Herrera et al., 2007).

2.19 Scoring in Formative Assessment

The literature sheds light that one core reason teachers hesitate to use alternative assessment is because they provide little information in a numerical way. However, Herrera et al. (2007) assert that if teachers become aware of the many ways that formative assessment makes it possible to quantify or measure the information, this concern can be alleviated. Some ways to achieve this numerical representation are using rubrics, checklists, and questionnaires. Wiggins and McTighe (2007) define a rubric as a "criterion-based evaluation tool, consisting of a fixed measurement scale (such as four score points) and descriptions of the characteristics for each score point" (p. 87). Rubrics are used to engage pupils in the details of their own learning. Rubrics can be adapted based on grades of pupils, starting with picture style in pre-school and progressing to more structured forms in upper levels. Herrera, Murry and Cabral (2007) emphasize involving pupils in the process of creating rubrics, which provides an opportunity for the pupils to focus on the targeted goal, criteria. Herrera et al. (2007) summarize key tips to follow in developing a rubric: Determine the desired outcome, develop your current classroom practices as task that will create opportunities to pupils to demonstrate the targeted skill, determine what a good or high-quality performance on this task might look like, and complete the rubric by describing the requirements that must be met to attain each quantified level of performance" (p. 43). In addition to these formats, there are other alternative assessments to measure student learning. Questionnaires and checklists are developed initially by identifying skills, knowledge,

and competencies to perform a task. Given the indentified knowledge and skills, a series of questions or statements are developed to describe expected outcomes, taking into consideration the varying levels of pupils, as well. Herrera et al. (2007) believe that using questionnaires and checklists helps teachers to reduce repetitions, and they also provide information about pupils' prior knowledge and what they bring into the classroom. 25 Although alternative authentic assessments can be developed and used in ways that demonstrate pupils' academic learning, Herrera et al. (2007) note that "such assessments are not immune to bias" (p. 46). This means that a teacher may provide more feedback to some pupils and less to some others, or the instructor may prioritize his/her perspective in assessing a performance, ignoring the fact that other voices and aspects should be considered accordingly. As can be summarized from the above discussion, increased pupil involvement in the process of assessment, can be used to reduce this concern (Wiliam & Thompson, 2008 & Herrera et al., 2007).

2.20 Classroom assessment and science subjects

Reviewing the literature on assessment in teaching and learning science, research studies have shown that classroom assessment and especially formative assessment can improve students' understanding and learning in science subjects (Black & Harrison, 2004; Ruiz-Primo & Furtak, 2007). Many scholars suggest that questioning, dialogue and feedback play a key role in conceptual development in science education, and therefore classroom assessment is seen as a crucial component in this process (Bell & Cowie, 2001; Black & Harrison, 2004).

Moreover, as Coffy, Hammer, Levin, and Grant (2011) argue, the role of assessment in science education is to emphasis student reasoning, so that students learn to assess ideas as participants in science, and do not resort to telling the teacher what they think she wants to hear. The purpose of such an approach should be to investigate pupils' ideas

and misconceptions and promote their thinking (Black & Wiliam, 1998; Black & Harrison, 2004). Furthermore, science lessons provide many opportunities for classroom talk. Dialogue is vital for both teachers and pupils as they gather and use information about their educational progress (Black & Harrison, 2004; Harlen, 2007; Ruiz-Primo & Furtak, 2007). As Cowie (2013, p. 477) notes: "To sustain discussion teachers need to withhold judgement and encourage pupils to clarify, compare, challenge and defend their various views using evidence that can also be subject to critique". In addition, pupil feedback regarding their existing understanding of science can be related to scientifically accepted models, and help them to modify their thinking accordingly, a crucial step for conceptual development in science education and teaching (Bell & Cowie, 2001). Several studies have been carried out exploring teachers' questioning strategies in science. In a project at King's College, London, teachers from six schools worked on *FA* practices in their science classrooms. Black and Harrison found that at the beginning of the project many teachers did not identify questions in classroom dialogue as an important instrument of assessment (Black & Harrison, 2001). Over the course of the study, however, teachers focused more on the construction, quality and different functions of their questions, and also on the importance of "wait time". Minstrell and Van Zee (2003) found positive gains in learning when science classroom conversations are led by pupils. However, asking "rich" questions and encouraging productive dialogue during a lesson does not seem to be an easy process for science teachers, even when they have prepared some of their questions in advance. As Coffy et al. (2011) point out, specific instances of classroom dialogue in the literature illustrate little consideration for the disciplinary substance of pupils' ideas and argumentation. This is in line with the study of Ruiz-Primo and Furtak (2007), where promoting dialogue and argumentation was not a practice used by

participants. Moreover, Black and Harrison (2004) report on research carried out to look at feedback on written work given by secondary teachers of science. They argue in favour of "comment only" marking, in which teachers give only written comments to pupils, without giving a grade or mark. These comments should be pertinent and relevant in order to help pupils move forward in their learning. According to their findings, written feedback takes teachers much longer, but, as they note, this process is worthwhile, as effective comments prompt pupils to move on and develop their thinking and learning (Black & Harrison, 2004). Considering the aforementioned research, it seems that *CA* and especially *FA* practices could have a beneficial role in science education and on pupil learning in general, but they can be realised to their full potential only when teachers work on assessment principles and have a clear decision in mind about how they will use the information elicited to promote learning, rather than simply reporting on pupil achievements.

2.21 Teachers' Assessment Practices and Competencies

Investigations of teachers' assessment practices revealed that teachers were not well prepared to meet the demand of classroom assessment due to inadequate training (Goslin, 1967; Hills, 1991; O'Sullivan & Chalnick, 1991; Roeder, 1972). Problems were particularly prominent in performance assessment, interpretation of standardized test results, and grading procedures. When using performance measures, many teachers did not define levels of performance or plan scoring procedures before instruction, nor did they record scoring results during assessment (Stiggins & Conklin, 1992). In terms of standardized testing, teachers reported having engaged in teaching test items, increasing test time, giving hints, and changing pupils' answers (Hall & Kleine, 1992; Nolen, Haladyna, & Haas, 1992). Teachers also had trouble interpreting standardized test scores (Hills, 1991; Impara, Divine, Bruce, Liverman, &

Gay, 1991) and communicating test results (Plake, 1993). Many teachers incorporated nonachievement factors such as effort, attitude, and motivation into grades (Griswold, 1993; Hills, 1991; Jongsma, 1991; Stiggins et al., 1989) and they often did not apply weights in grading to reflect the differential importance of various assessment components (Stiggins et al., 1989). Despite the aforementioned problems, most teachers believed that they had adequate knowledge of testing (Gullikson, 1984; Kennedy, 1993) and attributed that knowledge to experience and university coursework (Gullikson, 1984; Wise, Lukin, & Roos, 1991).

Teachers' concern about the quality of classroom assessment varied with grade levels and slightly with subject areas (Stiggins & Conklin, 1992). There was an increased concern among teachers about the improvement of teacher-made objective tests at higher-grade levels; mathematics and science teachers were more concerned about the quality of the tests they produced than were writing teachers. Higher-grade level mathematics teachers were found to attach more importance to and use more frequently homework and teacher-made tests in classroom assessment than lower-grade level teachers (Adams & Hsu, 1998). Two points are noteworthy about the existing literature. First, assessment practices and assessment skills are related but have different constructs. Whereas the former pertains to assessment activities, the latter reflects an individual's perception of his or her skill level in conducting those activities. This may explain why teachers rated their assessment skills as good even though they were found inadequately prepared to conduct classroom assessment in several areas. Current literature is scarce in simultaneous investigation of assessment practices and assessment-related perceptions. Second, classroom assessment involves a broad range of activities. Teachers may be involved in some activities more than in others due to the nature of assessment specific to the grade levels and content areas they are required

to teach. Although the existing literature has suggested that grade levels and subject areas may account for some variations in classroom assessment (Adams & Hsu, 1998; Stiggins & Conklin, 1992), none of these studies, however, have covered sufficiently the broad spectrum of classroom assessment. Further research addressing teachers' assessment practices and their self-perceived assessment skills in various assessment activities in light of teaching levels and content areas is desirable to strengthen the current literature on classroom assessment. These two points provide the rationale for this study. The primary purpose of this study was to investigate teachers 'assessment practices and self-perceived assessment skills. Specifically, this study aimed at achieving three objectives: (1) to investigate the relationship between teachers' assessment practices and self-perceived assessment skills, (2) to examine classroom assessment practices across teaching levels and content areas, and (3) to examine teachers' self-perceived assessment skills in relation to years of teaching and measurement training. Embedded in these objectives is the premise that assessment practices are impacted by content and intensity of instruction whereas self-perceived assessment skills are influenced mainly by teaching experience and professional training (Gullikson, 1984).

2.22 Attitude of teachers to assessment practices

A major influence on teachers' assessment practice decisions is their beliefs and values (McMillan 2007). The beliefs and values of teachers are reflected in their philosophy which in turn guides how they teach and assess pupil learning. However, the teacher's philosophy and the curriculum aims and pressures are not always in harmony and conflicts arise. When teachers are faced with conflict between their philosophy of teaching and learning and the pressures they encounter, they may resort to giving in to the demands of the pressures at the expense of assessing pupils' understanding. It is

very difficult for teachers to change their attitude to classroom assessment practices (Sato & Atkin 2007). The authors note that such change may be facilitated only by careful reexamination of fixed routines and techniques and even the teacher's self-image. Teachers may have great difficulty in giving up the familiar and comfortable practices. Their personal beliefs can greatly influence their assessment practices. While some teachers believed in giving pupils opportunity, regardless of the time taken to master major concepts and skills others felt that this practice was unfair to those who were able to complete their work to the desired standard in less time. Some teachers feared that the more able pupils would lose interest while other teachers wanted to reward those pupils who demonstrated care and precision (Sato & Atkin 2007). The authors noted that teachers were willing to adapt what worked for other teachers to match their own beliefs about assessment.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter describes the methods adopted in carrying out the research study. The following were considered.

Study Area, research design, population and sampling procedure, instrumentation, validation of the instrument, reliability of the instrument, procedure for data collection and procedure for data analysis.

3.1 Study Area

The study took place at the Bia West District of the Western Region of Ghana. It is about 450 km from the National Capital (Accra) and most of the inhabitants are farmers and very few of them have formal education. Most of the famers are into food and cash crops production with cocoa and oil palm the main crops cultivated with various food crops cultivated on a subsistent level. The major food crops cultivated are tomatoes, fresh chili pepper, garden eggs, cocoyam and many other food crops. Although most of the inhabitants are farmers, the few doing the white colour jobs are teachers, clinical nurses and Agriculture Extension Officers. Others; mostly the women are petty traders ranging from fresh vegetables to processed food and provisions.

The natives of Bia are very much interested in formal education and do their best in sending their wards to school but poverty has been a hindrance and it affects the Pupils performances at School. The basic schools in the district also have a very formidable Parents and Teachers' Association (P.T.A) that mostly contributes to the progress of the various schools in diverse ways.

3.2 Research Design

The descriptive survey research design was adopted for this study. The researcher collected data on certain characters among the randomly selected sample from the target population in the study area. According to Osuala (2005) descriptive survey research design gives the accurate assessment of the characteristics of the whole populations of people. It is also more realistic than the experiment in that it investigates phenomena in

their natural setting. Descriptive surveys make measurement easier and the results can be statistically significant even when analyzing multiple variables. Another advantage of surveys is that it enables many questions to be asked on a given topic, thereby giving flexibility to the analysis. If a survey is well conducted using a representative sample, valid reference can be drawn from the sample to make generalization on the opinions, attitudes and beliefs of the whole population on a specific topic. According to Salaria (2012) descriptive research is devoted to the gathering of information about prevailing conditions or situations for the purpose of description and interpretation. This type of research method is not simply amassing and tabulating facts but includes proper analyses, interpretation, comparisons, identification of trends and relationships.

3.3 Population and Sampling Procedure

The schools in the district were clustered based on their geographical location into 9 circuits which resulted in 9 clusters. 5 schools each was randomly selected from the 9 circuits, and contained 250 pupils and 54 integrated science teachers. The selected Integrated Science teachers and pupils in the schools were used as the respondents for the study.

Because of the fact that all JHS offer Integrated Science as a core subject, a simple random sampling technique was then used to select 5 schools among the 9 clusters of schools. This constituted 54 Integrated Science Teachers. The clustered circuits were Yawmatwa Circuit, Essam Circuit, Oseikrom Circuit, Sukusuku-Toya Circuit, Kwamebikrom Circuit, Adjoafua Circuit, Asanteman Circuit, Papaase Circuit, Elluokrom Circuit.

Cluster random sampling technique was used to select the sample for this study. Cluster sampling involves dividing the specific population of interest into geographically distinct groups or clusters, such as neighborhoods or families. Because the information

is readily available, many people use census blocks or block groups for their clusters. A random sample of clusters is obtained, and then members of the selected clusters are then surveyed either randomly or as a census (Ramsey, 2014).

3.4 Instruments

Questionnaire was the major instruments used to gather data for the study. Questionnaires are important useful instruments for collecting survey information and are comparatively straight forward to analyze (Wilson & Maclean, 1994).

The questionnaire was developed by the researcher, it was both closed and open ended. It has 62 items which were divided into three sections, A, B and C. Section A was made up of 6 items, and was used to collect background information on the participants. This was followed by section B with 37 items, which was constructed to gather information on assessment practices conducted by the integrated science teachers and the type of assessment practices most often used followed by section C which was constructed to gather information on views of pupils on assessment conducted by their integrated science teachers, this consisted of 19 items.

3.5 Validity of the instrument

Merriam (1998) stated that validity addressed the following question: did the research actually measure what it intended to measure? This is the accuracy of the instrument. The content validity of the instruments was determined by making sure that the research objectives were well noted and questionnaires were developed in line with the objectives. The questionnaires were given to the supervisor for careful scrutiny and all

his comments and suggestion were taking into consideration. Before the instruments were given to the supervisor, colleagues of the research were given the questionnaire to review and make their comments on its face validity. The researcher then made sure that all the words and instruction were clear, and free from any ambiguity.

3.6 Reliability of instrument

Reliability refers to the quality of measurement method that suggests that the same data would be collected each time in a repeated observation of the same phenomenon (Babbie, 2005). Since the research design employed in this study called for asking people for information, reliability measures were created by asking questions that respondents have some idea about. Items were also made very clear in a simple language with no ambiguities.

The quality of the instrument was determined by pilot testing. A pilot test increases the reliability and practicability of the questionnaire (Oppenheim, 1992; Wilson & Maclean, 1994). A pilot test of the instruments was carried out with 54 science teachers from the various circuits. The Alpha reliability for the teachers' questionnaire was found to be 0.82 (Appendix B). According to Fraenkel and Wallen (2003), reliability should be at least 0.70 and preferably higher. These values are quite high, implying that the questionnaires used were reliable.

3.7 Data Collection Procedure

The researcher sought permission from the headmasters of the various schools sampled for the study. The researcher established rapport with the integrated science teachers, and arranged with them to administer the questionnaires at their convenient times. The questionnaires were personally administered to teachers and were collected on the same day. The finding from descriptive survey design was used to generalize the

researcher's results about the target population. The subjects or respondents were given questionnaire as the instruments to collect the data. This resulted in a high return rate. The procedure also afforded the researcher the opportunity to offer guidance to the respondents where the need arose. Three working weeks were used for the collection of the data.

3.8 Data analysis

Quantitative data analysis was employed in this study. According to McMillan and Schumacher (1997), quantitative data analysis presents statistical results represented with numbers whiles qualitative data analysis presents facts in a narration with words. The data obtained from the questionnaire were tabulated and statistically analysed using SPSS version 16. The demographic data of the respondents were organised into frequencies and percentages in terms of sex, age group, academic and professional qualifications and years of teaching experience. The results were presented in tables, bar and pie charts. The data from Section B of the questionnaire were analysed to answer research question 1 to 5 and the data from Section C of the questionnaire were analysed to answer research question 6 on the views of the pupils on the assessment conducted by their science teachers. Also, the participant's responses on the section were organised into simple frequencies and percentages.

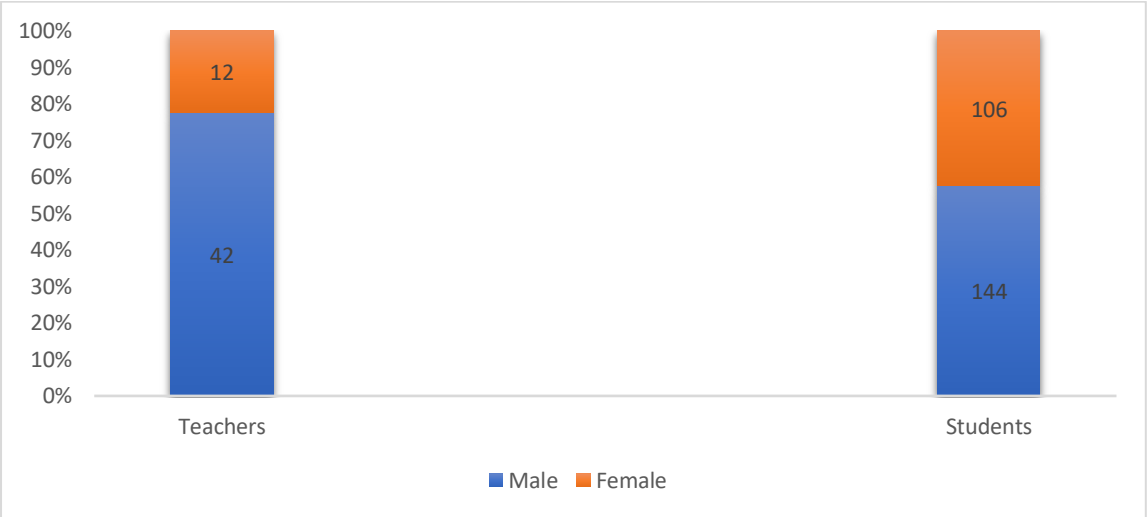
CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Overview

This chapter covers analysis of the data and presentation of the results of the findings. The purpose of the study was to determine junior high school integrated science teacher's assessment practices in the Bia West District of the Western Region. This chapter also presented the report of the research findings based on the data collected from teachers and students. The first sets of data were presented in tables of frequencies and percentages on demographic variables of the respondents. The research questions were presented in table of frequencies and percentages with relevant items.

Figure 1 shows the demographic data for gender of the respondents (teachers and pupils) for the study.



Source: Field work (Sept, 2018)

Figure 1: Demographic data of Respondents in relation to Sex

From the data below, 42 representing 77.8% were male teachers whiles 12 representing 22.2% were female teachers. On the part of the students, 144 representing 57.6% were male whiles 106 representing 42.4% were female. This indicates that there is male dominancy to female in relation to teachers and students in the various circuit schools.

Table 1: Demographic data of Respondents (Teachers) sex in relation to Age

Age range of respondent in years	Sex of respondent male	Female	Total
20-35	13(31.0%)	5(41.7%)	18(33.3%)
36-45	28(66.7%)	6(50.0%)	34(63.0%)
46-60	1(2.4%)	1(8.3%)	2(3.7%)

Total	42(100%)	12(100%)	54(100%)

Source: Field work (Sept, 2018)

Table 1 above shows the ages of respondents for the study. In the male category, thirteen (13) representing 31.0% fell within 20 to 35 years; twenty-eight (28) representing 66.7% were in between the ages 36 and 45 years whiles one (1) representing 2.4% were also above 46 years. This indicates that more of the male staff was within the working age group. The female category of the respondents also showed that, five (5) representing 41.7% were in between 20 and 35 years, six (6) representing 50% fell within 36 to 45 years followed by one (1) respondent representing 8.3% is above 45 years of age. This attests that more of the female teachers are still active.

The educational status of the respondents for this study. It was observed that three (3) of the respondents representing 6% held WASSCE/CERT; thirty-six (36) representing 67% held Diploma/HND certificate; eight (11) representing 20.4% had obtained Bachelor Degree certificate whiles four (4) had Master's Degree certificate representing 7.4%. The data obviously indicate that more than half of the respondents had undergone courses which had warranted them for the award of Diploma/HND which suggest being a minimum requirement for someone to teach at the basic schools in the country.

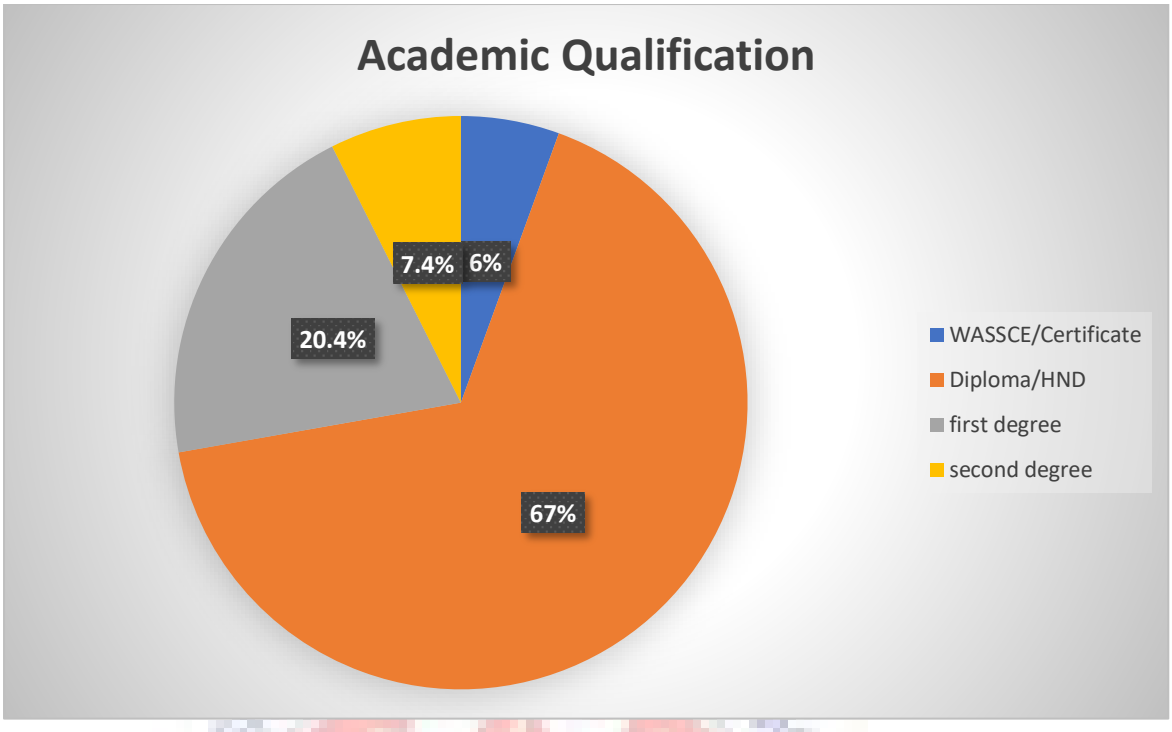
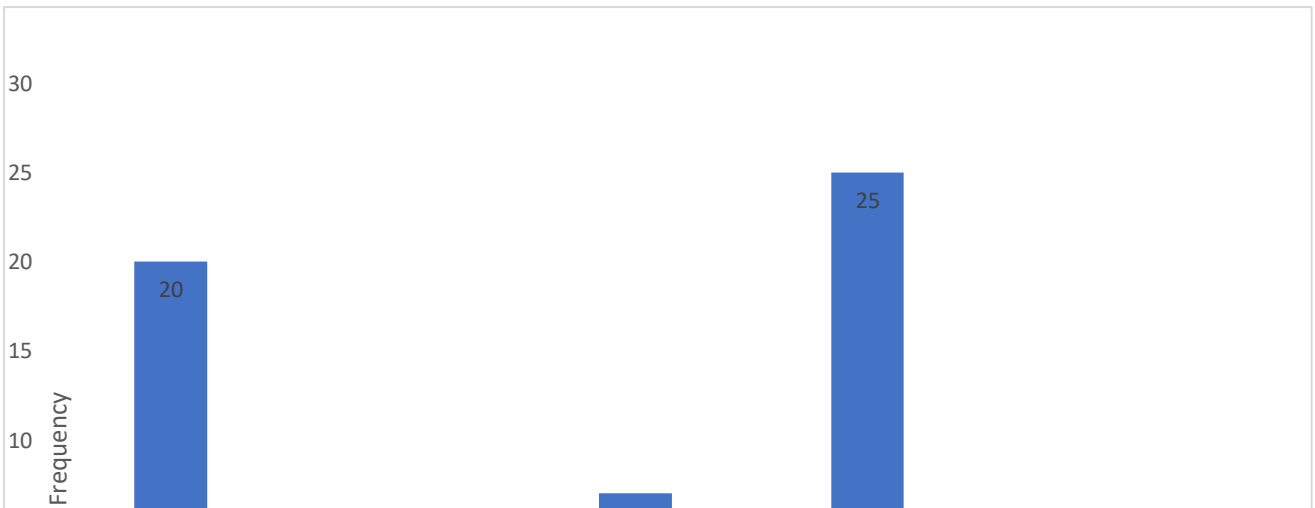


Figure 2: Educational Level of Respondents (Teachers).

Source: Field work (Sept, 2018).

The subject area of specialization of the respondents in relation to teaching. The data showed that, out of the fifty-four (54) respondents teaching integrated science, twenty (20) representing 37% specialized in Science; two (2) representing 3.7% specialized in Business; seven (7) representing 13% specialized in Art and twenty-five (25) representing 46.3% holds Basic Education certificate. It could be argued that DBE teachers recorded the highest frequency.



Source: Field work (Sept, 2018)

Figure: 3 Area of professional specialization

The teaching experience of the respondents for the study. 12 respondents fell within the range of 1 and 5 years constituting 22.2%; 34 respondents (teachers) fell within the range of 6 and 10 years which constituted the majority representing 63% and 8 respondents recorded above 10 years representing 14.8%. No respondent had teaching experience below five (5) years. The analysis in the Table 2 indicates that most of the respondents are well experienced as far as teaching is concerned. The analysis from the Table 2 indicates that most of the respondents have been in the teaching profession for more than five (5) years and are well experienced as far as teaching is concerned. Some of the teachers are able to arouse and maintain students' interest in the area of science. Hence the teachers have skills and experiences for teaching. The experienced teachers can identify student's problems and be able to change methodology to aid effective teaching and learning.

Table 2: Teaching Experience

Age	Frequency	Percent
1-5	12	22.2
6-10	34	63.0
above 10	8	14.8
Total	54	100.0

Source: Field work (Sept, 2018)

4.3 Analyses of Data to Answer the Research Questions

The data provided by the respondents to the six research questions of the study were analysed and presented in Tables 4 to 9. In the course of the analysis, opinions of teachers were categorized into frequencies of most preferred form of assessment to improve pupil's performance. The views of students were analysed using five-point rating scale.

4.3.1 Research Question One

What instruments do the junior high school integrated science teachers use to assess their pupils?

Identify the types of instructional assessment being used for teaching in order to improve pupil's academic performance in integrated science.

In order to enable the researcher to present the answers to this question, questionnaire items eight (8) and thirty-five (35) on section B was used, the summary of response is as shown in Table 3

Table 3: types of instructional assessment usage

Types of test	Frequency	Percentage
Ability test	27	50

Achievement test	23	42.6
Diagnostic test	4	7.4
Total	54	100

Source: Field work (Sept, 2018)

Table 3 shows the frequency and percentage responses of respondents on the types of instructional assessment available for use to influence the academic performance of integrated science students in Bia West District. Questionnaire items soughs to assess which of the three main types of assessment is/are good and relevant and mostly use by teachers to influence the academic performance of students in integrated science. In response to this item, respondents who strongly agreed to the use of Standardised ability tests scored 27 representing 50%, those who agreed to the use of achievement test scored 23 representing 42.6% and 4, representing 7.4% also agreed to the use of diagnostic test as the best form of assessment. Ability tests are descriptive in that they assess people's knowledge and skills, but they are also predictive because they measure qualities that are presumed to influence the person's ability to learn new skills and to solve novel problems, probably the reason for use of this type of assessment by most teachers.

4.3.2 Research Question Two

How often do the teachers assess the pupils? In order to enable the researcher to answer these questions, questionnaire items 6 to 9 in appendix I section B was used. The summary of the responses is shown in Table 4.

Table 4: **The Percentage and frequency Summary of Responses on how often teachers assess their students.**

Times of exercise administering	Frequency	Percent
all times	24	44.4
once a while	00	0.00
most often	30	55.6
Total	54	100.0

Source: Field work (Sept, 2018)

Table 5: **Responses on Exercise Conduction by Teachers.**

Responses	Frequency	Percent
Yes	49	89.1
No	5	10.9
Total	54	100.0

Source: Field work (Sept, 2018)

Table 5 showed the responses of respondents on how often teachers assess their pupils being used to influence the academic performance of pupils in integrated science. Questionnaire item two sought to determine how often teachers assess their students. In response to this item, respondents who assess their pupils most often scored 30, which represents 55.6% of the total responses; 24 respondents representing 44.4% also assess their pupils all times and none of the teachers assess his/her pupils once a while. Item fifteen sought to determine whether teachers give class exercises after lessons and item sixteen sought how frequent they conduct the exercises to influenced students' academic performance in science. Responding to these items, teachers who respondents said "yes", they conduct exercises after lessons constituted the majority with frequency of forty-nine (49) and only five (5) teachers responded "no" to that question. Questionnaire item sixteen (16) which sought to determine how frequent teachers sampled conduct exercises shown that only one (1) teacher representing 1.9% conduct his/her exercise once in a while twenty-eight (28) of the respondents conduct class

exercises at the end of every lesson, representing 51.9% of the sampled population. Twenty-five (25) of the respondents give their exercises to their pupils at the end of some of the lessons they deliver in class which represent 46.3% as shown in the table below.

Table 6: Frequency of exercise conduction

Responses	**Frequency**	**Percent**
Once a while	1	1.9
every lesson	28	51.9
some of the lessons	25	46.3
Total	**54**	**100.0**

Source: Field work (Sept, 2018)

On the overall, teachers conduct class exercises and most does it at the end of every lesson or some of the lessons delivered.

4.3.3 Research Question Three

What type of feedback do the teachers give to their pupils on the various assessment tasks?

Table 7: Feedback giving to the pupils

Professional qualification	feedback do you give to your pupils				
	Best	Better	Good	Poor	Total
Certificate	6	10	3	0	19
Diploma	7	12	6	3	28
first degree	3	0	3	1	7
Total	16	22	12	4	54

Source: Field work (Sept, 2018).

In order to enable the researcher to answer this question, item three of the questionnaire in appendix one section B was used.

The summary of the responses of the respondents is shown in Table 4.

In the observed lessons, a few participants gave oral feedback to students, mainly correcting their mistakes, while others sought further explanations about the students' responses by questioning them back. Arguably, asking questions back to students reflects the principles of classroom assessment, as it is a way of eliciting information and scaffolding learners' thinking (Black et al., 2003). However, corrective feedback seems to focus only on the quality of their speaking or work, rather than helping students to identify the nature of their learning gap and provide them with information and guidance on how to close it (Hattie & Timperley, 2007; Heritage, 2010). In other words, student errors should not just be dismissed by correction but should be investigated, as they reveal information about how students learn, and this can be used to improve teaching approaches (Pryor & Crossouard, 2008; Wiliam, 2011). In addition, there is a distance between comments, instructions, corrections and feedback. Teacher comments can be characterized as effective feedback only when the learner acts on them and improves her performance (Hattie & Timperley, 2007; Wiliam, 1998). However, in this study, participants were concerned about the effectiveness of their feedback, as pupils did not appear to take full advantage of it. Furthermore, many authors argue that, when feedback is given with grades, the latter undermines feedback, as students do not look beyond the numbers (Black & Wiliam, 2010; Brookhart, 2007; Earl, 2013; Lipnevich & Smith, 2009). Grades alone cannot reveal the study needs of students, and therefore asking students to reflect on their grades is ineffective.

In addition, the majority of participants appear to give positive feedback to students to help cultivate a friendly atmosphere in the classroom and to motivate students, especially low achievers.

According to the literature, praise is the most common form of feedback, but it has little impact on learning as it focuses on the students' ego, rather than on the task and the learning objectives (Black et al., 2003; Hattie, 2008). It is also related to social comparison with peers (Earl, 2013), as shown by the quotation from an observed lesson when a pupil wanted to know which group received praise from the teacher, not which task was being praised. Last but not least, according to the findings, students appeared to have a peripheral role in the *CA* practices, without taking responsibilities in the learning assessment process through self-assessment and peer-assessment practices. This teacher-centred assessment is a more didactic approach, with the teacher being responsible for transmitting knowledge and assessing the outcomes, while pupils remain passive recipients (Stobart, 2008). The teachers appear to think that their role is to be responsible for student understanding—and many hold the view that learning occurs when students listen to them. This approach embraces a rather convergent view of assessment, where only teachers gather evidence through assessing what learners know, understand or can do, so as to give quantitative feedback and adjust their subsequent teaching (Pryor & Crossouard, 2008).

4.3.4: Research Question Four

What types of assessments record-keeping are practiced in the schools?

In order to enable the researcher to answer this question, items 1 to 4 of the questionnaire in Appendix I Section B were used. The summary of responses is shown in Table 4. Accurate, factual, up to date Record keeping is a very important part of a teacher's role. They need to keep effective assessment records for every student. It allows both teacher and the student to reassess the teaching-learning relationship. This identity's

which students need more help, guidance and support and helps them understand what they need to do next to improve their work. This enables the teacher to base their lesson plans on a detailed knowledge of each pupil. Records tell us what has been taught and when. It helps underpin the courses -structure by telling us the complete history and progress of both students and teachers. The most common assessment records types kept by teachers include:

- a record of current attainment
- a record of progress
- record of acknowledgement of achievement and underachievement
- record of pupils' readiness for future learning
- record of the effectiveness of the teaching methods employed and the current scheme of work.

Table: 8 Type of Assessment Recordinsed by Teachers

Assessment Record	Frequency	Percentage
Pupil's progress	18	33.3
Pupils' readiness	8	14.5
Acknowledgement of achievement & underachievement	6	11.1
Records of work	10	18.6
Effectiveness of teaching method	12	22.2
Total	**54**	**100**

The assessment record mostly kept is the records on pupils progress which had a percentage of 33.3%; records on effectiveness of the teaching methods employed and the current scheme of work constituting 22.2% followed by records of work 18.6% and records of pupils readiness for future learning 14.8% with the least kept been record of acknowledgement of achievement and underachievement 11.1%

4.3.5: Research Question Five

What difficulties do the teachers encounter in constructing assessment items?

In order to enable the researcher to answer this question, items 15 to 20 of the questionnaire in Appendix i Section B were used.

The summary of responses is shown in Table 9. The teachers identified numerous challenges which is divided into two different sets by the researcher. The first set of challenges is listed as common to their instructional assessment practices. The challenges identified are; time constraints, not allowing completion of syllabus objectives, reporting test not possible due to large classes and teacher interpretation of progress and multiple level of diagnostic information. None of the teachers experienced difficulty in constructing test items that test syllabus objectives or difficulty in developing marking schemes.

Table 9: Challenges in assessment items construction

Challenges in assessment construction	Frequency	Percent
Timing to complete syllabi	15	27.8
reporting test	19	35.2
teacher interpretation of progrees	11	20.4
multiple level of diagnostic information	9	16.7
Total	54	100.0

Source: Field work (Sept, 2018)

The second set of instructional challenges which consisted of four of them and the responses from the respondents are presented in the table below.

Table 10: Teachers' Instructional Assessment Challenges and how they overcome the challenges

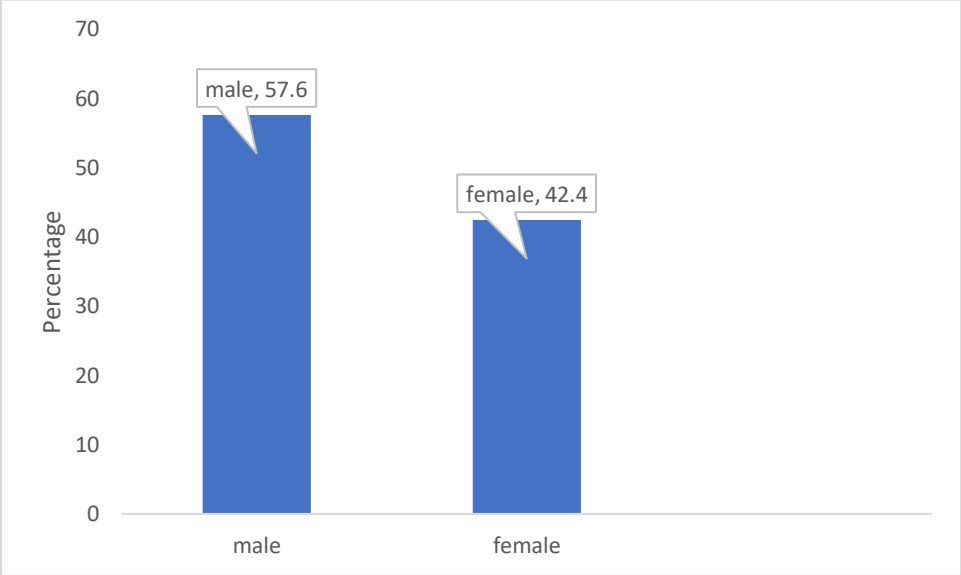
Challenges in assessment construction	Method of overcoming challenge
Time constraint do not allow assessment of all syllabus objectives	Use of projects Lunch time/ vacation classes Home assignments Selection of most important objectives
Classes are too large to assess practical skills Lack of materials and/or apparatus limit my assessment of the pupils practical skills	Group work Purchasing or borrowing materials Purchasing or borrowing materials Using group work Demonstrations Use of inexpensive and recycled materials
I do not have the time to carefully plan assessment procedures.	Use of the same procedure over and over

The teachers identified four of the listed challenges as common to their instructional assessment practices. The challenges identified are; time constraints not allowing completion of syllabus objectives, assessment of practical skills not possible due to large classes and lack of materials, and not having time to carefully plan assessment procedures. None of the teachers experienced difficulty in constructing test items that test syllabus objectives or difficulty in developing marking schemes. The major methods given by teachers for overcoming specific instructional assessment challenges are shown in Table 10.

4.3.6: Research Question six

What are the views of the pupils on the assessments conducted by their science teachers?

In order to enable the researcher to answer this question, items 1 to 19 on Section C of the questionnaire were used to analyse the views of pupils on assessment conducted by their integrated science teachers. The data were analysed using descriptive statistics to demonstrate an overall perception of students to the four scale (19 items) assessment questionnaire. The analysis shows that male respondents represent more than half of the overall sample (See figure).



Source: Field work (Sept, 2018)

Figure 6: Sex distribution of sampled respondents

Table 11: Differences and clarity of assessment

Sex of respondent	Clarity of assessment					
	Very clear	Clear	Neutral	Some how	Not clear	Total
Male	142	0	1	0	1	144
Female	8	94	2	2	0	106
Total	150	94	3	2	1	250

Source: Field work (Sept, 2018)

This suggests that, the male pupils are clearer about assessment and the requirements of an assessment task and the way their work is assessed compared to their female counter parts. This suggests that pupils see a connection between their assessment in their class and their daily life activities. item number one (1) and item number two (2) shows that slight difference in terms of whether pupils perceived assessment as testing what they memorize or what they understand. For example, the value for item number one that indicates assessment is used to test what pupils memorize is higher M = 3. 34 compared to the item number two which indicates that assessment measures what students understand M = 3. 03. This implies that pupils perceive assessment as a measure of memorization and comparatively less as a measure of understanding. In terms of consultation about the classroom assessment, responses from pupils show that pupils are fairly positive about the type of assessment being used in their class with an average mean of 3. 49. This indicates that pupils can have a say in terms of the forms of assessment being used in their classes. In addition, based on pupils' responses, the average mean score shows that pupils received instruction about the use of various assessment forms in their classes. In addition, the data shows that regarding the capabilities of pupils in performing an assessment task, pupils perceived their assessment task quite positive (M = 3.5). However, two items that indicate that students are given a choice or another way to answer a question in an assessment task has the

lowest mean scores (M = 2. 59) in item number 19 and (M = 2. 63) in item number 17. This implies that students are less likely given the choice of an assessment format, and an alternative way to approach a question when they are confused.

4.4.5 Major Findings

The findings from the results of the research questions included among others, that good assessment practices are relevant to influence students' academic performance in science, that regular instructional assessment contributes to students learning. That the uses of instructional feedback are important to influence students' academic performance in science. Accurate, factual, up to date **Record keeping** is a very important part of a **teacher's** role in instructional delivery. Challenges are what most integrated science teachers face in the construction of assessment items and students on the other hand also hold very important views as far as instructional assessment are concerned were the major findings to the integrated science teachers assessment practices in the Bia West District.

4.5 Discussion of Findings

The research work was specifically designed to determine the integrated science teacher's assessment practices to influence the academic performance of students in science at Bia West District. In order to achieve this purpose, four specific objectives, six research questions were raised. Simple percentage and frequencies were used in analyzing the data of respondents and answering of the research questions. The first objective was to identify the types of instructional assessment being used for teaching in order to improve pupils' academic performance in integrated science. Data collected were analysed and rated. The findings of this study suggest that the assessment practices of science teachers in the Bia West District span general, collaborative, formative, and

summative assessment practices while assessing students' knowledge, skills and attitudes. Several implications arise from these findings. The finding that the teachers reported using collaborative assessment practices imply that they discuss assessment questions critically with their peers, they are aware of their colleagues' assessment practices, they share ideas with other teachers and learn from each other. Wiggins (1992) also claims that teachers can help each other by sharing assessment task ideas. This claim is somewhat supported by the techniques that the teachers report using. The techniques used most often by the teachers are tests, home assignments, projects, observations and checklists. The majority of teachers used tests to assess cognitive skills however, it is purported by Wiggins (1992) that tests usually over-assess knowledge and under-assess 'know how with knowledge.

The second objective of the study was to determine the characteristics of instructional assessment that can be used to influence pupils' academic performance in integrated science.

Effective use of tests requires teachers to be familiar with diverse test items and to know how to use each type of test item for assessing a variety of cognitive processes (Chiappetta et al. 1998). The authors claim that tests tend to reveal what students do not know instead of what they know and can do and focus mainly on isolated facts whereas the focus of learning is directed towards relevant future oriented content. The only two reasons given by the teachers for using tests were to gauge understanding of a unit of work and to assess cognitive skills. These reasons may suggest that the teachers do not use a variety of tests as indicated by Chiappetta et al. (1998) and that these tests do not assess the psychomotor or affective domains. There is great demand for accountability (value for money) which tests do not necessarily achieve. A high-test score is not a true

measure of instructional effectiveness as there are many other influencing factors. Tests (paper and pencil) do not match learning theories which promote individual differences in learning style and do not actively involve students in the assessment process. These, among other factors contribute to the disadvantages of paper and pencil tests.

The third objective was to determine the importance of the use of instructional assessment in enhancing pupils' academic performance in integrated science. Data collected to achieve this objective were analysed in which the result showed that tests provide teachers with opportunity to discuss test items with their colleagues as well as share ideas and learn from each other. Tests also provide teachers with an easily administered technique for assessing student knowledge. Given the multiple tasks of teachers, they would welcome an easily administered, less time-consuming method of assessing student learning. Although the teachers did not report this, they may well be using tests to overcome the challenges of: insufficient time to complete the syllabus, large classes, lack of materials and insufficient time to plan a variety of assessment techniques. The use of projects in instructional assessment can: be authentic; integrate understanding, skills and strategies; involve pupils in self-assessment and independent learning; help pupils develop generalizable skills; foster collaboration among teachers and students; and motivate as well as challenge pupils (Gronlund 2006). None of these reasons were given by the teachers for selecting projects as a form of assessment. This suggests that teachers use projects predominantly as a method of overcoming the challenge of time constraints and may not be aware of the benefits of using projects to improve teaching and learning. Extensive evidence that formative assessment improves learning was provided by Black and Wiliam (1998). Formative assessment throughout instruction can provide feedback to help students improve their learning (Chiappetta et al. 1998). Teachers' use of formative assessment practices suggests that they: provide

opportunity for individual learning, assess student learning while teaching, give pupils feedback to improve learning, and use assessment results to reveal pupils' weaknesses. The use of home assignments by many teachers may promote individual learning, but the teachers gave reasons such as, to reinforce concepts taught in class and to develop research skills are very important to influence students' academic performance in science.

The fourth objective was to examine the factors affecting the use of instructional assessment to influence the academic performance of pupils in integrated science. Data collected in respect of this objective were analysed and the items were rated and it was observed that home assignments may not be fully effective in promoting individual learning as pupils may receive too much assistance and this can give the teacher a false impression of pupil learning. Despite this disadvantage, giving pupils home assignments can help students to: develop critical thinking skills, become self-motivated to learn, share their knowledge with other family members and/or learn from other family members, and to be more creative. The finding that many teachers overcome their instructional assessment challenges by assigning group work (Table 8) can also hinder individual learning. Pupils' attitudes, interests and values significantly affect their future behaviour and learning (Popham 2008). The science teachers in the study saw the importance of assessing pupils' attitudes as well as their scientific attitudes. This contrasts the view of Popham (2008) that few teachers assess Pupils' attitudes and values. The teachers also clearly indicated that they specify the learning outcomes and match their assessments to the learning outcomes, develop assessments that provide meaningful information, develop clear scoring criteria and guidelines for administering assessments. Such practice reflects current trends in instructional assessment and the assessment standards developed by the National Research Council.

The finding that teachers assess pupils' skills implies that they use hands-on experiences in their assessments, allow pupils opportunity to display their skills, assess Pupils' use of science process skills and see value in assessing Pupils' skills. The techniques of observations and checklists which are often used in assessing skills were used by many teachers, however rating scales which is more time consuming to develop and were rarely used. Many teachers reported using observations to assess students' practical skills and to gain insight into Pupils' strengths and weaknesses. A systematic procedure is needed to keep track of observations and the process can be time consuming in addition to increasing test anxiety in some Pupils (Good et al. 2008). More teachers reported using checklists than rating scales. While checklists are useful in assessing procedures, products, behaviours and as a self-evaluating tool (Gronlund 2006; Nitko 2004), they only indicate whether a step, property or action is present. Rating scales (not often used by teachers) on the other hand, are useful in both teaching and assessing, to show the degree a Pupil has attained a learning target, and to help the teachers see the growth of each Pupil (Nitko 2004). The reasons given by the teachers suggest that they either are not aware of these advantages of rating scales or they lack expertise in developing rating scales. One limitation of the instrument is that it was not possible to include skills such as communication, reasoning, and presentation. The use of interviews and observations would have provided richer data in terms of clarifying teachers' conceptions of skills. Due to the quantitative nature of this research, the use of these instruments was not explored. The science teachers assess knowledge more than any other kind of learning outcomes and place heavy emphasis on the assessment of facts, concepts, principles, laws and theories. The findings do not indicate the nature of such assessments and further research is necessary to establish just what knowledge teachers assess and what value they ascribe to what they assess. Peer assessment, also

used by the teachers is important as some students may be more willing to receive feedback from their peers than from teachers (Parkay et al. 2010). In addition, the authors report that self-assessment is useful for allowing students to recognize factors that may promote or hinder their learning. The teachers practiced using summative assessments to quite a large extent. While summative assessments are useful in assessing a range of behaviours, skills and knowledge (Chiappetta et al. 1998), Trowbridge et al. (2004) caution that teachers should use a variety of assessment techniques. Although the assessment practices of the teachers are varied and reflect current trends in instructional assessment, it is important that teachers master the principles of appropriate classroom assessment for productive school improvement (Stiggins 1995). Achieving assessment literacy require teachers to know what, why, and how they assess, as well as anticipating and addressing problems that may arise in their assessment practices (Stiggins 1995). Interviews, portfolios and concept maps are rarely used by teachers despite the many benefits of these techniques. Interviews assess quality and extent of learning in science (Abdullah et al. 1997), and give teachers insight into Pupils thinking and understanding (Chiappetta et al. 1998). Portfolio assessments foster in Pupils the skills of selecting, organizing, synthesizing, summarizing, collaborating with others, and reflecting (Adams et al. 1992; Chiappetta et al. 1998; Good et al. 2008; Gronlund 2006; Trowbridge et al. 2004).

Again, the challenges of time and large classes identified by the teachers may be the reasons why they rarely use these techniques. If teachers do not have the time to review multiple drafts of portfolios and provide individual feedback to Pupils or small groups of Pupils, then portfolios may not be the choice of assessment. The use of interviews is also time consuming and requires management skills on the part of the teacher. For

instance, what happens to the rest of the class when the teacher is interviewing a Pupils or group of Pupils may be a major concern to the teacher.

Concept mapping has proved particularly useful in both assessment and instruction in science education. It is surprising that very few science teachers use this technique. Concept maps are used to show meaningful relationships between science concepts, to reveal Pupils' conceptions before and after instruction and to indicate growth in understanding (Chiappetta at al. 1998; Trowbridge et al. 2004). Lack of teacher knowledge of these techniques could be responsible for their very scarce use in the classroom. This is indicated by the two reasons (to assess Pupil ability, and as an advance organizer) given by the teachers for using concept mapping. The challenges in instructional assessment identified by the teachers are systemic in nature. While the methods that teachers employ to overcome their instructional assessment challenges may provide temporary solutions, it is necessary to approach these challenges at the institutional level. Teachers tend to devise ways of coping with their overload and multiple demands from policy makers, administrators, parents and students. However, the reasons indicated for using the various techniques suggest teachers' lack of knowledge and experience in using these techniques. Teachers appear to attend to immediate practical and contextual challenges rather than theoretical or propositional knowledge (Marx et al.1994).

In conclusion, the results showed that majority of the respondents made use of the instructional materials effectively which had positive impact on the Pupils' academic achievement in science. The findings revealed that students performed better when appropriate and improvised materials were made available and utilized in teaching science and teachers possessing good qualifications enhanced Pupilss performance in

science. This was in line with Ozorehe (1998), Oshadumi (2003) and Uyagu (2009) that the teaching of science in selected secondary schools depended on the availability and utilization of instructional materials which had positive relationship in the teaching of science in selected secondary schools.

They argued that Pupils made good use of the instructional materials effectively which had positive impact on their academic achievement in science. The finding that sex, teaching experience, professional status and academic performance do not significantly affect teachers' instructional assessment practices seem to support the suggestion by Mc Millan (2007) and Sato et al. (2007) that teachers' beliefs and attitudes highly affect their assessment practice decisions. Research into the assessment practices of the teachers' previous teachers may provide insight into whether teachers' assessment practices reflect how they were assessed as students. It is worth noting that female teachers with less teaching experience and male teachers with more teaching experience are more likely to engage in collaborative assessment practices. This finding implicates female

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Overview

This chapter contains the summary of the major findings and discussions, conclusions and recommendations

5.1 Summary

The purpose of this study was to determine junior high schools integrated science teachers assessment practices in the Bia West District of the Western Region.

The population for the study was focused on integrated science teachers and students in the district at the basic level. In order to achieve the objective, four specific objectives were raised, six research questions were formulated. The researcher used questionnaires as the instrument for the data collection. Descriptive Survey research design was

adopted for this study. A total of 304 respondents made up of students (250) and teachers (54) were used for the study. The data collected were presented in tables and analyzed using simple percentages and frequencies.

The science teachers assess knowledge more than any other kind of learning outcomes and place heavy emphasis on the assessment of facts, concepts, principles, laws and theories. The findings do not indicate the nature of such assessments and further research is necessary to establish just what knowledge teachers assess and what value they ascribe to what they assess. Peer assessment, also used by the teachers is important as some students may be more willing to receive feedback from their peers than from Academic Journal of Interdisciplinary Studies teachers (Parkay et al. 2010). In addition, the authors report that self-assessment is useful for allowing students to recognize factors that may promote or hinder their learning. The teachers practiced using summative assessments to quite a large extent. While summative assessments are useful in assessing a range of behaviours, skills and knowledge (Chiappetta et al. 1998), Trowbridge et al. (2004) caution that teachers should use a variety of assessment techniques. Although the assessment practices of the teachers are varied and reflect current trends in instructional assessment, it is important that teachers master the principles of appropriate classroom assessment for productive school improvement (Stiggins 1995).

Achieving assessment literacy require teachers to know what, why, and how they assess, as well as anticipating and addressing problems that may arise in their assessment practices (Stiggins 1995). Interviews, portfolios and concept maps are rarely used by teachers despite the many benefits of these techniques. Interviews assess quality and extent of learning in science (Abdullah et al. 1997), and give teachers insight into student thinking and understanding (Chiappetta et al. 1998). Portfolio assessments

foster in students the skills of selecting, organizing, synthesizing, summarizing, collaborating with others, and reflecting (Adams et al. 1992; Chiappetta et al. 1998; Good et al. 2008; Gronlund 2006; Trowbridge et al. 2004). Again, the challenges of time and large classes identified by the teachers may be the reasons why they rarely use these techniques. If teachers do not have the time to review multiple drafts of portfolios and provide individual feedback to students or small groups of students, then portfolios may not be the choice of assessment. The use of interviews is also time consuming and requires management skills on the part of the teacher. For instance, what happens to the rest of the class when the teacher is interviewing a student or group of Pupils may be a major concern to the teacher.

Concept mapping has proved particularly useful in both assessment and instruction in science education. It is surprising that very few science teachers use this technique. Concept maps are used to show meaningful relationships between science concepts, to reveal students' conceptions before and after instruction and to indicate growth in understanding (Chiappetta at al. 1998; Trowbridge et al. 2004). Lack of teacher knowledge of these techniques could be responsible for their very scarce use in the classroom. This is indicated by the two reasons (to assess Pupil ability, and as an advance organizer) given by the teachers for using concept mapping.

The challenges in instructional assessment identified by the teachers are systemic in nature. While the methods that teachers employ to overcome their instructional assessment challenges may provide temporary solutions, it is necessary to approach these challenges. Teachers tend to devise ways of coping with their overload and multiple demands from policy makers, administrators, parents and Pupils. However, the reasons indicated for using the various techniques suggest teachers' lack of knowledge and experience in using these techniques. Teachers appear to attend to immediate

practical and contextual challenges rather than theoretical or propositional knowledge (Marx et al.1994). Brooks and Brooks (2001, 3) maintain that "questions regarding understanding and meaning and the roles that schools play in encouraging or stifling the search for understanding are far more important to many educators than questions regarding achievement as measured by test scores". It is suggested that assessment practices be overhauled to make assessments more relevant to students. The finding that sex, teaching experience, professional status and academic performance do not significantly affect teachers' instructional assessment practices seem to support the suggestion by McMillan (2007) and Sato et al. (2007) that teachers' beliefs and attitudes highly affect their assessment practice decisions. Research into the assessment practices of the teachers' previous teachers may provide insight into whether teachers' assessment practices reflect how they were assessed as students. It is worth noting that female teachers with less teaching experience and male teachers with more teaching experience are more likely to engage in collaborative assessment practices. This finding implicates female teachers as being more open-minded regarding collaboration with colleagues, however further research is necessary before drawing conclusions on this issue. The finding that males with 1 – 5 years of teaching experience are more likely to use general assessment practices may indicate the need for ongoing professional development activities to address teachers' instructional assessment needs.

5.2 Conclusion

Based on the findings in this study, the following conclusions were drawn:

Teachers' instructional assessment practices were not significantly influenced by their sex, teaching experience, professional status or academic qualification; and the techniques used as well as the reasons for using the techniques did not reflect teachers' application of theoretical knowledge. As other researchers (Anderson 2002;

Blumenfeld et al. 1994; Bol et al. 1996; Marx et al. 1994; Osborne et al. 2003) have proposed, I suggest that science teachers' instructional assessment practice reflect what is practical in their classroom contexts. Teachers should focus on what is practical in their classroom instead of applying theory to practice (Blumenfeld et al. 1994). In light of the potential benefits of science teachers' instructional practices compared to the reasons that the teachers gave for using the various techniques, it appears that teachers do not realize that their assessment practices are incongruent to science instructional goals (Bol et al. 1996). The techniques should be appropriate for developing students' science inquiry skills and for allowing students opportunity for constructing knowledge. From the findings, the teachers do know the appropriate instructional assessment practices for improving teaching and learning, and it is also clearly apparent that the reasons given for using the various techniques show their ineffectiveness in assessing student learning in science. It appears that the teachers select the most easily administered assessment techniques instead of the technique which will result in improved teaching and learning. The teachers gave idiosyncratic ways of overcoming their instructional assessment challenges although the challenges they identified were mainly systemic in nature and they reported a high degree of collaboration in their instructional assessment practice. This implies that teachers need help in addressing their instructional assessment needs from a systemic approach.

5.3 Recommendations

Based on the findings of this research and previous research reported in the literature, the researcher recommends that more attention be directed towards providing professional support for practicing teachers to have opportunity for reflective and collaborative practice. Such opportunities should: focus on practical challenges that teachers face in their own classrooms (Anderson 2002; Osborne et al. 2003), be long

term (Henze et al. 2007; Marx et al. 1994), and benefit both teachers and facilitators (Blumenfeld et al. 1994). Teachers need opportunities to consider their practice and how they may improve their practice. This approach was successful in getting teachers to change their assessment practices as indicated in the Classroom Assessment Project to Improve Teaching and Learning (Atkin et al., 2005)

5.4 Suggestions for Further Studies

The researcher suggests the following areas for further studies.

1. Further research is necessary to look into the influence of teacher beliefs and attitudes on their instructional assessment practices.
2. To gain a deeper insight, future studies should be focused on exploring the extent assessment results are used to improve instruction and students' learning.
3. Further studies should be performed examining the relationship between the current assessment practices and students' learning.
4. The findings implicate female teachers as being more open-minded regarding collaboration with colleagues, however further research is necessary before drawing conclusions on this issue.

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APPENDICES

APPENDIX A

QUESTIONNAIRE FOR INTEGRATED SCIENCE TEACHERS

All responses will be treated confidentially

The purpose of this study was to find determine junior high school integrated science teachers 'assessment practices in the Bia West District of the Western Region.

Note: please tick in the appropriate box, where possible

SECTION A: PERSONAL DATA

1. Sex: 1. Male [ ] 2. Female [ ]
2. Age: 1. 20-35 yrs. [ ] 2. 36-45 yrs. [ ] 3. 46-60 yrs. [ ]
3. How long have you been teaching integrated science? A. 1-5 yrs. [ ] b. 6-10 yrs. [ ] c. above 10 yrs. [ ]
4. What is your academic qualification? 1. diploma/HND [ ] 2.First degree [ ] 3. Second degree [ ]
5. Do you have professional qualification? 1. Yes [ ] or 2. No [ ]

6. 6a. If 'Yes' to question 5 above, please indicate your level of professional qualification. 1. Certificate [ ] 2.diploma [ ] 3.first degree [ ] 4. Second degree [ ]

   6b. If 'Yes' to question 5 above, please also indicate your area of professional specialisation: 1. Sciences [ ] 2.Business [ ] 3.Arts [ ] 4. Basic Education [ ]

SECTION B: TEACHING AND ASSESSMENT

1. What type of instrument do you use to assess your pupils?

a) Standardised ability tests (sometimes referred to as psychometric tests) are designed to be curriculum-independent and measure more enduring and long term traits than the attainment of learning, that is, they measure what a student is capable of knowing rather than what is known [ ]

b) Standardised achievement tests (sometimes referred to as attainment tests) measure what a student knows and can be used to assess, for example, students' knowledge and skills in literacy and numeracy, and to determine progress in these areas [ ].

c) A diagnostic test is designed to provide specific information about a student's strengths and needs in some aspect of learning, for example, word identification skills or understanding of number concepts [ ].

2. How often do you assess your pupils? 1 all the time [ ], 2 most often [ ], 3 once a while [ ]
3. What type of feedback do you give to your pupils on the type of assessment task used? 1 best [ ] 2 better [ ] 3 good [ ] 4 poor [ ]
4. What type of assessment record keeping do you practice?

   1 pupils progress record [ ] 2 achievement records[ ] 3 test record [ ] 4 records of work [ ]
5. What difficulties do you encounter as a teacher in constructing assessment items?

   1 timing [ ] 2 reporting test results to support valid references [ ] 3 teacher

interpretation of the learning progression [ ] 4 multiple levels of diagnostic information generated [ ] 5 non-linear student progress on multiple dimensions [ ]

6. How many periods do you teach in a week? 1. 5-10 [ ] 2. 15-20 [ ] 3. above 20 [ ]
7. Do you ask students questions in class during lessons: 1 yes [ ] 2 no [ ]
8. 7a If 'yes' to question 7, how often do you ask the questions 1 all the time [ ], 2 most often [ ], 3 once a while [ ]
9. 7b if no state your reasons……
10. How will you rate the student's response to the questions asks in class? 1. Best [ ] b. better [ ] c. good [ ] d. poor [ ]
11. Do you conduct class exercises/quizzes during lessons? 1 yes [ ] 2 no [ ]
12. 11a If yes to the above, how often do you do it? 1 every lesson [ ] 2 some of the lessons [ ] 3 once a while [ ]
13. 11b If no to the above state your reasons……
14. How will you rate your students' performance in the exercises during lessons? 1 best [ ] 2 better [ ] 3 good [ ] 4 poor [ ]
15. Do you give class exercise/quizzes after lessons? 1 yes [ ] 2 no [ ]
16. 15a If yes how frequent do you conduct the exercises: 1 every lesson [ ] 2 some of the lessons [ ] 3 once a while [ ]
17. 15b How will you rate students' performance in the exercises given after lessons? 1 excellent [ ] 2 very good [ ] 3 good [] 4 poor []
18. If no give reasons …….
19. Do you mark exercises given to students: 1 yes [ ] 2 no [ ]

20. 19a If yes how frequent do you mark: 1 all the time [ ] 2 more often [ ] 3 some of the time [ ]
21. 19b. If no give reasons…….
22. Do you give assignments/home work to students? 1 yes [ ] 2 no [ ]
23. 22a how frequent do you give the assignments/homework to students: 1 all the time [ ] 2 more often [ ] 3 less often [ ]
24. 23b If no to the above, state your reasons ……
25. Do you give science projects to your students? 1 yes [ ] 2 no [ ]
26. 25a if yes how often do you give science project to students? 1 all the time [ ] 2 more often [ ] 3 less often [ ]
27. If yes to '25', how will you rate the students' performance in the project? 1 best [ ] 2 better [ ] 3 good [ ] 4 poor [ ]
28. 25b If no, state your reasons……
29. Do you conduct end of term exams for your students? 1 yes [ ] 2 no [ ]
30. 26a If yes how would you rate your students' performance in class during end of term exams in Integrated Science: 1 best [ ] 2 better [ ] 3 good [ ] 4 poor [ ]
31. 26b Base on your response to 26a, what is the average mark scored by your students……
32. If no state your reasons…….
33. Do you conduct assessment during practical lessons for your students? 1 yes [ ] 2 no[ ]
34. 33a How frequent do you conduct the test during practical lessons: 1 all the time [ ] 2 most often [ ] 3 less often [ ]
35. 33b If no state your reasons……

36. Which of the following types of assessment practice do you like most? 1 formative assessment [ ] 2 summative assessment [ ] 3 integrated assessment [ ]

37 Give reasons for your choice above……

SECTION C: Views of pupils on assessment conducted by their integrated science teachers.

This questionnaire aims to explore your views on the type of assessment conducted by your teacher in integrated science as students. Please read the following statements carefully and tick in the space provided.

Congruence with planned learning

1. My assessment in integrated science department tests what I

memorize. 1= very clear [ ], 2=clear[ ], 3= neutral[ ], 4= some how [ ],5= not clear[ ].

2. My assessment in integrated science tests what I understand. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

3. My assignments are about what I have done in class. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

4. How I am assessed is similar to what I do in class. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

5. I am assessed on what the teacher has taught me. 1= strongly agree [ ], 2= agree[ ],

3= neutral [ ], 4= disagree[ ],5= strongly disagree[ ].

Authenticity

6. I am asked to apply my learning to real life situations. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ]

7. My integrated science department assessment tasks are useful for everyday life. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

8. I find integrated science department assessment tasks are relevant to what I do outside of school. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

9. Assessment in integrated science department tests my ability to apply what I know to real-life problems. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ]

10. Assessment in integrated science department examines my ability to answer every day questions. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ]

11. I can show others that my learning has helped me do things. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

Student Consultation

12. In integrated science department I am clear about the types of assessment being used. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

13. I am aware how my assessment will be marked. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ]

14. My teacher has explained to me how each type of assessment is to be used. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ]

15. I can have a say in how I will be assessed in integrated science department. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

Students Capabilities

16. I can complete the assessment tasks by the given time. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

17. I am given a choice of assessment tasks. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

18. I am given assessment tasks that suit my ability. 1= strongly agree [ ], 2= agree[ ], 3= neutral[ ], 4= disagree[ ],5= strongly disagree[ ].

19. When I am confused about an assessment task, I am given another way to answer it. 1= strongly agree [ ] , 2= agree[ ], 3= neutral[ ], 4= disagree[ ], 5= strongly disagree [ ].