UNIVERSITY OF EDUCATION, WINNEBA

INTEGRATED SCIENCE TEACHERS ASSESSMENT PRACTICES OF SENIOR HIGH SCHOOLS IN SELECTED DISTRICTS IN NORTHERN REGION

ISSAHAKU MUGISU

2014

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF SCIENCE EDUCATION

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ISSAHAKU MUGISU

A DISSERTATION IN THE DEPARTMENT OF SCIENCE EDUCATION, FACULTY OF SCIENCE, SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, UNIVERSITY OF EDUCATION, WINNEBA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR AWARD OF THE MASTER OF EDUCATION IN SCIENCE DEGREE.

2014

DECLARATION

STUDENT'S DECLARATION

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

Candidate's Name: Issahaku Mugisu

Candidate's Signature……

Date……

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of the dissertation has been read and approved as meeting the requirement of the school of research and graduate studies of University of Education, Winneba.

Supervisor's Name: Dr. Ernest Ngman-Wara

Supervisor's Signature…….

Date…….

ACKNOWLEDGEMENTS

My sincere gratitude goes to the Almighty Allah for the strength, wisdom and guidance He has given me to embark on this research and have come to its conclusion.

I owe Dr. Ernest Ngman-Wara, my able supervisor, Department of Science Education, who is also the Head of Department for Integrated Science Education, University of Education, Winneba, a debt of gratitude for helping me with all that I needed to make this work come to a successful completion. He read through the script, gave his suggestions and directed this research to its current stage.

My thanks also go to Mr. Hudu Zakaria, Department of Agric. Extension Education in the University for Development Studies for his support and guidance during the work.

I wish to also acknowledge the effort of Iddrisu Mahama Boga for his countless support. May Allah pay him back?

I can't forget to thank my wife Ayishatu Kwagyaba for her support and understanding during this stressful period.

Finally my thanks go to those who have contributed in diverse ways towards the success of this research work.

DEDICATION

This dissertation is dedicated to Allah Almighty and also to my son, Uzeru Wunpini Mugisu (Winneba Boy) who was given birth to during my stay in the University of Education Winneba.

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ABSTRACT

The research was to investigate effects of integrated science teacher's assessment practice on performance of SHS students for effective teaching and learning in some selected districts in Northern Region of Ghana. The research design was descriptive survey with mixed methods for data collection. A sample of 60 respondents was selected for this study. A questionnaire and interview schedules were used to collect data for the study. The data was analysed by using Excel and SPSS statistical packages. Independent sample test, K-square and analysis of variance were carried out and the results summarised in tables and figures such as bar charts and pie chart. Findings of the study include: That majority of the integrated science teachers mostly use the following. Asking questions in class during lessons, giving class exercises to students during and after lessons, giving assignment and home work to students. Only few integrated science teachers gave science project to their students most often. Also it was uncovered that student's performance was affected when the following assessment practices were carried out frequently or most often: Asking student's questions in class during lessons, giving class exercises to students during and after lessons, giving them assignment/homework and also giving them science projects. In conclusion, majority of the integrated science teachers used integrated method of assessment practice to promote effective teaching and learning.

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter gives an over view of the background to the study, as such the chapter presents the statement of the problem, the purpose of the study, significance of the study, objectives of the study, the research questions, delimitations of the studies, and limitations of the study, the definition of terms and abbreviations used in the study, and finally the structure and organization of the study.

1.2 Background to the Study

The contribution of science and technology to the socio-economic advancement of nations and societies has been appropriately recognized worldwide and much attention is being paid to the teaching of science and technology as an important component of many educational curricula. When used effectively science and technology is able to improve productivity, reduce societal ills and improve human development which is a crucial ingredient for national development. This has been demonstrated in many societies and nations ranging from the green revolution to industrialization and now the advancement of information and communication technology creating cyber optic world. This has further enhanced globalization and improved human interactions and transportation of goods and services.

This is the reason why science education has found a save and secured place in school curricula of most countries around the world, with the aim of providing scientific knowledge and skills to students and influencing their thinking and understanding of their environment. Modern science curricula in various countries do not only focus on

developing the understanding of science concepts in their students, it also involves a wide variety of goals. For instance, the early and mid 1990s, reforms in science, particularly in developed countries have placed an added emphasis on the development of students understanding about the nature of science (American Association For the advancement of science [AAAS], 1990; National Research Council [NRC], 1996).

The importance of science to Ghana socioeconomic development was emphasised in the vision 2020 policy document which envisaged Ghana achievement of a middle-income status and a better standard of living by the year 2020 (Ministry of Environment Science and Technology [MEST], 2000). Anamuah-Mensah (2004) asserted that, a strong science and technology knowledge base constitutes the currency for social and economic transformation of nations, including Ghana. He observed that nation states that have developed have utilized the opportunities offered by the current phenomenal increase in science and technology especially information and communication technology, biochemistry and material science.

Ghana recognizes the role science and technology education plays in the development of a country's economy, environment and social life, which had seen the first post-independent government committing considerable resources to the development of science and technology in the country by introducing science and technology in primary and secondary schools in the 60s, establishing the Kwame Nkrumah University of science and Technology and the University College of Science Education (now the University of Cape Coast) for training scientists, engineers and science teachers respectively (Anamuah-Mensah, 2004)

In order to ensure that students going through educational institutions especially the pre-tertiary level are embedded with the requisite scientific knowledge and understanding, the

system incorporates assessment and evaluation practices to provide feedback of teaching and training provided to students. In this regard, teaching and assessment in science should help encourage students understanding of the subject, and sustain their interest in learning science to reflect the goals that the nation has set for herself with regard to science education (Klassen, 2006; Martínez et al., 2009, and National Academy of Sciences [NAS], 2013).

Also MEST (2000) observed that teaching and assessment practices in science at all levels of Ghana educational system must increase the speed of complete absorption of patterns of science and technology in the society, and produce a number of requisite human resources and well informed and scientific minded citizens. In addition Klassen (2006) opined that assessment practices in science have gone through a lot of changes over the last decade. The bases for the changes and the resultant assessment practices may have consequential effect on students' performance in science.

According to Hein (1994) assessment practice has taking a wider definition and a purpose, and has gone through a paradigm shift from psychometric to a broader model of assessment in education. A wider range of assessment used presently, calls for an assessment for learning, instead of assessment of learning. Assessment should help determine what students have already learned over a period of time and not what they must be compelled to learn for the purpose of the assessment.

Examinations have not always been used in the way that they are used today. Their use likely originated with the written chine's civil service examination to select the most competent civil servants (Lissitz, 1997; Madaus, 1993).

The way students are tested affects the way they learn. And whatever knowledge they might have acquired in science will go a long way to shape their view and understanding of happenings around them which will invariable influence their future general wellbeing.

As a result of the stature and place science is occupying in this modern era, it is considered as one of the most important subjects at the basic and senior high levels of education, and major entry requirement into the university. It is therefore incumbent upon teachers to lay a solid foundation in science for their students, through their teaching and assessment practices. This would go a long way to build the confidence in students to go in for science courses, and to erase the notion that science is difficult.

Teachers' assessment practices in science should help shape the students mentality and view about examinations and what is require of them by the way of understanding in scientific issues and concepts. The mentality of 'chew' and 'pour', pass and forget' which seem to be an examination strategy adopted by students is inimical to embedding scientific values and attitude on students and such should be discourage through pragmatic and effective assessment practices that gauge students' knowledge and evaluate teaching learning. Teacher's assessment practices should rather help students to learn science as part and parcel of their lives to make them a well resource and scientific minded citizens of the state (MEST, 2000).

1.3 Statement of the Problem

Majority of the senior high students in northern region always performed poorly in integrated science in West African schools certificate exemptions (WASSCE). The Chief Examiner always reported that science is one of the major problems faced by both JHS and SHS student in national examinations. (Ghana Education Service [GES], 2005-2008). The

northern region of Ghana is always ranked among the poorly performed regions in integrated science in WASSCE. This is one of the reasons why the problem of Integrated Science persist in the selected districts which include Bumkpurugu-yunyoo, West Mamprusi, East Mamprusi and Savelugu-Nantong districts in the region in which the study took place. Students who normally fail in some subjects after the senior high school in these districts always have Integrated Science as one of their problems, preventing them from furthering their education.

As a teacher in one of the senior high schools in the Region, I have prepared many private candidates through remedial classes towards their WASSCE examination. Integrated Science has always been a major area of concern for the candidates. Several factors may contribute towards their poor performances in integrated science, however, since assessment practice can influence students learning. The researcher deemed it necessary to find out the extent to which integrated science teachers assessment practices can affect students' performance in the selected districts.

1.4 Purpose for the study

The purpose of this study was to find out the type of assessment practices used by integrated science teachers of senior high schools in the selected districts in northern region of Ghana, and its implications on effective teaching and learning of integrated science to improve students performances in the subject in these areas.

1.5 Objectives of the study

The general objective of this study was to find out the effects of integrated science teachers assessment practices on students 'performance. The specific objectives include:

1) To find out the assessment practices of integrated science teachers in senior high schools in selected districts in the Northern Region of Ghana.
2) To identify teacher related factors that influence their assessment practices
3) To examine the implications of integrated science teacher's assessment practices for effective teaching and learning.

1.6 Research questions

The following research questions guided the study:

1. What are the assessment practices of integrated science teachers in senior high schools in selected districts in Northern Region of Ghana?
2. What are the teacher related factors that influence the integrated science teachers' assessment practices?
3. What are the implications of integrated science teacher's assessment practices for effective teaching and learning?

1.7 Significance of the Study

This study would identify the type of assessment practices carried out by teachers in schools in the selected districts in Northern Region. The findings of the research would suggest better ways in which integrated science teachers should carry out their assessment practices to improve students' performance in integrated science.

The study would served as a source of information for future researchers to lay their hands on and also give recommendations on areas where further research can be under taking for national development.

This study would therefore provide an insight on how assessment practices in science affects students' performance and recommendations for better ways of assessing students to enhance good performance outcomes creating scientific informed citizens.

1.8 Delimitation of the Study

The study took place in ten senior high schools of the following selected districts: Bumkpurugu-yunyoo, West Mamprusi, East Mamprusi and Savelugu-Nantong districts in the northern region of Ghana. The region comprises of more than twenty districts and over fourty senior high schools in them. However, the study only covered four districts and ten schools because of limited time given to the study of masters in education programme.

1.9 Limitations of the Study

According to Best and Khan (1989) limitations are factors and conditions beyond the control of a researcher that will place restriction on the conclusion of the study and its application.

Retrieving the questionnaire given out to some of the respondents was quite difficult and delayed the data collection process. It was quite easy for respondents to put on paper the assessment practices they normally carried out in real class room situation, but as to whether the responses could have reflected their normal practices in real class room situation was another concern. It was therefore difficult for the researcher to determine whether the responses given were true or otherwise and put him in difficult situation to generalized the outcome of the study.

1.10 Abbreviations

NRC: National Research Council

AAAS: American Association for the Advancement of Sciences

MEST: Ministry of Education Science and Technology

NAS: National Academy of Sciences

BECE: Basic Education Certificate Examination

WASSCE: West African Secondary School Certificate Examination

DOE: Department of Education

PHC: Population and Housing Census

SHS: Senior High School

GSS: Ghana statistical service

GLSS: Ghana living standards survey

MESS: Ministry of education science and sports

ETS: Educational Testing Service

SPSS: Statistical package for social sciences

1.11 Organization of the work

This research consists of five chapters. Chapter one deals with the introduction under which the background of the study, statement of the problem, purpose of the study, significance of the study, objectives, research questions, delimitation, limitation, definition of terms and abbreviations used in the study and the organisation of work are discussed.

The second chapter deals with literature review. In this chapter, the necessary information on history of assessment, assessment practices in science education, types of assessment, purpose of assessment, role of science teachers in assessment, and as well as the effects of assessment practice on students' performance were reviewed. The third chapter also

indicates the methodology used to gather the necessary information about the issues raised in the study.

Also discussed in this chapter includes the population and sample selection, research design, research instruments and data analysis plan. The fourth chapter of the study dwells on the analysis and discussion of results that will be obtained from the research instrument. The last chapter, chapter five considers the summary, conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter presents a review of earlier studies on teachers' assessment practices and their effects on students' performance, which include historical perspective of assessment, assessment practices in science and its purpose and the effects of science teachers' assessment practices on students' performance.

2.2 Historical perspective of Assessment

A brief review on the history of assessment reveals that, public policy have likely always played a role in the motivation for examinations, examinations has not always been used in the way they are used today. Their use likely originated with the written Chinese civil service examination in 210BC, to select the most competent civil servants (Madaus & Kellaghan, 1993) or even earlier (Lissitz, 1997). The written examination first appeared in Europe in the sixteenth century, when it was used to supplement the viva voce examination. Ranking however was not introduced until around 1750 and the qualification grades did not appear until 1792, promoted by William Farish a pioneering engineering professor of Cambridge University (Madaus & Kellaghan, 1993). Qualification through the aeard of marks was not a major turning point in the nature of examinations since it led to the formulation of factual, categorical, narrowly focused questions that replaced questions aimed at the rhetorical exposition of topics ranging across the curriculum (Hoskins, 1968).These developments in assessment in Europe did not go unnoticed by Horace Mann in the united states, an influential advocate of public education, while he was secretary to the Massachusetts board of education. In 1845, Mann administered the first public written examination to Boston's brightest 14-year old public school students to encourage a higher degree of standardization (Rothstein, 1998). And from 1845 until

around 1900, the essay examination became the dominant mode of testing in the United States (Madaus & Kellaghan, 1993). Mann discovered the quantitatively scored, ranked examination to be the political tool for which he has been looking for in his battle with Boston's headmaster over his attempt to have corporal punishment in his schools abolished (Madaus & Kellaghan, 1993). Mann may have reasoned that if schools were publicly demonstrated to be deficient in examination scores, this will imply incompetence on the part of teachers and headmasters, placing enormous pressure on them to change their ways in reference to both standards of education (Linn, 2001).

Different people have different views on assessment and its practices. Some of these views may be pointing out to a common issue, others are different. National Academy of Sciences (2013) see assessment as a way of providing feedback to the various stake holders in the education system and a way of communicating the expectations of that system to all concern. It provides students with feedback on how well they are meeting the expectations, teachers with feedback on how well students are learning, districts with feedback on how the effectiveness of their programs, and policy makers with feedback on how well policies are working.

2.3 Assessment practices in Science Education

Harlen (2013) sees assessment as a term used to refer to judgement on individual student performance and achievement of learning goals. It covers classroom-based assessment as well as large-scale external test and examinations. He further asserted that, assessment describe a process of generating and interpreting evidence for some purpose. It involve decision about what evidence to use, the generation and collection of that evidence in a systematic and planned way, the interpretation of the evidence to produce a judgement, and the communication and use of the judgement (Harlen, 2013).

The theoretical and practical issues in the assessment of science learning are complex, as maintained by (Klassen, 2006). It is this overwhelming complexity, as perceived by non-specialist which makes it difficult to engage with the discipline in a critical manner. Gunzenhauser (as cited in Klassen, 2006) points out that there is lack of reflective, engaged dialogue among the various stakeholders in educational assessment. Science educators therefore should have adequate knowledge about philosophical and theoretical assumptions and methodology underlining assessment practices. Assessment practices also communicate what is important and what is valued in science education. For example, assessment that emphasize on the acquisition of factual knowledge implies that facts are important, whereas inquiry centred assessment indicate that scientific inquiry is important.

Also, Assessment in science is seen by most people as a means of public accountability. Klassen (2006) have maintained that, when one reads about assessment history, as well as present practices, one is struck by how little the issues in regard to public accountability of education have change over the past century. Over a century ago, Mill (2006) advocated a law making a public education compulsory and proposed the institutionalization of examinations. Although Mills' view on assessment as a public accountability can be criticized as somewhat quaint and even amusing, never the less, it still reflects the tension that exist even today, between educators, on one hand, and public policy, on the other.

Following suit, the development of concern over the state of science education accompanied the increase usage of standardised test results to monitor the quality of education. Since testing was introduced, examinations or test have served to check for, and enforce public standards in education. Testing has been concern mainly with ranking students for the purpose of placements, certification, and college or university admissions or with providing public accountability for student achievement (Klassen, 2006). Tamir (1998) also observed that, providing feedback during the process of instruction was not

emphasized not until the 1990s. Rather factual recall questions and problem solving questions usually function as summative high stakes assessment after curriculum had been completely covered in the classroom. Such tests had the additional attribute of a strict time limit, which is consistent with the requirement of short, specific answers and the absence of reflective thought on the part of students. Since ranking was a primary consideration, the student was always tested in isolation from other students. Tamir (1998) further observed that, the administration of large scale assessment was made quite easier by the development of digital electronics and invention of high speed grading machine in the 1950s. Machine scoring dictated a test form in which the student selected one of the several possible answers to a question, here designated as a selected-response. Since then selected response testing has been a main stay in the assessment of science learning. The main example of selected response style testing is the multiple choice format, but other styles include true-false, mix and match, and fill in the blank.

However, in the 1970s, there was a serious concern raised by educationists about the representativeness of achievement test following studies that established a significant discrepancy between students' scores on achievement test and intelligent test. The discrepancy made it possible to categorise students who perform poorly on achievement test but much better on intelligent test as 'learning disabled' (Willson, 1991).

2.4 Types of Assessment Practices in Science Education

Bell and Cowie (2000) supports that the multiple purpose for assessment is said to be addressed by using school-based assessment, the purpose of which can be described as 'improving learning, reporting progress, providing summative information and improving programmes. This multiple purpose of school based assessment are seen as given rise to

three broad categories of assessment, namely diagnostic, summative and formative assessment.

Formative assessment is described as an integral part of the teaching and learning process. It is used to provide the students with the feedback to enhance learning and to help the teacher understand students learning. It helps build a picture of students' progress, and informs decision about the next step in teaching and learning (Bell & Cowie, 2000; Harlen, 2013).

Assessment should contribute to instruction and learning, assessment after instruction is over does not allow for the assessment to contribute to any instructional decisions. All that can be said is the degree to which a student mastered some amount of content. Assessment must be a continuous process that facilitates 'on-line' instructional decision making in the class room (Gitomers & Duschl, 2000).

Both formative and summative assessment influence learning. In other words, to improve learning outcomes, we need to consider not only the teaching and learning activities, but also the assessment tasks (Gipps & James, 1998). More over the extent to which formative assessment improves learning outcomes is now being recognised.

F-Rubrics (2000) in their write up also identified two types of assessment in science education as formal and integrated assessment. Although they may be seen as opposing methods, formal and integrated assessments are not necessarily in conflict. They are different ways of measuring students' performance, with different goals and outcomes. A complete assessment programme includes both formal and integrated; A complete student profile includes results from both kinds of instruments. By using a mixture of assessment, you and your students, together, can develop comprehensive account of the students' progress in learning science.

Formal assessment ask the student: what do you know? Its primary purpose is to measure how much knowledge a student has retain from what has been taught.

The emphases in on recall, generally demonstrated in paper-and-pencil test. The test often includes multiple-choice, matching and true-false items.

The test is usually timed, given student a limited amount of time in which to show what they know.

Formal assessment allows for comparison. In standardised test, a student results are compared with national norms, in criterion reference test, the results are compared with percentage score that is said to indicate mastery. When these tests are used, it is possible to compare a student's performance with that of other students in the class room, the district or the country (F-Rubrics, 2013).

Integrated assessment asks students the following: what can you do? How can you do it? It primary purpose is to give a broad picture of the students as a critical thinker, problem solver and learner.

The task and experiences used in integrated assessment are already familiar to students. They include the variety of activities found in most class rooms, such as unit projects, laboratory investigations, models, discussions and other forms of expressions.

Integrated assessment is on-going. Students have the opportunity to show what they can do in a variety of task over time.

Both teachers and students are actively involved in integrated assessment. Reflection, self-assessment, observation and participation are at the heart of the process.

Integrated assessment is holistic. Teachers use many different models to get a full picture of students' performance. (F-Rubrics, 2013)

2.5 Purpose of Assessment

Assessment has multiple purposes. One purpose is to monitor educational progress or improvement. Educators, policy makers, parents and the public want to know how much students are learning compare to the standards of performance or to their peers. This purpose often called summative assessment is becoming more significant as state and school districts invest more resources in educational reforms.

A second purpose of assessment is to provide teachers and students with feedback. The teachers can use the feedback to revise their class room practices, and the students can use the feedback to monitor their own learning. This purpose, often called formative assessment is also receiving greater attention with the spread of new teaching methods.

A third purpose of assessment is to drive changes in practice and policy by holding people accountable for achieving the desire reforms. This purpose called accountability assessment, is very much in the fore front as states and schools districts design systems that attached strong incentives and sanctions to performance on state and local assessment (National Research Council [NRC], 2000).

2.6 The role of Science Teachers in Assessment

The methods used to gain educational information should mirror the way the teachers teach and should define what students should learn (NAS, 2013). Assessment may be used in many ways by teachers to bring about an improvement in the educational system. NAS (2013) have clearly indicated that, teachers may use assessment data powerfully in many ways such as providing class room practice, planning curricula, developing self-directed learners, reporting students' progress, and researching teaching practice. Science assessment may also be conducted at the district, state or national levels. For the purpose

of formulating policy, monitoring the effects of policies, enforcing compliance with policies, demonstrating accountability, making comparisons, or monitoring progress towards goals. It may also be conducted by schools districts to judge the effectiveness of programs, schools or teachers. Teachers want assessment to mirror what they see from their students every day. Many teachers have turned to integrated assessment that involves students in complex, multimodal activities. These assessments help teachers see their students holistically as critical thinkers, problem solvers and acquirers of knowledge (F-Rubrics, 2013).

NAS (2013) continued by saying that all levels of the assessment should include the active participation of teachers of science. Their experiences with students help to ensure congruence of class room practice with assessment. Therefore, teachers should be an integral part of the development and interpretation of externally design assessment.

2.7 Influence of Teacher qualification and Professional status on Assessment

In this research context, teacher quality connotes the teacher qualification, teaching experience, training before joining the service. However, Greenberg et al. (2004) in their study on the relationship between the teacher quality and students' achievement in integrated science found that teacher certification and teacher experience were strongly associated with higher students' achievement in integrated science. There were also significant associations between higher degrees of education or teaching experience with achievement in integrated science.

Lee and Fradd (1996) had earlier posited that the teacher is the primary factor in school and

much depends on him to promote students' higher order thinking skills which are required for

academic success. Grandall (1994) had earlier reiterated the importance of teacher training when he said teachers can provide an insight into linguistic and communicative activities.

The minimum qualification to teach at the senior high school should be first degree in a relevant area of study. Teachers need to have the requisite qualification in order to conduct a meaningful assessment that can enhance learning and better performance for their students. The qualification and experience of a teacher can help him to adopt assessment practices that can improve the performance of their students.

The interest in raising the level of performance in Integrated Science especially at the senior high school level has led to the focus on the role of teacher's qualification and professional status in student's achievement in Integrated Science (Ojimba, 2013).

2.8 Implications of Assessment on effective teaching and learning

The way students are tested affects their way of learning. According to N A S (2013) assessment can be used to developed self-directed learners among students and this will go a long way to have an influence on their performance. F-Rubrics (2013) also indicated that assessment can develop critical thinkers among students, and when students become critical thinkers, their learning is shaped and performance will improve. Teachers are normally described as organizers, coordinators, managers and directors of the teaching and learning process, they serve as the pivot in which all activities relating to teaching and learning takes place. Therefore the kind of assessment practices being carried out have a direct impact on the student and student's performance in general. Teachers must design questions which promote the kind of critical thinking required by the curriculum and learning outcomes (Vandeyar & Killen, 2003).

Teachers' assessment practices in science should help shape the student's mentality and view about examinations and assessment. The idea that 'chew' and 'pour', past and forget, which an examination strategy by students is should be erased. Teacher's assessment practices should rather help students to learn science as part and parcel of their lives to make them a well resource and scientific minded citizens of the state (MEST, 2000).

Harlen (2013) sees assessment as a term used to refer to judgement on individual student performance and achievement of learning goals. This implies that, a well-structured and organised assessment will have a positive impact on students' performance, whiles a poorly structured and poorly organised assessment will also have negative impact on students' performance and can be attributed to poor performance of students.

2.9 Conceptual Framework

The conceptual frame work gives an overview of the proposed variables under this study. It offers a schematic representation of how teacher related factors influence the choice of assessment practices in various schools and the implication of the assessment practices on effective teaching and learning of Integrated Science.

The teacher related factors such as academic and professional qualification, years of teaching experience and so on would have an influence on their choice of assessment practices such as the formative, summative and integrated assessment practices. These factors would go a long way to influence effective teaching and learning of integrated science in their various schools. Teachers with high academic standards, professionally trained with years of teaching experience may adopt better methods of assessing their students as compared to non-professionals and less experienced teachers.

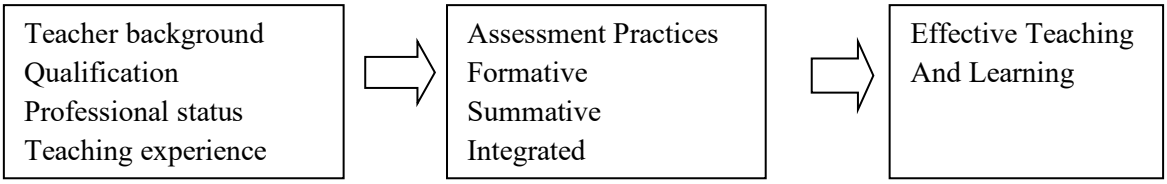

Figure 1: Conceptual frame work.

Figure 1 shows an outline of the proposed variables under this study and visualized the interactions of teacher background in terms of qualification, professional status within the context of national science educational policies and curriculum, as determinants of the kind of assessment practices used in evaluating integrated science students**.** It shows how teacher related factors such as his qualification and experience can influence his choice of assessment practice used to evaluate students learning. And also how this will intend influence and affect students' performance in Integrated Science. The national science curriculum and educational policy provides the framework which guides the teaching and assessment practices in educational institutions.

Teachers are normally described as organizers, coordinators, managers and directors of the teaching and learning process. They serve as the pivot on which all activities relating to teaching and learning turn. Therefore the kind of assessment practices being carried out have a direct impact on the student and student's performance in general. Teachers with higher academic standards, good professional ethics and highly experienced must design questions which promote the kind of critical thinking required by the curriculum and learning outcomes (Vandeyar & Killen, 2003). When teachers adopt good and effective assessment methods and practices, it will have a consequential effect on teaching and learning outcomes. Students will understand better, what they are instructed to do and teachers will receive the feedback on what they have instructed their students to do. And this would lead to positive implication on effective teaching and learning of Integrated Science.

CHAPTER THREE

METHODOLOGY

3.1 Overview

The discussion under this chapter include the design of the study, study area, population, sample and sampling techniques, instruments, validity and reliability of instrument, data collection procedure and data analysis.

3.2 Research Design

Descriptive survey was used for the research design. Surveys are useful tools for gathering factual information, data on preferences, beliefs, behaviour and experiences (Weisberg, Krosnick & Browen, 1996).

Descriptive survey is a method which concerns itself with the present phenomena in terms of conditions, practices beliefs, processes, relationships or trends. 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 Study Area

The research study took place in selected senior high schools in Northern Region of Ghana. The Northern Region, which occupies an area of about 70,383 square kilometres, is the largest region in Ghana in terms of land area. It shares boundaries with the Upper East and the Upper West Regions to the north, the Brong Ahafo and the Volta Regions to the south, and two neighbouring countries, the Republic of Togo to the east, and La Cote d' Ivoire to the west (Ghana Districts Repository [GDR], 2006).

A report from GDS (2006) indicated that the region comprise 26 Districts with a total population of 2,479,461, and over thirty senior high schools spread across the various Districts.

3.4 Population

The target population for this study was integrated science teachers in Senior High Schools in the Northern Region of Ghana. Northern Region consist of 34 public senior high schools, and some private senior high schools as well (Ghana schools on line, 2012). Since the target population was quite large for the researcher to carry out the work, an accessible population of integrated science teachers in ten senior high schools in a four selected districts in the Northern Region was used as the sample for the study.

3.5 Sampling Technique

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 neighbourhoods 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)

The districts in the region were clustered based on their geographical location that is north, south, east and west, which resulted in four clusters. Because of the fact that all SHS offer Integrated Science as a core subject, a simple random sampling technique was then used to select one cluster among the four clusters of districts and the Integrated Science Teachers in senior high schools in the selected district formed the study sample. The cluster along the geographic north was randomly selected, which consisted of the

following districts; Bunkpurugu-Yunyoo, East Mamprusi, West Mamprusi and Savulugu-Nantong Districts. There are eight public and two private senior high schools in the cluster. The Integrated Science teachers in the schools were used as the study sample, which consist of 66 integrated science teachers.

3.6 Instruments

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

The questionnaire was developed by the researcher, it was both closed and open ended. It has 37 items which were divided into two sections, A and B. Section A was made up of 8 items, and was used to collect background information on the participants. This was followed by section B with 29 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.

3.7 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 40 science teachers from the Tamale metropolis. 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.

3.8 Validity of the instrument

Merriam (1998) stated that validity addresses 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.

3.9 Data Collection Procedure

The researcher sought permission from the headmasters of the various schools sampled for the study. He was then directed to see the heads of department for science in their various schools. The researcher established rapport with the heads of department and 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. 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.

3.10 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 onto an electronic spreadsheet (Microsoft Excel software) and statistically analysed using SPSS version 17.

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 on the assessment practices used by integrated science teachers. Also the participant's responses on the section were organised into simple frequencies and percentages.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Overview

This chapter presents the results of the study. The results are presented in four sections based on the research questions. The results are discussed as they are presented.

4.2 Characteristics of the Study Sample

The data were presented in terms of age of the respondents, sex, years of teaching experience, academic and professional qualifications.

4.2.1 Age Distribution of Respondents

Table 1 indicates the age distribution of the respondents.

Table 1: Age distribution of integrated science teachers

Age Category	Number of Respondent	Percent (%)
20 - 35years	39	59.1
36 - 45 years	23	34.8
46 - 60years	4	6.1
Total	**66**	**100.0**

The table indicates that 59.1% of the respondents were in their youthful age, this shows that more than half of the respondents are in their youthful age. This suggests that this group of teachers still have more years to build their experience to enhance better teaching and learning.

4.2.2 Sex Distribution of respondents

Figure1indicates the sex distribution of the respondents. The respondents were mostly men, represented by 89%, with 11% being females.

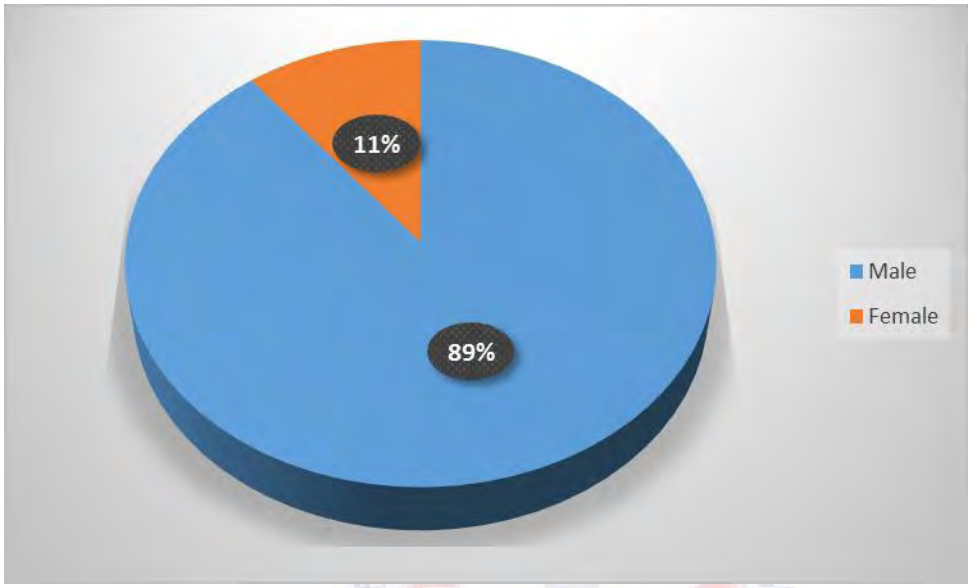

Figure 9: Pie chart illustrating sex distribution of respondents

4.2.3 Academic Qualification of Respondents

Figure 2 represents the academic qualification of the respondents. Majority of the respondents (76%) were first degree holders. This was followed by diploma holders (17%) and very few of them (7%) had their second degree.

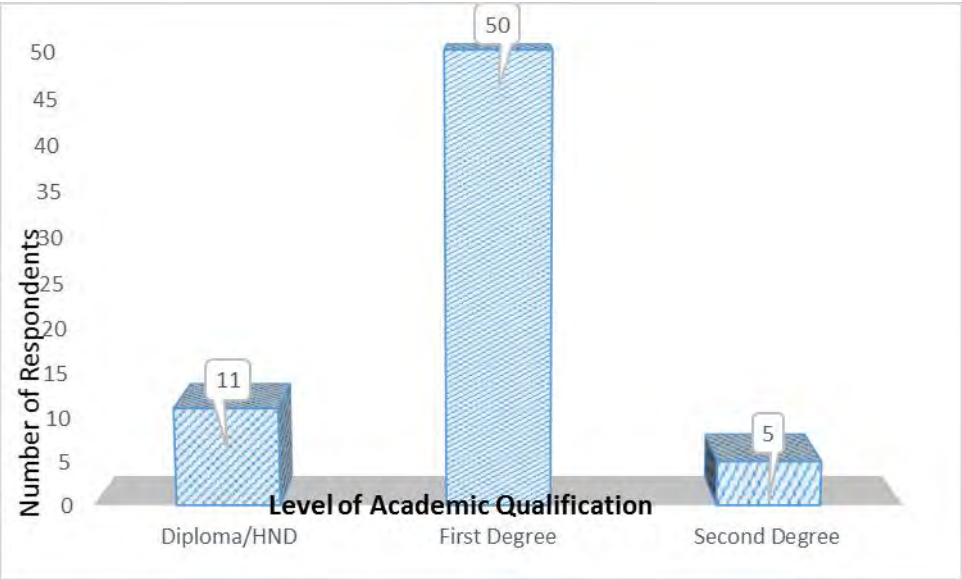

Figure 10: Bar Chart Showing Distribution of Academic Qualification of respondents

4.2.4 Professional Qualification of respondents

Table 2 presents the level of professional qualification of the respondents. About 69.7% of the respondents were professional teachers and 30.3% of them were non-professional teachers. Also 37% of them had certificate in education and 34.8% had diploma in education. Only28.3% had first degree in education.

Table 2: professional qualification of respondents

professional qualification	Frequency	Percent (%)
Certificate in education	17	25.8
Diploma in education	16	24.2
First degree in education	13	19.7
No professional qualification	20	30.3
Total	**66**	**100**

4.2.5 Years of Teaching Experience of respondents

Table 3 shows years of teaching experience of the science respondents. More than half of the respondents (59.1%) had between 1-5years of teaching experience. About 38% of them also had between 6-10years of teaching experience. Only few of the respondents (3%) had above 10 years of teaching experience.

While young teachers and the fresh ideas they can bring are essential to improve teaching effectiveness, experience always matters in teaching. Research clearly showed that with each year of experience, teachers improve their proficiency and effectiveness during the first seven years. A study by Huang and Moon (2013) found that additional years of teaching experience at the same grade level add to direct positive impact on student achievement for up to 20 years of teaching experience. This indicates that teaching experience has significant impact on student achievement.

Table 3: Distribution of Teaching Experience

Years of Teaching	Number of Respondents	Percent (%)
1 -5years	39	59.1
6 - 10years	25	37.9
Above	2	3.0
Total	**66**	**100.0**

4.3 Research question one: What are the Assessment Practices of Integrated Science Teachers

Discussions under teacher's assessment practices include the frequency of asking questions in class during lessons, giving class exercises/quizzes during lessons and exercises given after lessons, giving assignments/homework and given science projects to students. Questionnaires were given out to respondents to indicate whether they carry out

these assessment practices with their students, and also the frequency at which it is done. This was how data was generated to answer research question one. The items were analysed by looking at the frequencies of each one of them.

4.3.1 The frequency of asking questions in class during Lessons

Figure 2 shows the rate at which questions were asked in class during lessons.

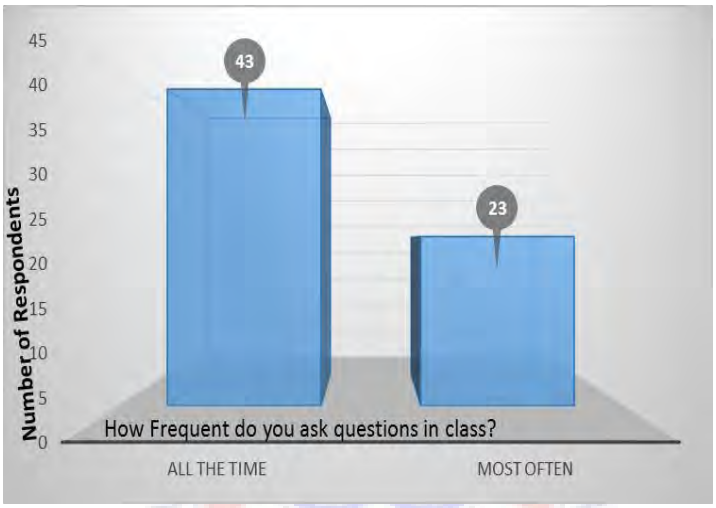

Figure 2: Bar Graph showing Frequency of questions ask in class

Asking questions in class during lessons is a form assessment. All the respondents agreed that they ask questions in class during lessons. They were further required to indicate the frequency at which questions were asked. Out of 66 respondents, 65% indicated that they asked questions in class all the time. Whiles 35% of them also indicated that they asked questions in most of their lessons. Since majority of the respondents (65%) asked questions in class all the time, it may imply that students stand the chance of learning better. And teachers would also receive a quick feedback to adjust their instructional approach in the class room to promote better teaching and learning. However, when teachers ask students questions in class, it helps them to know whether the students are following the lessons or not. This will help the teacher to change his strategies and

methods used in teaching his students, and it will go a long way to improve the quality of teaching and learning.

Some people have different views about teachers asking question in class, they believe that it leads to only learning for recall in test. According to Schwartz (2012) teachers often ask questions of their students to gauge comprehension, but that is a passive model that relies on students to absorb information they need to reproduce on during exams. However, intellectual engaging questions helps stimulate and focuses students thinking, while helping the teacher understand their thinking (Weiss et al., 2003).

4.3.2 Class Exercise given to students during lessons

Figure 3 represents how class exercises were given to students during lessons.

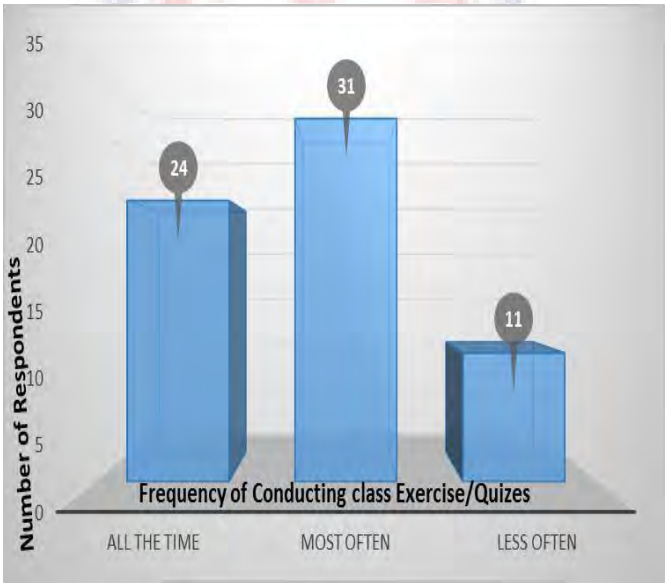

Figure: 3 Bar Graph Showing class exercises during lessons

All the 66 respondents agreed that they gave exercises to their students during lessons. About 36 respondents out of the 66 gave exercises most often, while 24 and 11 respondents also gave exercises all the time and less often respectively. It may be difficult for a teacher to conduct class exercise during lessons all the time. But most often than not, teachers give exercises to their students in class. This may be one of the reasons why more

of the respondents (31) gave exercises to their students during lessons most often and only 11 also gave exercises less often than not.

Given exercises to students in class during lessons is very important, as it helps teachers to measure the success of their students in the class. Students also learn very well before coming to class when they know they would be given class exercise during their lesson.

Exercises given to students during lessons are forms of formative assessment which is an integral part of the teaching and learning process. It is used to provide the students with the feedback to enhance learning and to help the teacher understand students learning. It helps build a picture of students' progress, and informs decision about the next step in teaching and learning (Bell & Cowie, 2000; Harlen, 2013).

Class exercises should contribute to instruction and learning. Exercises after instruction is over dont allow for the assessment to contribute to any instructional decisions. All that can be said is the degree to which a student mastered some amount of content. Assessment must be a continuous process that facilitates 'on-line' instructional decision making in the class room (Gitomers & Duschl, 2000).

4.3.3 Exercises given to students after lessons

Figure 4, shows the frequency at which class exercises were given to students after lessons.

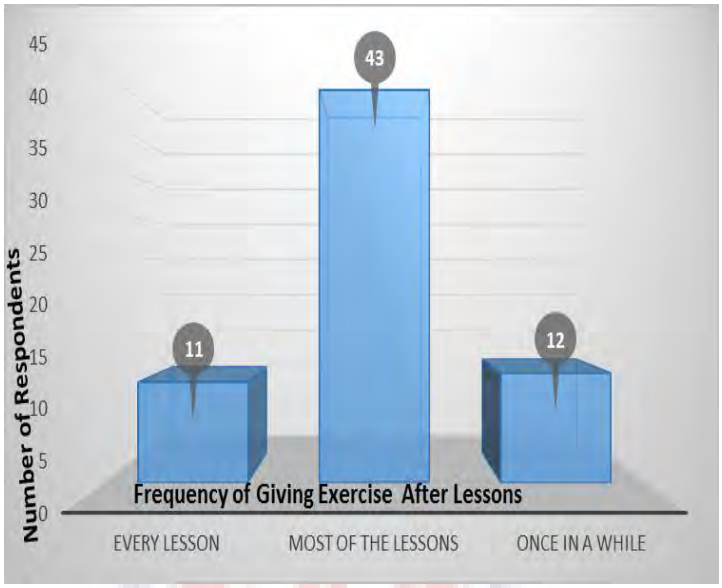

Figure: 4 Bar Graph Showing class exercises after lessons

Majority of the respondents (43) agreed that they conducted class exercises after most of their lessons, 12 of them agreed that they conducted exercises after their lessons once in a while and the remaining 11also conducted exercises after every lesson. It is clear that majority of the respondents conducted class exercises in most of the lessons than those who conducted in every lesson and once in a while. Again the assumption here may be that it is practically difficult to always conduct class exercises after every lesson all the time. That may be the reason why few of the respondents (11) conducted class exercises after every lesson. Exercises given to students after lessons are related to summative assessment practices and promote assessment of learning which doesn't contribute to the instructional process. However, since it also promotes learning, it is good for teachers to always give exercises to their students after lessons. Especially when a unit or chapter has been completed, so that they can judge their students' performance in that unit, chapter or topic.

4.3.4 Home work/assignments given to students

Figure 5 shows the frequency at which homework and assignments are given to students.

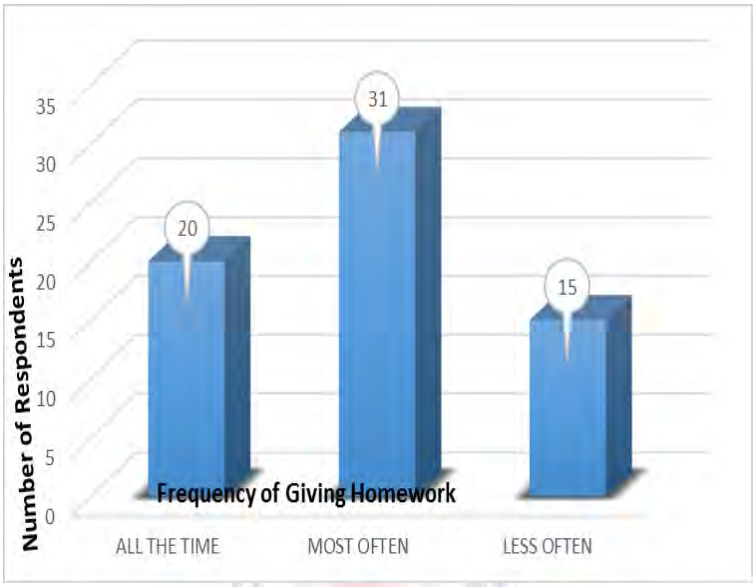

Figure 5: A bar chart showing frequency of given homework to students

Respondents were asked to indicate the frequency at which they conducted assignments. And 20 of them indicated that they conduct assignments all the time, 31 also indicated that they conducted assignments most often and not all the time. The remaining 15 also indicated that they conducted assignments less often than not. One may conclude that it is practically difficult to give and mark home-work or assignments all the time, which is why only 20 of them gave home work to their students all the time.

Assignment/homework given to students is very important as it engages the student at home so that they don't easily forget their books while at home or after school period. According to Goldstein (1999), homework is the intersection between home and school. And it can serve as a window through which one can observe the child's education and express positive attitude towards the education. As children grow older, homework and the amount of time engaged in homework increases in importance. For teachers and

administrators, homework is a cost effective way to provide additional instruction in practice.

Supporters of homework/assignment believe that it is important because it prepares children for the competition that they have to face in their life. Proponents also believe that homework help reinforce the concept taught in school. But disputants believe that the extra time those children get at home, can be used for some co-curricular activities, there by introducing them to new realms of life and expanding their horizon (Oak, 2013).

4.3.5 Science Projects given to students

The integrated science teachers were asked to indicate whether they give science projects to their students or not. Majority of them (53) indicated that they give science projects to students and the remaining (13) said they do not give science projects to students at all. The frequency at which science projects were given is shown in figure 6.

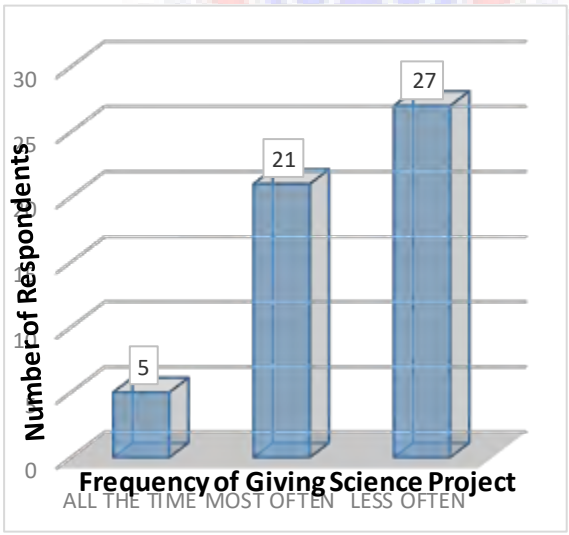

Figure 6: A bar chart showing science projects given to students

About 5 of them indicated that they gave science projects all the time to their students, 21 of them also indicated that they gave science projects most of the time and the remaining

27 also indicated that they gave science projects to their students less often than not. Only few teachers gave science projects all the time, and majority of them only gave science projects less often.

. Under normal circumstance, science teachers most often teach their students without given them science projects. The science project's will help students to develop their creative abilities, and could also lead to innovations. The most likely difficulties on the part of teachers for not giving science projects may be due to lack of science laboratories, materials and equipment.

Teachers who embrace science project or hands-on learning in science seem to recognise certain desirable outcomes and endorse student centred instructional approach. Research have confirmed many of the seemingly intuitive benefits of science projects and have also documented a variety of unanticipated benefits. Students in hands-on science project will remember the material better, feel a sense of accomplishment when the task is completed, and be able to transfer that experience easier to other learning situations. When more than one method of learning is assessed on science projects which bring about hands-on learning, the information has a better chance of been stored in the memory for useful retrieval. Students who have difficulty in the learning arena for reasons of auditory deficiencies and behavioural interference can be found to be on task more often, because they are part of the learning process and not just spectators (Haury, 1994).

4.3.6 Test after Practical Lessons

Figure 7 shows the frequency of test conducted to students after every practical lesson.

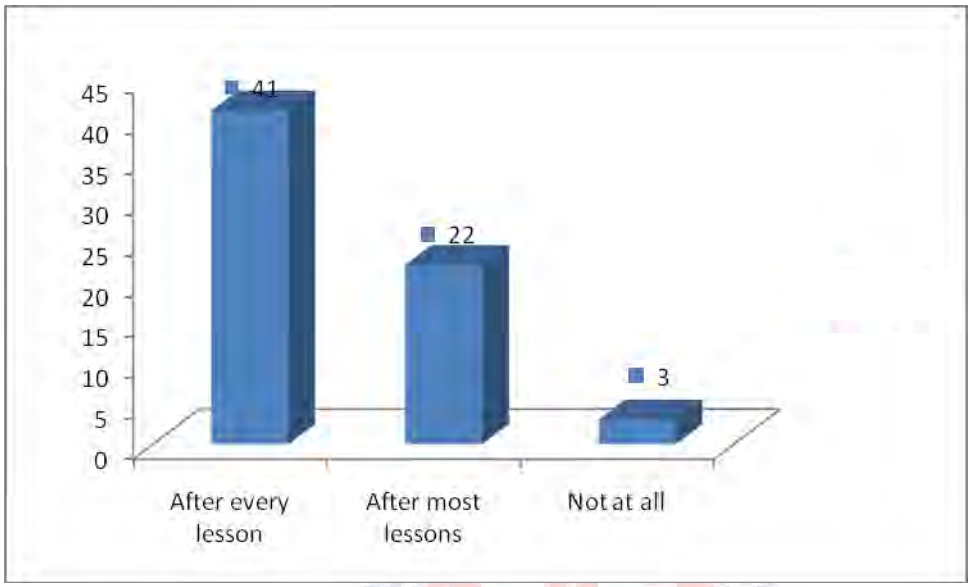

Figure 7: Test after practical lessons

Majority of the respondents (41) indicated that they conduct test after every practical lesson, 22 indicated that they also conduct test after most of their practical lessons and not every practical lesson and the remaining 3 do not conduct practical lessons at all.

Science is a practical oriented subject, therefore should be handled as such. No matter the amount of theory taught to students, without practical lessons, students would never have a better understanding of the subject and will not appreciate what is been taught. Given practical test to students is very important, practical assessment in science is very critical and need critical consideration. Since science is practical oriented subject, the paper and pen test is not sufficient. Testing students in science through paper and pen is like testing a footballer's skills through pen and paper. We may find out what some one knows about football, but we won't be able to know how well that person plays the game (Hein & Price, 1994)

4.3.7 End of term exams conducted by teachers

All the respondents agreed that they conducted end of term examinations to their students. End of term examinations are always conducted at the end of every term, as the name implies to test students' knowledge on all that they have learned within the term. These exams help the school authority to keep records of students' performance in every school. Apart from WASSCE results given to schools by West African Examination Council, records of end of term exams is the only document of students 'academic records that one can find in senior high schools. According to the Ministry of Education Science and Technology (2007), the end of term examination is a summative assessment system and should consist of a sample of the knowledge and skills students have acquired in the term. The end of term examination for term three should consist of items or questions based on the specific objectives studied over the three terms, using a different weighing system that can reflect the importance of the work done in each term in appropriate proportions. For example, a teacher may develop the end of third term examination in such a way that it would reflect 20% of the objectives studied in term one and term two and 60% of the objectives studied in term three.

4.3.8 Most preferred Assessment practice of Teachers

Respondents were asked to indicate the assessment practice they mostly preferred to evaluate their students' during teaching and learning. Table 1 indicates that 32% of the respondents preferred using formative assessment most, 24% of them also preferred using summative assessment most and the remaining 44% preferred integrated assessment most.

Table 4: Most used assessment practice

Assessment practices	Frequency	Percentage (%)
Formative assessment	21	32%
Summative assessment	16	24%
Integrated assessment	29	44%
Total	**66**	**100%**

This shows that majority of the respondents used integrated assessment practice more than the other types of assessment practices.

Formative assessment is described as an integral part of the teaching and learning process. It is used to provide the students with the feedback to enhance learning and to help the teacher understand students learning. It helps build a picture of students' progress, and informs decision about the next step in teaching and learning. (Bell & Cowie, 2000; Harlen, 2013). However, summative assessment is the assessment of student's performance at the end of the teaching process. For example the end of a chapter, unit, topic, and end of a particular programme of study.

Bell and Cowie (2000) also maintained that both formative and summative assessment influence learning. In other words, to improve learning outcomes, we need to consider not only the teaching and learning activities, but also the assessment tasks (Gipps & James, 1998).

The task and experiences used in integrated assessment are already familiar to students. They include the variety of activities found in most class rooms, such as unit projects, laboratory investigations, models, discussions and other forms of expressions.

Integrated assessment is on-going. Students have the opportunity to show what they can do in a variety of task over time. Both teachers and students are actively involved in integrated assessment. Reflection, self-assessment, observation and participation are at the heart of the process. Integrated assessment is holistic. Teachers use many different models to get a full picture of students' performance (F-Rubrics, 2013). These may be some of the reasons why majority of the teachers preferred to use integrated assessment.

4.4 Research question two: What are the Teacher related factors that influence their choice of Assessment Practices?

This section gave a detailed discussion on how the teacher related factors such as sex, age, professional and academic qualification, area of professional qualification of the teacher and teaching experience can influence their choices of the three different types of assessment practices, thus formative, summative and integrated assessment practices. The data was analysed by using the SPSS data analysis.

4.4.1 Sex of Teachers and Most preferred Assessment Practice

Table 4 shows sex of the respondents and most preferred assessment practice.

Table 4: Sex of respondents and most used assessment practice

Most preferred type of Assessment practice	Sex of Respondent	
	Male(n= 59)	Female(n=7)
Formative (n= 21)	18 (30.5%)	3(42.9%)
Summative(n=16)	15 (25.4%)	1(14.3%)
Integrated(n= 29)	26(44.1%)	3(42.9%)

The respondents were made up of 59 males and 7 females. Twenty one of both male and female respondent preferred formative assessment, 18 (30.5%) of them were male respondents who prefers formative assessment. While 3 (42.9%) of them were female respondents who also preferred formative assessment. Also, 16 of both female and male respondents preferred or mostly used summative assessment, out of this, 15 of the respondents representing 25.4% were males who prefers the summative assessment, while 1 of the respondents representing 14.3% was a female who prefers the summative assessment. As for integrated assessment, a total of 29 respondents (male and female) representing 43.9% of the total respondents preferred to use it. Out of this number, 26 of them representing 44.1% were males who prefer the integrated assessment; whiles 3 of them representing 42.9% were females who prefer integrated assessment practice. From the above analysis, one can conveniently conclude that female respondents mostly used formative assessment and integrated assessment as well, while male respondents mostly used summative assessment. The choice and use of a particular assessment practice from the researchers' observation may depend on individual preference and ease of use, or the convenience in using any of them. Sex of the respondents may not be a major factor to consider since the sample did not consider a proportional representation of males and females.

4.4.2 Age of Teachers and Most preferred Assessment Practice

Figure11 indicated how the age of a respondent can influence his /her type of assessment practice mostly preferred.

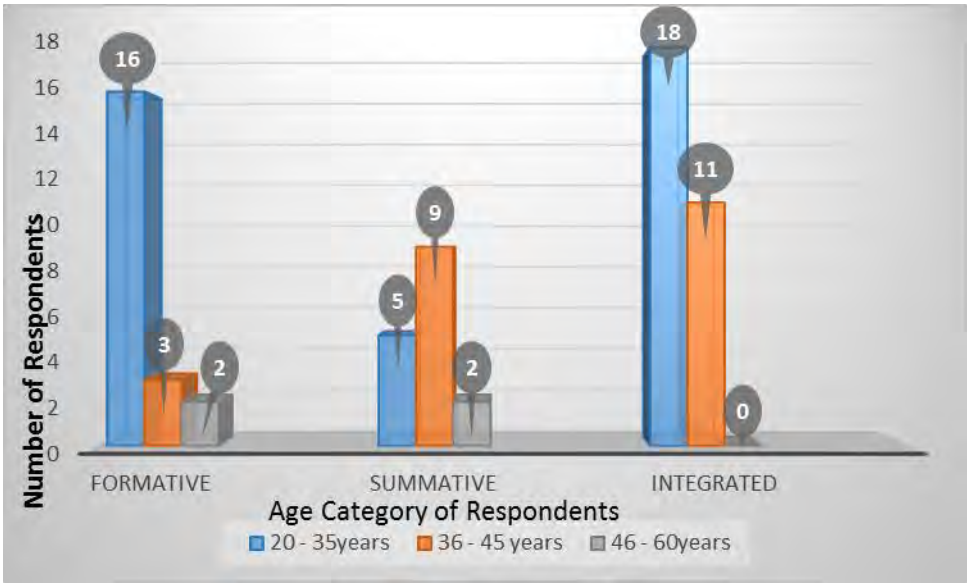

Figure 11: Age and most used assessment practice

From figure 11 respondents within the age range of 46-60 years mostly preferred formative assessment, followed by 20-35 years and 36-45 years. It also indicates that respondents within the age range of 46-60 years preferred summative assessment more, followed by 36-45 years and 20-35 years. Another observation was that respondents within the age group of 36-45 years mostly preferred integrated assessment. From the above details, one can make a conclusive statement that respondents within the age of 46-60 years preferred to use formative assessment and summative assessment. While respondents within the age group of 36-45 years preferred integrated assessment. The speculation here may be that respondents with the highest age group might have been in teaching for a very long time to enable them adopts the better methods of assessing their students, or it could be that they have found those assessment methods to be more convenient to them.

4.4.3 Most preferred Assessment Practice and Academic Qualification

Table 5 shows how academic qualification of respondents can influence their choice of assessment practice.

Table 5: Academic qualification and most used assessment practice

Assessment practice	Diploma	First degree	Second degree	Total
Formative	4 (36.4%)	16 (32.0%)	1 (20.0%)	21 (31.8%)
Summative	2 (18.2%)	12 (24.0%)	2 (40.0%)	16 (24.2%)
Integrated	5 (45.5%)	22 (44.0%)	2 (40.0%)	29 (43.9%)
Total	**11 (100.0%)**	**50 (100.0%)**	**5 (100.0%)**	**66 (100%)**

Numbers in brackets are within column percent %

From table 5 respondents who were diploma holders preferred formative assessment more than the others. It is also clear that respondents with their second degree preferred to uses summative assessment more than those with the other academic qualifications. One can conclude that respondents with diploma qualification used integrated assessment more than those with the other qualifications. Since the various respondents with different academic backgrounds preferred the three types of assessment practice to certain level in a way, one cannot say that their academic background has influence a particular type of assessment practice being used. Teachers with high academic background may adopt the best assessment practices for their students as compared with those of low academic background. And also those with diploma might have receive some kind of fresh training to inform their choice of formative assessment which calls for assessment of learning.

4.4.4 Level of Professional Qualification and most preferred Assessment Practice

Table 6 indicates the influence of respondent's professional qualification on their choice of assessment practices.

Table 6: Most used assessment practice and level of professional qualification

Assessment practice	Certificate in education	Diploma in education	First degree in education	Total
Formative	5 (29.4%)	4 (25.0%)	2 (15.4%)	11 (23.9%)
Summative	2 (11.8%)	6 (37.5%)	5 (38.5%)	13 (28.3%)
Integrated	10 (58.8%)	6 (37.5%)	6 (46.2%)	22 (47.8%)
Total	**17 (100%)**	**16 (100%)**	**13 (100%)**	**46 (100%)**

Numbers in parenthesis represent % calculated over column total

A total of 46 respondents were professional teachers, seventeen of them had certificate in education and 5 of them representing 29.4% preferred formative assessment. Sixteen of them also had diploma in education and 4 out of the 16 representing 25.0% preferred formative assessment, while 13 of them also had their first degree in education. Two out of the 13 representing 15.4% preferred formative assessment. The conclusion here is that, respondents with certificate in education preferred formative assessment more than the others. For summative assessment, about 11.8% of the respondents with certificate in education mostly used summative assessment as compared to 37.5% of respondents who had diploma in education and 38.5% who had first degree in education, which also preferred summative assessment. It can be seen that respondents with first degree in education used summative assessment more as compared to those with the other qualifications. It is also indicated that 58.8% of the respondents with certificate in education used integrated assessment more than 37.5% of the respondents with diploma in education and 46.2% with first degree in education. The conclusion here is that, respondents with certificate in education use integrated assessment more than respondents

with diploma and first degree. Since respondents of different level of professional qualification in one way or the other uses the various types of assessment practices, one cannot conclude that level of professional qualification had an influence in respondent's choice of assessment practice. It all depends on individual preferences and convenience of using any of them. But the assumption here could have been that teachers with high professional standards should have more appropriate methods of assessing students learning than those with low professional standards.

4.4.5 Teaching Experience and most preferred Assessment Practice

Table 7 shows the influence of the respondents teaching experience on the type of assessment practice mostly used.

Table 7: Most used assessment practice and teaching experience

Assessment practice	1-5years experience	6-10years experience	Above 10years experience	Total
Formative	15 (38.5%)	4 (16.0%)	2 (100%)	21 (31.8%)
Summative	5 (12.8%)	11 (44.0%)	0 (0%)	16 (24.2%)
Integrated	19 (48.7%)	10 (40.0%)	0 (0%)	29 (43.9%)
Total	**39 (100%)**	**25 (100%)**	**2 (100%)**	**66 (100%)**

Numbers in parenthesis represent % calculated over column total

It can be seen from the table that 15 of the respondents representing 38.5% who had 1-5years teaching experience used formative assessment most as compared to 4 of them represented by 16.0% with 6-10years teaching experience and 2 of them representing 100% with above 10years teaching experience who also used formative assessment. The conclusion drawn from here is that respondents with teaching experience above 10years used formative assessment more than the others. Also 12.8% of the respondents with 1-

5years teaching experience used summative assessment as compared to 44.0% of the respondents with 6-10years teaching experience who also used summative assessment. The conclusion drawn from here is that, respondents with 6-10years teaching experience used summative assessment more than the other group of respondents. Also 47.8% of the respondents with 1-5years teaching experience preferred integrated assessment most as compared with 40.0% of the respondents with 6-10 years teaching experience that also used integrated assessment. It can also be seen from the table that, the most experience teachers with above 10years teaching experience prefer formative assessment. This could be due to their experience and the benefits they mostly enjoy from using this particular type of assessment practice. The experience they have acquired in teaching has helped them to identify the best assessment method for effective teaching and learning.

4.5 Research question three: What are the implications of assessment practices on effective Teaching and Learning?

The rationale for Integrated Science teaching and learning is to promote general scientific literacy for every Ghanaian citizen. This may be the only way by which the country can create scientific culture towards achieving the country's strategic programme of scientific and technological literacy in the shortest possible time. Every citizen of the country needs training in science to be able to develop a scientific mind and scientific culture. It is the only way by which people of the country could deal objectively with phenomenon and other practical issues; preventing reliance on superstition for explaining the nature of things and help us to construct and build the present and the future on pragmatic scientific bases (GES, 2010). Therefore the various forms of assessment practice in science should provide an effective ways of directing learners towards the rationale for Integrated Science teaching and learning.

The purpose of assessment practice in Integrated Science is to influence and promote teaching and learning. Therefore any type of assessment that can contribute towards effective teaching and learning of Integrated Science is considered as a good assessment practice. Assessment practice can be used to judge individual student performance and achievement of learning goals. It provides students with feedback on how well they are meeting the expectations and teachers with feedback on how well students are learning. The teachers can use the feedback to revise their class room practices, and the students can use the feedback to monitor their own learning. Assessment should be able to provide feedback during the process of interaction (Tamir, 1998).

4.5.1 Academic qualification of a teacher in assessment

The findings from the study revealed that respondents who were diploma holders preferred formative assessment more than the others. While respondents with their second degree preferred to use summative assessment more than those with the other academic qualifications (see table 5). Teachers with high academic standards are likely to adopt the best assessment methods and practices such as the combination of formative and summative assessment for effective teaching and learning of Integrated Science. The academic level of these teachers may equip them with different skills and knowledge of assessing students.

4.5.2 Professional Qualification of a teacher in assessment

The professional qualification of a teacher can influence his preferred choice of assessment practice for effective teaching and learning. It is revealed from this study that respondents with certificate in education preferred formative and integrated assessment more than the others. It was also indicated that respondents with first degree in education used summative assessment more as compared to those with the other qualifications (see Table

6). The conclusion here may be that, the teachers whose level of professional qualification is certificate in education have stay long in the system and are more experienced. This might have informed their choice and use of formative and integrated assessment practices.

4.5.3 The years of teaching experience of a teacher in assessment

The experience of a teacher cannot be detached from the methods used in assessing his students. The study revealed that respondents with teaching experience above 10years used formative assessment more than the rest of the respondents in the other groups (see table 7). Highly experienced teachers who have been assessing students for a longer period of time can easily determine the weaknesses and strength of their methods of assessment, and are likely to adopt and use the best assessment methods for effective teaching and learning to take place.

4.5.4 Most used assessment practice for effective teaching and learning

This current study revealed that, the most preferred and used assessment practice was integrated assessment, and followed by formative assessment (see Fig. 8). Assessment practices such as formative assessment are considered as the best method for students learning. Formative assessment is described as an integral part of the teaching and learning process. It is used to provide the students with the feedback to enhance learning and to help the teacher understand students learning. It helps build a picture of students' progress, and informs decision about the next step in teaching and learning (Harlen, 2013; Bell & Cowie, 2000). Assessment should contribute to instruction and learning, assessment after instruction is over does not allow for the assessment to contribute to any instructional decisions. All that can be said is the degree to which a student mastered some

amount of content. Assessment must be a continuous process that facilitates 'on-line' instructional decision making in the class room (Gitomers & Duschl as cited in Bell & Cowie, 2000). Lindsay and Clarke (2001) also maintained that formative assessment builds an interactive class room atmosphere in which children are involved in creating and reflecting on their learning. Formative assessment which is also described as assessment for learning is able to collect evidence about students understanding with the motive of finding out what they know, what they don't know and what they partly know. This then provides a starting point for effective teaching and learning to take place, allowing for the learners knowledge and understanding to be moved on (Black & Harrison, 2004).

Another form of assessment also known as summative assessment is used to measure students learning at the end of a lesson taught in class, a chapter or unit, end of term and end of program. This type of assessment doesn't contribute to instructional process. Bell and Cowie (2000), maintained that both formative and summative assessment influence learning. In other words, to improve learning outcomes, we need to consider not only the teaching and learning activities, but also the assessment tasks (Gipps & James, 1998).

The two types of assessment are not in conflict with each other since they both promote teaching and learning in different ways. In order to have a complete and comprehensive method of assessing students for effective teaching and learning to take place we need a combination of both formative and summative assessment practices. The combination of these two types of assessment gave rise to another form of assessment called integrated assessment. Integrated assessment asks students the following: what can you do? How can you do it? It primary purpose is to give a broad picture of the students as a critical thinker, problem solver and learner. The task and experiences used in integrated assessment are already familiar to students. They include the variety of activities found in most class rooms, such as unit projects, laboratory investigations, models, discussions and other

forms of expressions. Integrated assessment is on-going. Students have the opportunity to show what they can do in a variety of task over time. Both teachers and students are actively involved in integrated assessment. Reflection, self-assessment, observation and participation are at the heart of the process. Integrated assessment is holistic (F-Rubrics, 2013).

CHAPTER FIVE

SUMMARY, CONCLUTION AND RECOMMENDATIONS

5.1 Overview

This chapter presents over view of research summary, major findings and conclusions drawn based on the findings with recommendations and suggested areas for further research.

The purpose of this research was to find out the type of assessment practices used by Integrated Science teachers and its implications on effective teaching and learning of Integrated Science in some selected districts in Northern Region of Ghana.

The research design was a descriptive survey with a sample size of 66 respondents drawn from ten Senior High Schools in four selected districts in the Northern Region of Ghana. The data was collected from the respondents through questionnaires. The data collected was analysed using electronic spread sheet (Microsoft excel software) and Statistical Package for Social Sciences (SPSS) version 17 and results presented in tables and graphs.

5.2 Major Findings

The researcher identified the most common ways in which integrated science carry out assessment practices in senior high schools. These were classified under three broad categories of assessment practices as captured in literature. The three broad categories included: Formative assessment, Summative assessment and integrated assessment. The following findings were revealed by the research in the various common ways in which students' learning is normally assessed at the SHS.

1. It was revealed that majority of teachers asked students questions most often in class during lessons and also more teachers conduct class exercise during lessons and after lessons most often.

2. The findings also revealed that more teachers give their students homework and assignments most often.
3. The research also revealed that only few teachers gives science project to their students all the time.
4. The findings also revealed that more integrated science teachers conduct test for their students during practical lessons.
5. It was also clear that every science teacher conducts end of term examination for his/her students.
6. It was also revealed that majority of the integrated science teachers mostly used integrated assessment.

The teacher related factors that can influence teachers' choice of assessment practices were also examined.

1 The findings shows that more female integrated science teacher's preferred formative assessment whiles their male counterparts also preferred integrated assessment practices.

2 It was also revealed that integrated science teachers who fall within the ages of 46-60years preferred formative assessment. While teachers who fall within the ages of 36-45years also preferred using integrated assessment.

3 The findings showed that integrated science teachers with diploma as academic qualification preferred formative assessment. While those with second degree also preferred using summative assessment practice.

4 The research also found out that integrated science teachers with professional certificate prefer using formative assessment, while those with first degree in education also preferred summative assessment.

5 However, teachers with more than 10 years teaching experience were found to be using formative assessment, and those with 6-10 years teaching experience also liked summative assessment. And also integrated science teachers with 1-5 years teaching experience preferred using integrated assessment.

5.3 Conclusion

In conclusion, it is shown from the studies that all the three types of assessment practices identified can promote effective teaching and learning, for better performance of students' in Integrated Science. Teachers who have over ten years of teaching experience preferred the use of formative assessment and the frequency and rate at which it is used may have more impact on effective teaching and learning. Therefore integrated science teachers are encourage to always assess their students most often so that performance can be improved through effective teaching and learning. However, the most preferred choice of assessment of the respondent was the integrated assessment method which involves the combination of formative and summative assessment practices. This is the most effective method for promoting effective teaching and learning of Integrated Science. Teachers are therefore encouraged to adopt the integrated assessment method and practices for effective teaching and learning of integrated science.

5.4 Recommendations

The following recommendation have been made

1. It is recommended that further studies should be done on this research problem by using data collection instruments such as interviews and class room observation to allow for further interrogation and clarity of issues from respondents and not rely on only questionnaires.

2. Integrated Science Teacher should endeavour to use different assessment practices in evaluating students' learning since the study found integrated assessment practice to be very effective in ensuring improvement in students' learning.
3. It is recommended that further research be conducted on students' attitude response in class towards the various types of assessment' and its effect on students' performance

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APPENDIX A

QUESTIONNAIRE FOR INTEGRATED SCIENCE TEACHERS

All responses will be treated confidentially

The purpose of this study is to find out the effects of integrated science teachers assessment practices on performance of SHS students

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 [ ]

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 [ ] or Basic Education [ ]

SECTION B: TEACHING AND ASSESSMENT

1 How many periods do you teach in a week? A. 5-10 [ ] B. 15-20 [ ] C. above 20 [ ]

2 Do you ask students questions in class during lessons: 1 yes [ ] 2 no [ ]

3a If 'yes' to question 2, how often do you ask the questions 1 all the time [ ], 2 most often [ ], 3 once a while [ ]

3b if no state your reasons.
…….

4 How will you rate the students response to the questions asks in class? 1. Best [ ] b. better [ ] c. good [ ] d. poor [ ]

5 Do you conduct class exercises/quizzes during lessons? 1 yes [ ] 2 no [ ]

6a If yes to the above, how often do you do it? 1 every lesson [ ] 2 some of the lessons [ ] 3 once a while [ ]

6b If no to the above state your reasons……..

7 How will you rate your students' performance in the exercises during lessons? 1 best [ ] 2 better [ ] 3 good [ ] 4 poor [ ]

8 Do you give class exercise/quizzes after lessons? 1 yes [ ] 2 no [ ]

8a If yes how frequent do you conduct the exercises: 1 every lesson [ ] 2 some of the lessons [ ] 3 once a while [ ]

8b How will you rate students' performance in the exercises given after lessons? 1 excellent [ ] 2 very good [ ] 3 good [ ] poor [ ]

9 If no give reasons…….

10 Do you mark exercises given to students: 1 yes [ ] 2 no [ ]

11a If yes how frequent do you mark: 1 all the time [ ] 2 more often [ ] 3 some of the time [ ]

11b If no give reasons……

12 Do you give assignments/home work to students? 1 yes [ ] 2 no [ ]

12a how frequent do you give the assignments/homework to students: 1 all the time [ ] 2 more often [ ] 3 less often [ ]

13a If yes to the above, how will you rate the students' performance in that? 1 best [ ] 2 better [ ] 3 good [ ] 4 poor [ ]

13b If no to the above, state your reasons……

14 Do you give science projects to your students? 1 yes [ ] 2 no [ ]

14a how often do you give science project to students? 1 all the time [ ] 2 more often [ ] 3 less often [ ]

15a If yes to '14', how will you rate the students' performance in the project? 1 best [ ] 2 better [ ] 3 good [ ] 4 poor [ ]

15b If no, state your reasons……

16 Do you conduct end of term exams for your students? 1 yes [ ] 2 no [ ]

16a 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 [ ]

16b Base on your response to 16a, what is the average mark scored by your students……

17 If no state your reasons……

18 Do you conduct assessment during practical lessons for your students?1 yes [ ] 2 no[ ]

18a How frequent do you conduct the test during practical lessons: 1 all the time [ ] 2 most often [ ] 3 less often [ ]

19a If yes '18' how will you rate your students' performance in practical lessons? 1 best [ ] 2 better [ ] 3 good [ ] 4 poor [ ]

19b If no state your reasons……

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

21 Give reasons for your choice above……

APPENDIX B

Reliability Coefficient for Instrument

Reliability for Teachers Questionnaire

		N	%
Cases	valid	22	55.0
	Excluded	18	45.0
	Total	**40**	**100.0**

Reliability Statistics

Cronbach's alpha	No. of items
.822	**33**