

UNIVERSITY OF CAPE COAST

AN INVESTIGATION OF MONITORING OF THE TEACHING OF
SCIENCE IN BASIC SCHOOLS: A CASE STUDY OF THE
AKUAPEM NORTH DISTRICT

JACOB WILLIE MOLENAAR

2009

UNIVERSITY OF CAPE COAST

AN INVESTIGATION OF MONITORING OF THE TEACHING OF
SCIENCE IN PRIMARY SCHOOLS: A STUDY OF THE
AKUAPEM NORTH DISTRICT

BY

JACOB WILLIE MOLENAAR

Dissertation submitted to the Institute of Education, of the
Faculty of Education, University of Cape Coast in partial fulfillment
of the requirements for the award of Master of Education
Degree in Educational Management

JULY, 2009

DECLARATION

Student's Declaration

I hereby declare that this dissertation is the result of my original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature..... Date

Name: Jacob Willie Molenaar

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines and supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature:..... Date.....

Name: Prof. Joseph Ghartey Ampiah

ABSTRACT

The study investigated the extent of monitoring of teaching and learning of science lessons in some selected public primary schools in the Akuapem North District of the Eastern Region of Ghana. It ascertained the level of support given to teachers by headteachers and circuit supervisors who do the monitoring at the basic level with regards to science teaching and also to ascertain whether teachers' at the basic level are better prepared to teach science more effectively due to the support system from monitoring. The sample for the study comprised 76 Teachers, 20 Headteachers and 9 Circuit Supervisors. The main instrument used for the study was the questionnaire and was supplemented with an interview guide.

The major findings of the research were that majority of teachers (86.2%) and headteachers (75%) were Certificate "A" holders hence, the underlying factor to improve their competencies. Circuit Supervisors were mostly diploma or degree holders but did not specialize in science. The study identified lack of in-depth knowledge in science, the non use of activity method of teaching and child centered approach to teaching as a major hindrance in the effective teaching and monitoring of science lessons. The study also revealed that the areas the monitors mainly consider in terms of monitoring were lesson notes preparation and lesson presentation. The study recommends that periodic monitoring of science teaching and learning at the primary level should be done by competent officials to ensure that teachers are given the needed support.

ACKNOWLEDGEMENTS

My profound gratitude goes to Professor J. Ghartey Ampiah of the Science and Mathematics Education Department, University of Cape Coast who took time off his numerous schedules, read through the script, and offered useful suggestions and corrections where appropriate to bring it to an acceptable standard. I am grateful to all my respondents who provided me with the necessary information needed for the study. I also appreciate the support of Mrs Sabina Obeng of Ghana Education Service Council Secretariat which I found tremendously helpful in the completion of this work.

I wish to thank the District Director, Circuit Supervisors, Headteachers and Teachers of the Akuapem North District, for their candid assessment and opinion about the monitoring of science teaching which enabled me to complete this study. To the Director, Teacher Education Division of the Ghana Education Service and all my colleagues at the Division, I wish to express my profound gratitude to you all, for your unflinching support and encouragement, especially, in providing me with the necessary documents relating to the study I wish to say that the services of all these people are very much appreciated and we therefore have to share in the joy for the completion of this study.

Finally, I must appreciate that the completion of this work was due to motivation and encouragement of my wife Mrs. Rosa Molenaar and children who are now looking forward to the fruits of my labour.

DEDICATION

I dedicate this study to my wife; Mrs. Rosa Molenaar and children; Nana Banyin Molenaar, Mame Ahimah Molenaar, Ama Molenaar, and Ato Molenaar.

TABLE OF CONTENTS

Content	Page
DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
DEDICATION	v
LIST OF TABLES	x
LIST OF FIGURES	xii
CHAPTER	
ONE	
INTRODUCTION	1
Background to the Study	1
Statement of the Problem	6
Purpose of the Study	7
Objectives	8
Research Questions	8
Significance of the Study	9
Delimitation of the Study	10
Limitation	10
Organization of the Chapters	11
TWO	
REVIEW OF THE LITERATURE	12
Nature of Science	14

TWO		Page
	Monitoring -A Historical Perspective	16
	Trends of Monitoring in Schools	18
	Effective Methods of Teaching	24
	Effective Method for Teaching Science- Importance of Practicals in Teaching and Learning of Science.	27
THREE	RESEARCH METHODOLOGY	32
	Research Design	32
	Population	33
	Sample and Sampling Technique	34
	The Research Instrument	34
	Data Collection Procedure	37
	Analysis of Data	38
FOUR	RESULTS AND DISCUSSIONS	39
	Calibre of Headteachers and Circuit Supervisors and Teachers at the Basic Schools Level,	39
	Qualification of Headteachers and Circuit Supervisors	43
	Area of Specialization of Headteachers and Circuit Supervisors	44

Type of Monitoring and Supervision done by Headteachers and Circuit Supervisors.	47
Areas of Priority in Monitoring by Headteachers and Circuit Supervisors	48
Frequency of Supervision by Headteachers and Circuit Supervisors	49
Extent of Priority in Monitoring by Headteachers and Circuit Supervisors	50
How Challenges were Addressed by Teachers	54
Challenges Addressed by Headteachers and Circuit Supervisors	56
How Headteachers and Circuit Supervisors Addressed Challenges Facing Teachers	58
Monitoring of Instructional Delivery	59
Competency of Headteachers and Circuit Supervisors in Monitoring	60
Constraints to Effective Monitoring of Teachers in Science Teaching.	62
Other Constraints to Effective Supervision and Monitoring Activities	64

FIVE	SUMMARY, CONCLUSIONS AND	
	RECOMMENDATIONS	66
	Summary	66
	Summary of Key Findings	68
	Conclusions	70
	Recommendations	71
	Suggestions For Further Studies	72
REFERENCES		73
APPENDICES		82
A	Questionnaire For Circuit Supervisors	82
B	Questionnaire For Headteachers	88
C	Questionnaire For Teachers	95
D	Interview Guide for Headteachers and Circuit	
	Supervisors	100

LIST OF TABLES

Table		Page
1	Pre and Post Assessment of Lesson Presentation in Science for Upper Primary Schools Teachers	23
2	Teaching Experience of Headteachers	40
3	Teaching Experience of Circuit Supervisors	41
4	Number of Years as Headteacher and Circuit Supervisor	42
5	Teaching Experience of Teachers	42
6	Qualification of Headteachers and Circuit Supervisors	43
7	Highest Qualification of Teachers	44
8	Area of specialisation of Headteachers and Circuit Supervisors	45
9	Area of specialisation of teachers	46
10	Teachers' Views on Areas Considered for Monitoring	47
11	Areas of Priority in Monitoring by Headteachers and Circuit Supervisors	49
12	Frequency of Supervision by Headteachers and Circuit Supervisors	50
13	Teachers' Views of Challenges Faced in Science Teaching	51

Table		Page
14	Challenges Identified by Headteachers and Circuit Supervisors in Science Teaching	53
15	Challenges Addressed by Teachers	55
16	Responses of Teachers to Challenges Addressed by Headteachers and Circuit Supervisor	56
17	Challenges Addressed by Headteachers and Circuit Supervisor	57
18	Forum for Addressing Challenges	58
19	Classroom Visits for Lesson Observation by Headteachers and Circuit Supervisors	59
20	Number of Teachers in School	63
21	Number of teachers in the circuit	64

LIST OF FIGURES

Fig.		Page
1	Pre- and Post-Lesson Notes Assessment Gain Scores of Upper Primary Teachers in Science	22
2	Pre- and Post-Lesson Presentation Assessment Gain Scores of Upper Primary Teachers in Science	24

CHAPTER ONE

INTRODUCTION

Background to the Study

It has been recognized globally that the development and application of science and technology are vital to a country's overall economic development strategy and policy as it is aimed at improving the living conditions of its people. Isenberg and Altizer-Tuning (1984) assert that in order to be prepared for potential success in the world today and in the future, knowledge of science and mathematics is important. A crucial indicator for the development of education is the system of quality of education. According to a study by the Ghana Statistical Service, more than 80% of the rural poor and about 50% of the urban poor were dissatisfied with the quality of education (Ghana Statistical Service, 1997).

The Education Reform Review Committee of the Ministry of Education and Sports (2004) in its report to the Government of Ghana among other things emphasized the importance of the teacher and remarked that, "...the quality of human capital of any nation depends upon the quality of education it offers, and the quality of education given is also determined by the quality of teachers who teach in the schools" (Ministry of Education 2004, p. 7). There has been

public outcry in recent times over the declining nature of teaching and learning in our basic schools especially the public sector. Ministry of Education (MOE) assessment of basic schools indicates that increased funding has not automatically led to improved achievement of pupils (GES, April 2000). It is therefore not surprising that improving the quality of teaching and learning is one of the key areas being addressed by the Free Compulsory and Universal Basic Education (FCUBE) programme. Teacher education policies in recent times have been designed within the framework of the FCUBE programme with the aim of equipping teacher trainees with the skills needed to effect positive changes in the school system (GES, April 2000). A key issue that needs to be addressed whilst equipping the trainees with the necessary competencies is the issue of relating teaching experiences to the real world. There is the need to understand and relate science to daily life experiences and thus help children to see it not as far fetched and abstract. The basic school science syllabus therefore specifies activity-oriented lessons emphasizing on student/pupil- centered lessons which concentrate on the acquisition of science process skills of predicting, investigating, classifying, observing, measuring, recording and interpreting data.

Educators have responsibilities for not only setting educational goals and objectives but also for instructing, monitoring and assessing in ways that help them to attain these. Currently, the Ghana Education Service produces teachers who do not specialize in any subject area. But science teaching and

learning requires a skill, which needs a dedicated, competent and specialized person to handle. More so the content of the basic science syllabus requires someone who has studied science as an elective subject to teach effectively.

One of the questions that have been asked of the 1986 education reforms in Ghana is the impact it has made on pupils learning. Test results, it can be argued, constitutes the primary benchmark for evaluating educational quality, and therefore pupils' performance in specially designed test could be used as the yard stick for measuring the impact of education reform. The evidence so far in science indicates that the achievement of pupils' has been far from satisfactory. Research conducted by the GES-JICA Science Technology and Mathematics Project in June, 2000 at Akuapem North District, Adansi West and Tamale Metropolis (basic 4,5,6 and; JSS 1) revealed that the level of attainment in science is very low. Trends in Mathematics and Science Study (TIMSS) in a series of studies undertaken once every four years by the International Association for the Evaluation of Educational Achievement (IEA) also contended that the overall performance of the Ghanaian student in science test was very low. According to the study, Ghana placed last (46th position) according to the ranking. For example, Ghana had no student reaching the Advanced International Benchmark and the High International Benchmark, only 3 percent reaching the Intermediate International Benchmark and 13 percent reaching the Low International Benchmark (Anamuah-Mensah, Asabere-Ameyaw, Mereku, 2003).

According to World Bank report as quoted in Education International (1999), there are no statistics showing the number of teachers who have received relevant in-service training during recent years. A Situation Report to reflect the thinking on the Management and Implementation of Teacher Education programmes (Awuku,1981) outlines weaknesses in teacher education which calls for effective monitoring system as: (a) insufficient training in teaching methodologies and practical teaching, but an over-emphasis on academic content is what is taught and tested in teacher training colleges (b) insufficient exposure of teacher trainees to schools and classroom management practices (c) inadequate differentiation in training colleges between primary school teaching, where teachers must teach all subjects in the curriculum, and junior secondary school teaching where subject teaching of up to about 3 subjects is the norm and (d) poor preparation of teachers in handling the new directions contained in the curricular that are being designed as part of the current educational reforms.

Supervision and monitoring play a key role in improving the quality of education. This is because improving the quality of education is not simply a question of injecting resources into the system. Management of these resources at the school level is very crucial. According to a paper presented by Inspectorate Division of Ghana Education Service, the Head, the Parent Teacher Association (P.T.A) and the School Management Committee (SMC) are the main structures responsible for the governance of the school. When it

comes to classroom delivery, headteachers and circuit supervisors are held responsible. The Annual Education Sector Operational Plan (AESOP), indicates that to improve the quality of teaching and learning for enhanced pupil/student achievement, effective day-to-day monitoring, supervision and accountability of the system by strengthening inspection and supervision is necessary (Ministry of Education, 2003).

The country is yet to have a well-structured system of INSET where teachers can update their knowledge from time to time. At the moment the only structure in place to encourage teachers to give their maximum output is the monitoring system instituted by the Ghana Education Service. Instructional monitoring at the basic school is done mainly by the headteachers and personnel from the district office, most especially, circuit supervisors. In the Akuapem North District for instance, there are 117 primary schools demarcated into 9 circuits. It is therefore evident that every circuit supervisor is averagely responsible for about 13 schools. Among the role of monitors as contained in, Circuit Supervisors' Handbook, Ghana Education Service (2002) are the following:

- 1 Assist the headteacher to apply basic management techniques to the running of the school.
- 2 Assess the teachers performance and provide the necessary support;
- 3 Monitor pupils' performance.

Circuit supervisors are supposed to visit a school at least three times in a term; at the beginning of the term when schools reopen, in the middle of the term and getting to the end of the term. The first and third visits are mainly for collection of data while the second is to check on school effectiveness.

The headteachers' handbook also outlines the role of the headteacher as providing support to the classroom teacher. Areas that are covered during instructional monitoring in science include lesson planning, lesson presentation, knowledge of subject matter, evaluation of learners ability, punctuality and attendance, relationships and participation in co-curricular activities, communication skills and personal traits (Headteachers' Handbook, 2002).

Statement of the Problem

In 1996, the Government of Ghana passed a legislation putting in place the Free Compulsory Universal Basic Education (*f*CUBE) Policy that aimed to increase access, improve quality of teaching and learning and educational management. Ultimately, The MOE and GES identified good management and administration and monitoring as critical for effective teaching and learning in schools. The need for capacity building for teachers was identified and INSET was seen as key to achieving the goals of the *f*CUBE.

In 2000, the STM Project put in place mechanisms to enhance the capacity of basic school teachers through center-based INSET and school-based INSET and cluster-based INSET. The emphasis was on mathematics and

science teaching. Headteachers and circuit supervisors were also given the needed training in order to monitor science teaching and learning. However, quite often captivating ideas are stated for interventions like the GES-JICA STM Project but more often than not they do not stand the test of time because translating such good ideas into realities sometimes become a problem (Tamakloe, 1997). There is the need for this study to find out how monitoring of teaching of science by headteachers and circuit supervisors is being conducted will give an in-depth knowledge of how the good practices acquired during the STM programme was being utilised and sustained.

Purpose of the Study

Monitoring provides a key to checking the process of an on-going activity against its plan and answering the questions of how the activity was carried out in relation to the desired output. The purpose of this study was to ascertain:

- the level of teacher preparation to teach science;
- the caliber of personnel monitoring instructional delivery;
- the type and extent of monitoring on-going in basic public schools in the Akuapem North District;
- the level of support in terms of instructional delivery to teachers with regard to science teaching and learning and
- constraints to effective monitoring of science teaching.

Akuapem North District is one district that has received many interventions including Science Technology and Mathematics Project (STM) which was aimed primarily to improve the capacity of Basic School Teachers in science and mathematics. The project did not only organize INSET for teacher in science and mathematics but also strengthened the capacity of headteachers and circuit supervisors to monitor science teaching and learning.

Objectives

The study took into consideration the following objectives.

- (i) To identify the calibre of the people who do monitoring of instructional delivery at the primary school level
- (ii) To find out the kind of monitoring done at the primary school level
- (iii) To find out the kind of support teachers receive from monitors, especially headteachers' and circuit supervisors with regards to teaching and learning.
- (iv) To identify whether teachers' at the primary school level are better prepared to teach science more effectively due to the support given them through monitoring.

Research Questions

The key research questions around which the survey report was organized were as stated.

1. What is the calibre of headteachers and circuit supervisors who monitor and support teachers in the Akuapem District?

2. What kind of monitoring do headteachers and circuit supervisors undertake at the primary school level in science?
3. To what extent are headteachers and circuit supervisors able to offer the necessary support to their teachers in terms of science lesson planning and delivery during monitoring?
4. What are the constraints to the effective monitoring of science teaching?

Significance of the Study

Improvement of pupils' performance in science to a large extent depends on how the subject is taught. Science teaching demands a lot of preparation and it is time consuming as well. Effective teaching of science also depends on effective supervision and the support system given to teachers. This study is significant in its objective to ascertain the caliber of head teachers and circuit supervisors in monitoring science teaching. It has provided empirical evidence of the effectiveness of the support system given to the teachers to improve on their work. The findings of this study will help GES make informed decisions to improve the monitoring and supervision system in basic schools.

The findings have also provide evidence to inform teachers, headteachers, circuit supervisors, district education directorates, the GES and all other education partners about the kind of support system needed by teachers and to encourage them to develop more effective strategies to enhance its

implementation for improve lesson delivery. Finally the findings of the study add to the limited literature on monitoring of science teaching in Ghana.

Delimitations

The study was delimited to Akuapem North District of Ghana. The choice of the district stems from the fact that the capacity of teachers have been built in the teaching of science. Headteachers and circuit supervisors received training in monitoring of science teaching and learning as well as providing professional support to teachers during the Science Technology and Mathematics (STM) Project period. Hence, the district with its unique characteristics as compared to the other districts in the Eastern Region.

The scope of the study was confined to Primary school headteachers, circuit supervisors and classroom teachers. This was because the focus of the Science Technology and Mathematics Project for improving the teaching and learning of science was at that level. Lastly, the scope of the study was delimited to monitoring and supervision. The researcher believes that instructional supervision is the foundation on which instructional improvement is built.

Limitation

The study relied mainly on the perceptions of the respondents. Thus, the results were limited by the accuracy and honesty of the responses. The study would have been more representative if at least a district in each region was captured but for the problem of limited resources such as material,

financial, as well as time constraints. This fact notwithstanding, the schools selected cut across and included those which exhibited good, average and low performance based on the grading of schools according to performance in Basic Education Certificate Examination (BECE), Basic Education Comprehensive Assessment System (BECAS) and School Education Assessment (SEA) by the district. This would in a way make the findings credible and also to be generalised

Organization of the Chapters.

This work consists of five chapters. The first chapter consists of the background information of the study, statement of the problem, purpose of study and research questions. It also includes the significance of study, delimitations, limitation and operational definitions as well as the organization of work. Chapter Two contains a review of available literature relevant to the study. The methodology used in the study is tackled in Chapter Three. Chapter Four focuses on the presentation and analysis of data collected. Chapter Five deals with the discussion and interpretation of findings, implications of the findings, recommendations, limitations and delimitation of the study as well as suggested topics for future research.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The activities of increasing technological development call for a greater command of science at the basic level. Yet evidence from numerous studies by Science Technology and Mathematics (STM) Project; baseline survey conducted in 2000, midterm review; 2002 and final survey; 2005 show that majority of pupils are not being equipped with the necessary knowledge for the application of science in the society in which they live. Similarly, International comparison of science achievement by the International Association for the Evaluation of Educational Achievement as done in Trends in Mathematics and Science Study (TIMSS) indicate Ghanaian students ranking in the lowest distribution among their counterparts in developing countries (Anamuah-Mensah, Asabere-Ameyaw, Mereku, 2003). The pivotal role of quality in bringing science teaching and learning into balance has proved elusive and beyond researchers present ability to measure. One of the packages to change and improve the teaching and learning of science in the Akuapem North District is the strengthening of the capacity of teachers and circuit supervisors through in-service training by Science, Technology and Mathematics Project (STM).

As the problems that hinder the provision of quality education persist, despite increased funding in support of educational initiatives (Ministry of Education, April 1996), it becomes more compelling to mount an in-depth examination and exploration of the major issues and critical dimensions of the problems for information that will illuminate the understanding of stakeholders particularly decision makers at the national, regional and local levels. Critical to this search is the availability of reliable and valid information emerging from research literature. Information from this source will not only illuminate stakeholders' understanding of factors that contribute to improving the quality of teaching science in schools, but will inform decisions that will engender solutions capable of moving Ghana's educational system forward. The high level of avoidance of work among teachers may be explained by McGregor's theory of 'X' which stipulates that the average human being would avoid work if he can. Therefore teachers apparently take advantage to avoid working when supervision is relaxed and the school environment is unattractive (Herzberg, 1996). This chapter presents a review of literature related to the topic under study and is classified under the following headings:

- (i) Nature of science
- (ii) Monitoring - a historical perspective
- (iii) Trends of monitoring and supervision in schools
- (iv) Effective method for teaching science at the basic schools.

Nature of Science

Science has two structures-the conceptual structure and the methodological structure. The conceptual structure is also known as the product of science and consists of the ideas, facts, theories, hypothesis etc which scientists generate as they work (Gega, 1990). The methodological structure of science which is also known as the process of science is the method scientists use to collect data. This method comprises experimentation, classification, observation, reporting, communication, plotting etc. Irrespective of the level at which science teaching and learning occurs ,it should reflect the procedures scientists adopt in order to make discoveries Apart from using approved approaches in their work ,scientists are also required to adopt certain dispositions in their work. These dispositions according Eminah (2004) are known collectively as the scientific attitude and include the following attributes:

- (i) open-mindedness
- (ii) being critical in thought and observations
- (iii) respect for other viewpoints
- (iv) curiosity
- (v) objective
- (vi) freedom from superstition
- (vii) belief in cause and effect relationship
- (viii) honesty
- (ix) use of systematic problem solving procedures

- (x) willingness to change one's views in the face of new evidence
- (xi) suspended judgment
- (xii) belief that all scientific knowledge is tentative
- (xiii) utilization of different instead of fixed problem-solving techniques
- (xiv) selection and use of recent and accurate material related to problems
- (xv) seeking facts and avoiding exaggerations

Scientists who possess the above dispositions are expected to attack problems, even in unfamiliar areas, in the same way.

According to Herbert (1970), scientists use extensive experimentation and observation as the basis for the development of conceptual structures. These conceptual structures evolve out of the regularity they find in the phenomena explored during the experiment. The value of these structures is the degree to which they lead to successful predictions about the further behavior of nature. These predictions are the basis of further observations and experimentations and so the whole process is a self-renewing, never-ending one which continuously builds new concepts and structures through experimentation.

However, Manson (1990), sees science as a process of dynamic interaction of rational inquiry and creative play. According to him, scientist probe, poke, handle, observe, question, think up theories, test ideas, jump to conclusion, make mistakes, revise, synthesize, communicate, disagree and discover. The primary science syllabus is geared basically towards the

development and acquisition of process skills, scientific attitudes and concepts for further use both in and out of school.

Monitoring - A Historical Perspective

During the twentieth century a number of educational rules were passed to promote the quality of education in the then Gold Coast. The most important one occurred under Governor Sir Frederick Gordon Guggisberg (1919-1927). His sixth principle indicated that the staff of teachers must be of the highest possible quality. To ensure that teachers were of the highest possible quality, a register was opened for only qualified teachers. Many inferior teachers were driven out of the profession (McWilliam & Kwamena-Poh, 1975).

Control and management of education during the post independence era could be classified as one of dual control. Both the churches and state exercised control over education. The state made policies affecting education. The churches, private individuals who owned schools and government schools implemented these policies. Churches (formerly Missions) appointed the heads of their institutions.

According to Adesina (1990) management is the organizational and mobilization of all human and material resources in a particular system for the achievement of identified objectives in the system. The classic definition of management, however is still held to be that of Henri Fayol (1983). He defined management thus: “to manage is to forecast and plan, to organize, to command, to coordinate and control”

It should be noted that educational management or educational administration, is an applied field of study and practice. In other word, educational management refers to the application of management theory and practice to educational institutions. In a description or functional definition of administration with regards to monitoring, (i.e. describing what administrators really do) Gulick and Urwick (cited in Cambell, Bridges, & Nystrand, 1977) came up with the coined word (acronym) POSDCORB which stands for Planning, Organising, Staffing, Directing, Coordinating, Reporting and Budgeting. In this sense, educational management may be associated with the Ministry of Education and the Ghana Education Service (GES) at the top level whose main functions are goal setting and policy making. Under the Ministry of Education or GES is the institutional head such as the principal, headmaster, or headteacher who may be associated with educational administration. He/she monitors and evaluates the teacher's performance as well as providing opportunities for their professional growth. As a headteacher, one has to make sure that the teachers with the requisite qualification are secured for the school with all the needed materials they have to work with to ensure their job satisfaction. Equally important of the heads task is to encourage the staff to attend courses and in-service training to always improve upon their professional skills and competencies.

One other role the teacher performs is that of supervision. The supervision work of the teacher embraces the academic performance of the

pupils. The teacher needs to keep an eye on pupils who are under performing and who need guidance and counseling in order to improve on their academic performance. In school and at class level, teachers must be able to exercise efficient management over their pupils, the resources at their disposal and the various programmes of learning that are given on in each subject to ensure that learning proceeds efficiently (Farrant, 1997).

Trends of Monitoring in Schools

Okumbe (1999) asserts that monitoring concentrated on such matters as appraising the general achievement of pupils in subject matter, evaluating methods used by teachers, observing the general management of schools and conduct of pupils and ascertaining whether money spent on education was wisely expended. Academic supervision, often associated with instructional leadership, is a multitude of task (Wiles & Bondi, 1991; McComas, 1993; Converse & Contant, 1993; Humphrey & Stokes, 2000; Oliva & Pawlas, 2001). According to them supervisory task important for science teaching include the following:

- i. teaching learning policy formulation
- ii. recruitment of qualified teachers
- iii. introduction and management of curricular reforms or instructional interventions
- iv. class observation and post observation conference with the teacher

- v. teacher development-arrangement, coordination or conduct of mentoring, in-service programmes, and follow-through of training.
- vi. teacher assessment- rating of teachers performance for different purposes
- vii. student assessment-coordination of construction and administration of test and other measures of student performance; monitoring of attainment of student achievement targets
- viii. resource generation and support for teaching and learning.

In the Philippine public schools, class observations are severely lacking compared to those in well-established private institutions of learning. Public schools either lack staff to do supervisory work or supervising staff have overlapping duties and responsibilities. Another reason is inadequate transportation fund given to supervisors doing supervisory rounds. One major constraint is the lack of trained and qualified supervisors. Asiedu-Akrofi (1978) contends that, “A supervisor’s work is to stimulate teachers and children’s enthusiasm for the improvement of their work” (p. 82) To be able to perform these roles, the supervisor must possess a wide repertoire of knowledge and skills because what is universally true throughout the school system is that, much is expected of all supervisors.

School monitoring involves tracking to find out whether teachers, heads and circuit supervisors, are performing their scheduled activities. Teachers are accountable to Heads, Heads to Circuit Supervisors and Circuit Supervisors to the Assistant Director –Supervision at the district level (Ministry of Education and Sports, 2004).

In Ghana There are two major types of supervision – external and internal supervision. This is in line with Neagley and Evans (1970) concept of supervision. The internal supervision refers to supervision in the various institutions by the institutional heads while the external supervision deals with supervision from the local, district or national office. According to Musaazi (1985), internal supervision is a situation where the head ensures that there is improvement in academic achievement and the instructional process is made more effective. Musaazi also talks about three types of supervision namely, full supervision, where all aspects of organization and instructional work are carefully examined. Routine supervision also involves discussion with teachers on specific issues. He talks of casual or check-up visits which are usually informal. Here, the supervisor forms an opinion on what he sees. This however is noted for future action (pp.227-228).

Reavis (1978) talks about monitoring and supervision in terms of clinical supervision. His opinion is that practitioners of clinical supervision assume that teachers have and possess the drive and personal resources to solve their own problem. According to him clinical supervision is a five step

process that aims at helping the teachers to identify and clarify problems, receive data from the supervisor, and develop solutions with the aid of the supervisor. Traditional supervision all too often cast the supervisor in the role of the superior telling the teacher what needs to be changed and how to change it. Clinical supervision tends to produce an other-directed teacher.

In science, class observations, need to be focused on the development of concepts, skills and attitude/values in children and how well the teacher brings about this. For instance what percent of class time is devoted to instruction? Horsley and Pratt (1993) recommend that 75% to 85% of science class time spent for instruction

Classroom assessment of impact monitoring by the STM Project (2004) indicated that in all the areas assessed in science before STM In-Service Education and Training (INSET), scores ranged from 1.9 to 2.2 below the mean score of 3.0. Teaching and Learning materials (TLMs) had the lowest score of 1.9. After the STM INSET intervention, all the areas were again assessed. Teachers' mean scores ranged from 2.8 to 3.2, three of which were above 3.0. The three areas were objectives, TLM and development. There were improvements in all the seven areas assessed. This is illustrated in Figure 1. The greatest improvement recorded was in TLM followed by evaluation. Improvement of the school system is a never –ending process(Humphrey & Stokes, 2000). Political will of the supervisors concerned at different levels is needed for a continuous process improvement (Chang, 1995) of teaching and

learning. Sustained systematic effort to plan, implement and focus all inputs and interventions towards student achievement gain and other goals is essential.

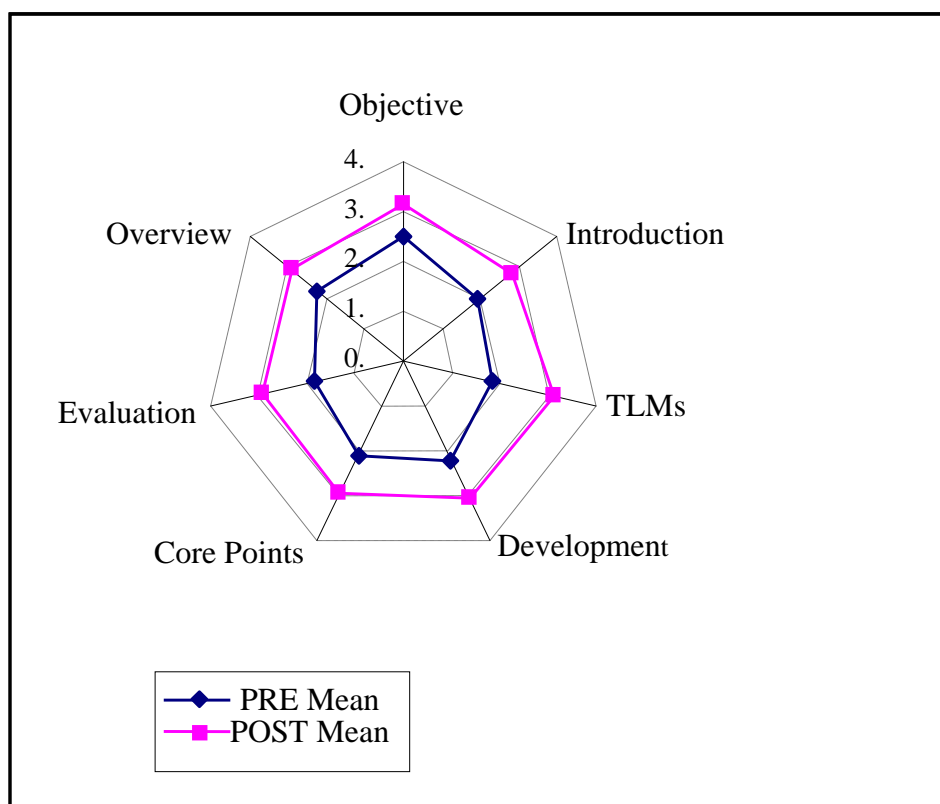


Figure 1: Pre and Post lesson notes assessment gain scores of upper primary teachers in Science

Source: GES-JICA STM Project, Final Evaluation, 2005.

Lesson presentations in science by teachers in the upper primary schools were assessed in the following five areas: method of teaching, teacher's knowledge of subject matter, personal and professional attributes, learner's activities, and subject specific matters. The results are shown in Table

1 and illustrated in Figures 2 for science. It can be seen from Table 1 and Figures 2 that there were improvements in all the areas assessed in science. The method of teaching and subject specific matters were two areas teachers had the greatest improvements.

Table 1

Pre and Post-Assessment of Lesson Presentation in Science for Upper Primary School Teachers

Areas	Pre-Assessment	Post-Assessment
Method of teaching	2.3	3.0
Teacher's knowledge of subject matter	2.6	3.0
Personal and professional attributes	3.0	3.3
Learners' activities	2.3	2.9
Subject specific matters	2.0	2.9

Maximum score = 5.0; mean score = 3.0

Source: GES-JICA STM Project Final Evaluation Document, 2005.

Subject specific matters consisted of evaluation work, proper use of materials, discussions and clear instruction. The area of assessment which recorded the least improvement was personal and professional attributes which had to do with verbal facility, teachers' confidence and relationship to the learners among others.

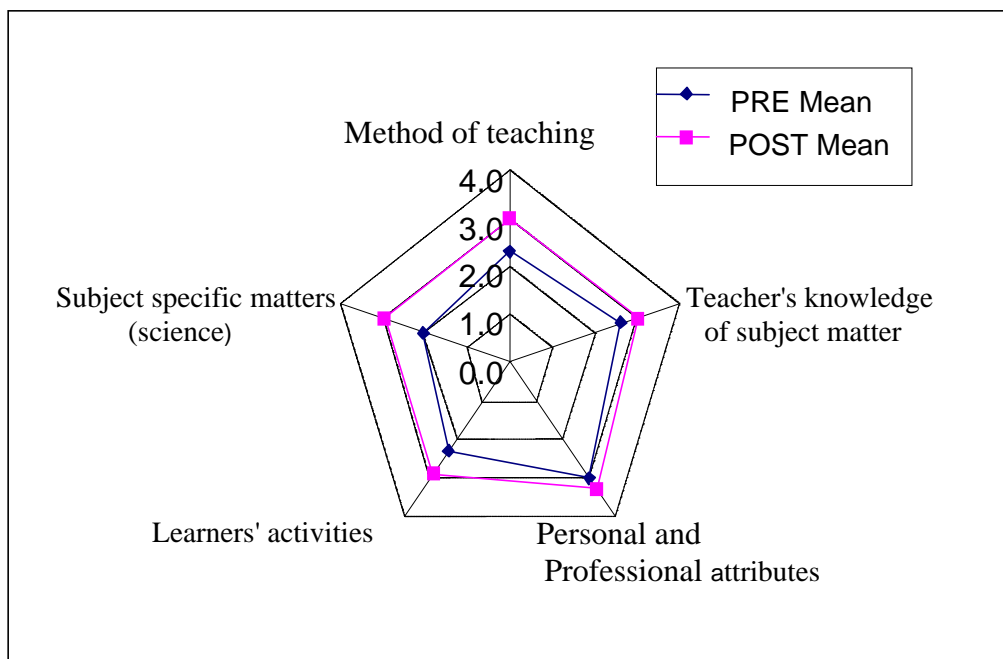


Figure 2: Pre and post lesson presentation assessment gain scores of upper primary teachers in science

Source: GES-JICA STM Project Final Evaluation Document, 2005.

Effective Methods of Teaching Science.

Chayter (1975) points out that most often the way science is taught is misleading. Teachers lay emphasis on rote learning and acquisition of knowledge rather than developing a total child which will help the child realize the relevance of what he/she learns to his/her environment.

If our children are to change their attitude towards the study of science, then, teachers also need to change their way of teaching the subject to make it fun especially for young children.

There are several methods of teaching science, for example the inquiry method, observation method, discussion laboratory method, discovery and activity methods. The inquiry approach is one of the many

ways through which ideas and concepts are transmitted to children Mechel and Oliver (1983). Inquiry is what scientist do when they observe, predict, hypothesis, collect, data, analyze and draw conclusions. If children are to behave like scientist then, it is important that teachers ensure that all the children are involved in hands-on investigations during science lessons. Inquiry promotes doing science by children .During inquiring learning, children are involved in observing, classifying, communicating and using other science process skills which help to prepare them towards thinking objectively. Primary science lays emphasis on children doing their own learning rather than teachers demonstrating or children reading only about science.

Inquiry approach encourages children to identify a problem, form their own opinion on how to collect relevant data with a view to finding solutions to their problems, Jacobsen (1981) explains that inquiry method helps children to identify content-related problems, formulate their hypotheses, gather information from different sources, analyse this information, evaluate and draw conclusions Children also acquire a model to follow in solving problems in their environment and this serves as intrinsic motivation and increases the memory of the children.

A child's attitude towards the teacher and the subject matter as promoted pointed out by Esler and Esler (1988), is closely related to the type of learning activities organized. The child will help the teacher to collect science materials and help set up the science room, if he\she is involved by the teacher .this whip up the child's interest. A teacher who

does all the talking and also does all other tasks related to the learning is likely to alienate the children. In view of the opportunities inquiry methods offers to young children to develop scientifically, science educators recommend the use of inquiry approach to teaching at primary school level.

Agboola (1984) has indicated the roles of practical or activity based method in science as follows:

- (i) to encourage accurate observation and careful recording
- (ii) to promote simple, common-sense, scientific method of thought;
- (iii) to develop manipulative skills;
- (iv) to give training in problem solving;
- (v) to verify facts and principles already taught;
- (vi) to educate on theoretical work as an aid comprehension;
- (vii) to be an integral part of the process of finding facts by investigation and arriving at principles;
- (viii) to arouse and maintain interest in the subject.

According to Bloom (1956), just as there is no single method through which new concepts are learnt, there is no single method of teaching which fits all learning situations. The teacher must accept his/her procedure to the situation as she finds it and modify her procedures in accordance with changing demands of the situation. The teacher method should be a combination of almost all the method of teaching. Each teacher should be an inventor of method suitable for the circumstances in which she finds him/her. Whatever method a teacher uses in teaching science should evoke the use the scientific method; or processes e.g. observations,

classification, measurement, inference experimenting, manipulating skills etc at appropriate stages in the teaching/learning process.

Sharma (1995) noted that achievement of modern science is due to the application of the experimental method. Practical work must therefore be made a prominent feature in any science lesson. Schwab (as cited by Chiappetta and Koballa, 2002) reported that during major science curriculum reform, some science educators felt that a considerable amount of practical /laboratory work should lead rather than lag behind.

Effective Methods of Teaching Science (Importance of Science Practical Work in Teaching and Learning of Science)

Theories describe a well-verified body of abstract knowledge that has a large number of practical applications. Practical work can help students develop a better understanding of concepts and principles as a result of concrete experiences. Science practical work leaves a lasting impression on students. Practical work enhances concept development and promotes scientific attitudes. It also breaks up the instructional period, which limit the amount of lecturing and adds a variety to the course (Chiapperra and Koballa, 2002). Sometimes, it is to link theory with practice, or to cultivate a scientific spirit in the students. If properly put to good use, it could lead to the acquisition of practical skills like planning, performing, observing and reasoning. Hence the major purposes of science practical work includes the cultivation of science methods and the development of scientific attitudes. Shulman and Tamir (as cited in Ossei-Anto, 1999) observed that practical work has been the most distinctive

feature of science instruction. Practical work motivates students to appreciate the distinction between science practical activities and the application of science and technology to real life cases. Practical work helps students to develop the ability to use one or more science process skills. It can also be used to improve students' awareness and competence in using skills that are related to scientific reasoning.

In monitoring the effectiveness of science teaching and learning the key questions that needs to be asked are, what do students know? How well do teachers teach? Do our schools work? (Kulm & Malcom, 1991). A science teacher needs to play a role as the advocate of current 'public concepts'(the current accepted scientific thought) to challenge students 'private thought' (Matthews, 1994) or to persuade (Kuhn, 1962) or to convinces a student to appreciate the current, prevalent interpretation or explanation of natural phenomena.

A report from the Eleventh Conference of Commonwealth Education Ministers at Barbados and as indicated by Commonwealth Secretariat (1990) states that: " of all the factors that influence qualitative improvement of education , the quality, competence and character of teachers are undoubtedly the most significant' (p. 17). The commitment, competence and creativity of teachers therefore seem to be central to the success of children for the achievement of goals of education. The Commonwealth Secretariat (1993), again states that: "if the teacher is not competent or qualified or does not have appropriate skills to handle the curriculum in terms of instructional methodology, all the inputs in the

classroom could be wasted” (p. 21). The assertion in this respect is that nothing happens in the classroom unless it first affects the teacher.

The Education Reform Review Committee of the Ministry of Education and Sports (2004) in its report to the Government of Ghana among other things remarked that “The quality of human capital of any nation depends upon the quality of education it offers, and the quality of education given is also determined by the quality of teachers who teach in the schools” (Education Reform Review Committee Report, 2004). This explains the need for an integrated teacher education system, which provides a structure for continuous professional development and monitoring of the teachers throughout their career of teaching.

One of the issues that need attention is teacher-pupil interaction, generally known as Teacher-Time-On Task (TTOT). Scholars of Education pointed to TTOT as the fulcrum of effective teaching and learning (Jacobsen, 1981). Most teachers if they have their own way will avoid the teaching of science. The avoidance of work among teachers may be explained by McGregor’s theory ‘X’ which stipulates that the average human being would avoid work if he can. Therefore, teachers apparently take advantage to avoid working when monitoring is relaxed and the school environment is unattractive (Herzberg, 1966). Monitoring therefore plays an important role in effective delivery.

Mayer (1987) noted in the behaviorist approach to teaching that what is of interest to the teacher is the relationship between instructional manipulation and the outcome performance. Behaviorist approaches tend

to focus more on overt behaviours where cognitive approaches focus on both overt and covert behaviours.

The cognitive approach attempts to understand (a) how instructional manipulations affect internal cognitive processes, such as paying attention; (b) how these processes result in the acquisition of new knowledge; and (c) how new knowledge influence performance such as on tests. The goal is to explain the relationship between stimulus and response by describing the intervening cognitive processes and structures (Mayer, 1987)

Ossei-Anto (1995) again asserted that, science teaching and learning will definitely be better done if the issue of inadequate supply of science equipment and materials is tackled with zeal. He further explained that, learning by doing is one of the cardinal principles of teaching science. Experimentation has put many theories on a sound footing and has also resulted in the rejection of many. History reveals that many beliefs and superstitions were trashed out from the minds of people as a result of experimentation.

Science practical/laboratory work engages students in ‘finding out’ ‘and learning how’ through first hand experience. It is an integral part of good science teaching, which involves students in the scientific enterprise-questioning, observing, classifying, gathering data, explaining, experimenting etc. This type of work permits students to plan and to participate in investigation or to take part in activities that will help them improve their manipulative skills (Collete & Chiappeta, 1989). Practical work would help improve students’ manipulative skills.

Practical work including hands-on activities, scientific inquiries, or experiments, always cited as the most powerful approach to helping students understand scientific knowledge. At the same time, Hodson (1992) argued that the skills-based approach of practical work was philosophically unsound, educationally worthless, and pedagogically dangerous. A holistic view of assessment to promote valid process learning, especially emphasizing the role of creativity in the data analysis process is necessary (Yager & McCormack, 1989). Torrance (as cited in Penick, 1996) described creativity as a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, and disharmonies. Creativity identification of the problematic, the research solutions, the generation of guesses, or the formulation of hypotheses about the deficiencies; testing and retesting the hypothesis and the potential modification and retesting; and last the communication of the result. The role of guessing as the basic element of creativity is stressed by Science Technology and Society of the United States of America. When students are viewing natural phenomena, to stimulate their creativity and interpretation of results, they should be encouraged to present wild guesses to generate diverse perspectives (Yager & McCormack, 1989).

CHAPTER THREE

METHODOLOGY

This chapter discusses the research design used in the study, instrument used in the collection of data and the statistical method employed for the analysis of the data collected from the study. It also gives information on the population and sampling procedures used for investigating into how monitoring is used in enhancing teaching of science in basic schools in the Akuapem North District.

Research Design

The design of the study was a descriptive survey using both quantitative and qualitative approaches. As Stone (1984) asserts, both quantitative and qualitative methods are appropriate and should be viewed as compatible and complementary approaches in the evaluation of educational programmes. In a descriptive survey data is collected from members of a population with respect to one or more variables (Gay, 1987). Essentially, the study surveyed monitoring and supervision of science teaching at the primary school by headteachers and circuit supervisors. The design therefore involved collecting data from a selected sample with a view to examining how monitoring is carried out and the support offered to teachers to bring about improvement in the teaching of science.

The survey design was also preferred because, according to Osuala (1987), it provides focus on the vital facts of people, their beliefs, opinions, attitudes, motivations and behaviour. Again information gathered from surveys can provide a basis for sound decisions and the drawing of implications.

Population

The population for the research work was made up of all basic 4 to 6 teachers, headteachers and circuit supervisors in the Akuapem North District. Akuapem North District was chosen because of proximity and convenience. All the basic schools in the Akuapem North District have received a number of interventions to improve the capacity of teachers. Notable of such interventions are the Whole School Development Programme which sought to enhance the capacity of headteachers to carry out effective monitoring and the Science Technology and Mathematics (STM) Project which organized workshops for basic 4 to 6 teachers and JSS science and mathematics teachers. Workshops were also organized for headteachers and circuit supervisors by the STM Project to enhance their capacity for effective monitoring of science and mathematics. Basic 4 to 6 teachers were targeted because the syllabus for the teaching of science starts from primary 4. There were 115 primary schools in the district in the 2006/2007 academic year when this study took place, with a total teachers population of 320. The headteachers, at the time of the research numbered 105 with 9 circuit supervisors in charge of the schools.

Sample and Sampling Technique

Twenty four primary schools were randomly selected out of the 115 primary schools for the study. The names of all the primary schools in the district were put into three groups according to performance and grading given by the District Education Office using Performance Monitoring Test and Basic Education Certificate Examination results. Group A schools had good performance record, Group B schools were of average performance and Group C schools were those whose performance fell below the average. The names of the schools were written on pieces of paper and then mixed up in a container. Eight schools were selected from each container by simple random sampling. The schools were limited to this number due to cost implications of the study. The classes chosen were primary 4 to 6 teachers. The total number of 105 respondents comprised 76 teachers (40 males and 36 females), 20 headteachers (8 males and 12 females) and 9 circuit supervisors, (all males). All the teachers in primary 4 to 6 taught science, participated in the study. In all, there were 57 males and 48 females

The Research Instrument

The researcher in collaboration with the supervisor developed the questionnaire and the interview guide. The questionnaire consisted of a series of questions designed to elicit certain discrete answers from respondents. The reason for using questionnaire was that it is widely used for the collection of data and it can be given to a large number of respondents at the same time. Respondents can also have ample time at

their disposal or they can answer the items at their own convenient time. Again, questionnaires are less expensive and can be administered through mail as compared to instruments like interviews and observations. In addition, Centre for Continue Education University of Cape Coast (2000) states that, questionnaires are stable, consistent and uniform measure without variation and also offer greater assurance of anonymity (p.176).

Three different questionnaires, which were both open-ended and close-ended, were developed for data collection for the study (Appendices A, B and C). The questionnaire was made up three parts namely:

(a) Questionnaire for Circuit Supervisors

The third questionnaire targeted circuit supervisors and was similar to that of the headteachers. It was made up of 23 items and requested for the same information as that of the headteachers as their roles compliment each other. Questions 1-10 sought to know about the background of circuit supervisors. The rest of the items solicited information about the type of monitoring carried out, challenges monitors have identified and the assistance they offer to teachers.

(b) Questionnaire for Headteachers

This questionnaire for the headteachers was made up of 23 items. Questions 1-10 sought information about the caliber of personnel monitoring of science teaching at the basic level. It also sought information on headteachers background, how often they monitor

teachers classroom instructional practices and the kind of assistance they give to the teachers. (See Appendix B)

(c) Questionnaire for Teachers of Primary 4 to 6 Science Teachers

This questionnaire contained 27 items which solicited information about the background of teachers, their knowledge of subject matter, the challenges they face in the teaching of science and how often they are monitored. It also solicited information on the kind of support given by headteachers and circuit supervisors. (See Appendix C)

All the questionnaires were developed by the researcher under the directions of the supervisor. After the initial development of the questionnaires they were first given to some science tutors of the Presbyterian Training College who have been part of the monitoring team during the STM Project and the Assistant Director in charge of supervision for their comments, corrections and contributions. This was done to ascertain the face and content validity of the instruments. The questionnaires also went through the process of scrutiny by the researcher's advisor and constructive suggestions were given for modification, change, or elimination of some of the items. The questionnaires were finally checked for legibility, clarity of instructions, layout space for responses, and above all spelling mistakes.

Finally, the questionnaire for teachers and headteachers were pre-tested at Abiriw Presbyterian Primary school. All the necessary changes were made in order to ensure content validity and reliability. The

questionnaires were also directly related to the objectives of the study so as to ensure content validity.

Data Collection Procedure

The researcher personally administered the questionnaire to the respondents. All selected schools in the Akuapem North District were notified in advance of the period for data collection which took place from 13th May-10th June, 2006 . When the time was due, the schools were visited one after the other. The first point of call was the headmaster/headmistress in each school. An introductory letter from the University of Cape Coast (Appendix D) was shown to the head for permission to conduct the research in the school. Primary 4, Primary 5 and Primary 6 teachers were assembled and the objective, purpose and significance of study vividly explained to them. The questionnaires were given to them to read through for further explanation and clarification. All completed 105 questionnaires were collected by the researcher within two weeks. Questionnaires for headteachers were also given to them following the same procedure. With the assistance of the District Director of Education a meeting was scheduled where the researcher met all the circuit supervisors. The purpose and significance of study were explained to them after which the questionnaires were distributed to them to go through. Areas they did not understand were clarified. In all cases, the respondents were asked to answer carefully and truthfully and as much as possible independently. They were also assured of the highest degree of confidentiality of their responses. The researcher then registered his outermost gratitude to all the

respondents and the headteachers in advance. The same procedure was used in all the other schools under study.

Data Analysis

Data collected were edited. Each questionnaire was given a serial number for easy identification before scoring the responses. A coding system was manually prepared for the open-ended items in the questionnaire. Also a manual template was prepared before the computer was used for the analysis of the data. The computer software used for the analysis of data was the Statistical Package of Social Sciences (S.P.S.S) which has been re-branded as Predictive Analytics SoftWare (PASW) The data were analyzed and presented in descriptive statistical forms, which include frequencies and percentages. The qualitative data gathered through focus group discussions and open-ended responses were analyzed using thematic framework. These involved scrutinizing the data, coding, comparing categories and searching for common themes across the data set. The themes from the qualitative analysis were juxtaposed with the results from the quantitative analysis for the purpose of triangulation.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This chapter presents the findings of the study. The results have been organized according to the research questions framed for the study. The findings of the study are presented in four sessions.

- (i) Calibre of headteachers and circuit supervisors at the basic schools level,
- (ii) Kind of monitoring that headteachers and circuit supervisors undertake at the basic level in science,
- (iii) Extent to which headteachers and circuit supervisors offer the necessary support to their teachers in terms of science lesson planning and delivery during monitoring,
- (iv) Constraints to effective monitoring of teachers in the science.

Calibre of Headteachers, Circuit Supervisors and Teachers at the Basic Schools Level

Research question one sought for information on the calibre of Headteachers and Circuit Supervisors who monitor the teaching and learning of science at the basic school level as well as the teachers.

From Table 2, 25% of the headteachers had teaching experience of between 16 and 20 years whilst 45% had taught from 21 to 25 years. Six headteachers had also taught beyond 26 years. The data suggest that,

majority of the headteachers were experienced and could therefore bring this to improve the vetting of lesson notes and the teaching of science by their respective teachers. But science is dynamic and there is the tendency also that, headteachers might not be in tune with modern trends of lesson notes preparation and lesson presentation.

Table 2

Teaching Experience of Headteachers

Responses	Frequency	Percentage
16 – 20	5	25.0
21 – 25	9	45.0
26 – 30	6	30.0
Total	20	100.0

Circuit supervisors also play a vital role when it comes to monitoring of teachers performance. The researcher thought it necessary to determine the experience of circuit supervisors in teaching as well.

Table 3 shows the distribution of circuit supervisors by teaching experience. Out of the nine, 66.7% taught for more than 26years and above. Two had teaching experience of more than 15 years. The data suggest that circuit supervisor had records of long service in teaching and therefore in tuned with classroom practices.

Table 3

Teaching Experience of Circuit Supervisors

Responses	Frequency	Percentage
10-15yrs	1	11.1
16-20yrs	2	22.2
26-30yrs	6	66.7
Total	9	100.0

Most teachers were younger in the service would see both headteachers and circuit supervisors as good source of knowledge and experience to update their skills and competencies.

The study investigated the number of years that headteachers and Circuit Supervisors had been at post with their current position. The observation in Table 4 was that both headteachers and circuit supervisors had been in their respective positions for some time now. More than half of the headteachers have served in that capacity for over ten years. Majority of the circuit supervisors were also in that category.

The picture being depicted here is that, both headteachers and circuit supervisors have been in the supervisory role for a long time and therefore can bring their rich experience to improve the teaching and learning process of science. This is in line with Vasquez & Cowan, 2000 that, quality supervision, thus aims to raise progressively the teacher's stage of concern about an innovation and its level of use to the highest level.

Table 4

Number of Years as Headteacher and Circuit Supervisor

Responses	Headteachers		Circuit supervisors	
	Frequency	Percentage	Frequency	Percentage
1-5yrs	3	15.0	1	11.1
6-10yrs	5	25.0	1	11.1
11-15yrs	3	15.0	7	77.8
16-20yrs	8	40.0	0	0.0
21-25yrs	1	5.0	0	0.0
Total	20	100.0	9	100.0

There was also the need to examine the experience of the teachers who were being supervised to establish the relationship between them and that of their supervisors. Table 5 indicates that majority of the teachers had teaching experience far below that of headteachers and circuit supervisors.

Table 5

Teaching Experience of Teachers

Responses	Frequency	Percentage
1 – 5yrs	41	53.9
5 – 10yrs	25	32.9
15 – 20yrs	6	7.9
21 - 25yrs	4	5.3
Total	76	100.0

Qualification of Headteachers and Circuit Supervisors

The researcher tried to establish the educational background of headteachers and circuit supervisors. Table 6 shows the distribution of qualification of headteachers and circuit supervisors.

The findings were that half of the headteachers have not upgraded themselves. The implication here is that lack of in-service training would render them ineffective. Teachers may not have much confidence in them. On the other hand, the Circuit Supervisors had diploma or degree. Therefore, academically, the Circuit Supervisors commanded more respect than most of the headteachers.

The researcher also tried to ascertain the qualification of teachers. This is because quality supervision is characterised by effectiveness. High academic standard of teachers than headteachers and circuit supervisors might undermine this principle

Table 6

Qualification of Headteachers and Circuit Supervisors

Responses	Headteachers		Circuit supervisors	
	Frequency	Percentage	Frequency	Percentage
First degree	2	10.0	7	77.8
Diploma	7	35.0	2	22.2
3yr Post Sec Cert. 'A'	8	40.0	0	0.0
2yr Post Sec Cert. 'A'	2	10.0	0	0.0
4yr Post Middle Cert. 'A'	1	5.0	0	0.0
Total	20	100.0	9	100.0

. It would mean that the supervisors may not have absolute control to give the necessary to teachers for effective teaching of science.

Table 7 indicates that most of the teachers (73.7%) had Certificate ‘A’ 3 Year Post Secondary. Two persons had 2 Year Post Secondary Certificate and 13.2% of the teachers possess 4 Year Post Middle Certificate. Only fourteen teachers had higher qualification.

Table 7

Highest Qualification of Teachers

Responses	Frequency	Percentage
Degree	4	5.2
Diploma	10	13.2
3yr Post Sec Cert. ‘A’	56	73.7
2yr Post Sec Cert. ‘A’	2	2.6
4yr Post Middle Cert. ‘A’	4	5.3
Total	76	100.0

The assertion made previously holds that most of the teachers would have respect for their supervisors. It also implies that with majority of the teachers within the minimum qualified category of teachers’ makes headteachers and circuit supervisors more confident in the supervisory role.

Area of Specialization of Headteachers and Circuit Supervisors

The researcher investigated into how competent the headteachers and Circuit supervisors were with regards to content knowledge in science or area of specialization. Table 8 presents the distribution of responses. In

the case of the headteachers, only one had a science related background. However a third (33.3%) of Circuit Supervisors also had science related background. The study revealed that majority of headteachers in the primary schools in the study area and circuit supervisors did not train as science teachers. They, therefore, lacked the necessary science background and competence to monitor science teaching effectively.

Table 8

Area of specialisation of Headteachers and Circuit Supervisors

Responses	Headteachers		Circuit supervisors	
	Frequency	Percentage	Frequency	Percentage
Arts related	5	25.0	6	66.7
Science related	1	5.0	3	33.3
No specialisation	14	70.0	0	0.0
Total	20	100.0	9	100.0

When it comes to the monitoring of science lessons, Circuit Supervisors had advantage over headteachers. But with reference to Tables 2 and 3 which indicated that headteachers in the sample schools were very experienced presupposes that they could give constructive suggestions to teachers to improve on lesson planning and delivery.

One cannot dispute the fact that an in-depth knowledge in science content is a prerequisite to effective teaching of science, hence the need to look at the competencies of teachers in terms of area of specialization. According to Table 9, 89.5% of the teachers did not specialize in any

subject area at the training college. Only two of them were science related whilst 7.9% indicated that they were of Arts related subject

Table 9

Area of Specialisation of Teachers (N=76)

Responses	Frequency	Percentage
Arts	6	7.9
Science related	2	2.6
No specialisation	68	89.5

Most educators agree that basic skills are the most important indicators of teacher quality (Archer 2002). Research suggests that, at a minimum, teachers should have a solid general education and know their subjects. According to Olson (2000), students whose teachers know their subjects perform better than students whose teachers lack subject matter preparation.

From the discussions made on the calibre of headteachers, circuit supervisors and teachers as well it could be summarized that majority of headteachers and circuit supervisor have long service on the job experience than the teachers they supervise (75.0% of headteachers and 88.9% of circuit supervisors have taught for more that 20 years). Most of the teachers (86.0%) have taught for only less than ten years.

Majority of headteachers were Certificate “A” 3-Year Post Secondary holders. Seven had diploma certificate. Two were degree holders. On the other hand, the Circuit Supervisors were either diploma (22.2%) or degree

holders (77.8%). Therefore, academically, the Circuit Supervisors will be in a better position to assist the teachers to teach well provided their area of specialization is science related.

Ninety-five percent of headteachers and 66.7% circuit supervisors did not possess science related background. The implications here is that, in terms of subject content knowledge, they would have very little to offer teachers.

Type of Monitoring and Supervision Done by Headteachers and Circuit Supervisors

Research question two sought to find out the type of monitoring headteachers and circuit supervisors undertake at the basic school level in science. The study looked specifically at the areas that supervisors concentrated on in monitoring science teaching. Table 10 shows the distribution of teachers' responses to this question. Majority of the teachers, totalling 71.1% said headteachers monitor mainly their lesson notes whilst 28.9% affirmed that the area that was normally looked at when monitoring was mainly classroom instructional delivery.

Table 10

Teachers' Views on Areas Considered for Monitoring

Areas	Headteachers		Circuit supervisors	
	No. of HT	Percentage	No. of CS	Percentage
Lesson notes	54	71.1	52	68.4
Lesson delivery	22	28.9	24	31.6
Total	76	100.0	76	100.0

Incidentally, the teachers, (68.4%) also said that circuit supervisors concentrated on lesson notes as the main area of monitoring whilst (31.6%) said that they attached importance to lesson delivery.

Science teaching and learning could improve if more attention was paid to what happen in the classroom. Teachers can prepare good lesson plan but the teaching might not be a reflection of that. The effectiveness of teaching depended on how often one is supervised in the classroom. Benito, Carale, Galvez, Magno, Pabellon, Talisayon, Tan and Treyes (2003) endorsed classroom observation in enhancing the teaching and learning process. According to them, classroom observation is essential in providing information about students and teacher performance. The supervisor can use this information to plan and provide advice to the teacher to improve the teaching learning process and serve as the basis for teacher development, evaluation of merit, and promotion.

Areas of Priority in Monitoring by Headteachers and Circuit

Supervisors

All the headteachers and circuit supervisors were also asked the same question put to the teachers if they were in agreement with the teachers. They all indicated that, they supervised the teaching and learning of science. The monitoring that is done was basically on lesson notes and observing teaching and learning in the classroom to make constructive suggestions to improve the teaching process.

Headteachers and circuit supervisors were also asked the same question to find out if they hold a different view to that of the teachers.

According to Table 11, 75.0% of the headteachers and 66.7% of the circuit supervisors who form the majority attached much importance to lesson observation in the classroom. The rest, 25.0% and 33.3% headteachers and circuit supervisors respectively attached importance to lesson notes vetting.

Table 11

Areas of Priority in Monitoring by Headteachers and Circuit Supervisors

Responses	Headteachers		Circuit supervisors	
	Number	Percentage	Number	Percentage
Lesson notes	5	25.0	3	33.3
Science teaching	15	75.0	6	66.7
Total	20	100.0	9	100.0

Frequency of Supervision by Headteachers and Circuit Supervisors

The number of times headteachers and circuit supervisors visit teachers in the classroom to observe lessons were also investigated. Table 12 shows that 45.0% of headteachers and 55.5% of circuit supervisors visited their teachers in the classroom not more than twice a term for lesson observation. Forty percent of headteachers and 11.1% of circuit supervisors visited once or twice in a month.

This information suggests that most headteachers and circuit supervisors were able to supervise teachers, at least, twice in a term. This according to the researcher is in the right perspective since some of the

headteachers play a dual role as classroom teachers and supervisors as well.

Most teachers tend to relax when monitoring is also relaxed. The implication is that preparation of lesson notes and teaching and learning materials for child catered approach would be lacking. Supervision should therefore be intensified so that constructive suggestions could be offered teachers for them to improve the teaching of science thereby making it activity oriented and child centered.

Table 12

Frequency of Supervision by Headteachers and Circuit Supervisors

Frequency of Supervision	Headteachers		Circuit Supervisors	
	No.	Percentage	No.	Percentage
Once	1	5.0	1	11.1
1-2 times a month	8	40.0	1	11.1
1-2 times a term	9	45.0	5	55.5
3 times a term	2	10.0	2	22.2
Total	20	100.0	9	100.0

The frequency of supervision was mostly twice in a term by headteachers and circuit supervisors. This, in the researchers view was realistic since some of the headteachers were themselves classroom teachers. But is suggested that where headteachers were not teaching the supervision could be increased to bring about improvement in output of lesson notes preparation and lesson delivery.

Extent of Support given to Teachers by Headteachers and Circuit Supervisors

Research question 3 investigated the extent to which headteachers and circuit supervisors were able to offer the necessary support to teachers who teach science. In order to ascertain this, teachers were asked about their challenges and the type of support they needed from their headteachers and circuit supervisors. To find out if headteachers and circuit supervisors were in agreement with teachers, they were asked the same questions put to teachers. The findings in Tables 15 to 20 present the challenges of teachers, how they were addressed, type of monitoring, areas considered and frequency of monitoring.

The information in Table 13 shows that 44.7% of the teachers had difficulty organizing practical work. According to 32.1% of teachers, preparation of teaching and learning materials was their major problem whilst 13.2% said teaching the content (subject knowledge) was a real challenge to them.

Table 13

Teachers' Views of Challenges Faced in Science Teaching (N=76)

Responses	No. of Teachers	Percentage
Subject knowledge	10	13.2
Practical activities	34	44.7
TLM preparation and usage	32	32.1

Headteachers and circuit supervisors said these problems were

mainly addressed through school-based (SBI) and cluster-based (CBI) INSET

According to Tymms (1999) at the Centre for Evaluation and Monitoring at Durham University, new approaches to primary school science must be developed. He reiterated that that the current national approach to science in primary schools is not impacting on children's scientific thought and curiosity as much as is possible. Despite the pass rates in public examinations later in secondary school, research suggests few students acquire a proper understanding of the science curriculum. This therefore calls for in-depth knowledge and pedagogical skills by teachers to teach to the understanding of pupils.

To find out if headteachers and circuit supervisors actually carry out any needs assessment on the teaching of science for them to be able to assist teachers, a question was posed to solicit headteachers and circuit supervisors' views on the challenges that they have identified among teachers in science teaching (Table 14). The question was also to find out if what headteachers and circuit supervisors said were in agreement with that of teachers. Most of the headteachers (85%) were of the view that, teachers inability to handle science was mostly due to lack of knowledge in the content. Only one headteacher and three headteachers attributed it to practical work and preparation and use of teaching and learning materials respectively.

For the circuit supervisors, 55.5% thought that knowledge in the subject content was a barrier to effective teaching of science. One also

agreed that practical work was a challenge and 33.3% saw the preparation and use of teaching and learning materials a major problem.

Table 14

Challenges Identified by Headteachers and Circuit Supervisors in Science Teaching

Responses	Headteachers		Circuit supervisors	
	No. of HT	Percentage	No. of CS	Percentage
Subject knowledge	17	85.0	5	55.5
Practical work	1	5.0	11	1.1
TLM preparation & usage	2	10.0	3	33.3
Total	20	100.0	9	100.0

This is in line with the thinking of Avalos (1991) that teaching in many developing countries is characterised by challenges such as subject knowledge and pedagogical skills.

From the table it is clear that the major challenge to effective teaching of science according to the circuit supervisors and the headteachers was lack of knowledge in subject matter of science which can also affect the type of practical work teachers could perform with their pupils. Hence with these problems facing teachers, effective teaching of science would not be possible. This conforms to the findings of Xedzro (1995), who carried out enquiries into the problem of teaching and learning primary science in South Tongu District that teachers in his study had problems with subject matter and were also not using the recommended

teaching methods. Various activities designed in the syllabus were not been carried out.

Marson (1998) has also pointed out that science is a dynamic process, hence, learners are to be encouraged to think and act like scientists through approaches that cater for their individual differences. This implies that primary school teachers should always endeavour to adopt approaches that will enable pupils to probe and question situations and be able to collect, classify and analyze simple scientific data. These activities in the long run, enable the pupils to discover facts and concepts for themselves. However, for the pupils in the study area, this appeared not to be the case. Preliminary observation conducted by the researcher in some upper primary showed that the teachers adopted predominantly literary approaches to the teaching of science. Little or no practical activities were conducted thus making the science lesson teacher-centered. However for effective science teaching and learning, the lessons should be activity-oriented and pupil-centered.

How Challenges were Addressed by Teachers

To know more about how challenges faced by teachers were tackled, teachers were asked whether they were able to address some of the challenges themselves. According to 63.2% of the teachers, teaching and learning materials was an area that they could manage a bit better whilst 36.8% said that they were able to address some of the problems associated with content.

Table 15
Challenges Addressed by Teachers

Responses	No. of teachers	Percentage
Subject knowledge	28	36.8
TLM preparation and usage	48	63.2
Practical work	0	0.0
Total	76	100.0

However practical work was an area the teachers paid little attention. This may be an indication that practical activities were almost absent. Table 15 confirmed the views of the teachers.

One of the objectives of the primary science curriculum is to help children to develop problem-solving skills. It could be argued that science is an area of the school curriculum which offers children the opportunity to develop these skills and teachers should ensure that they use methods that would help the pupils develop these with ease. One of the methods that could help children develop problem solving skills is the Guided Discovery Approach.

With Guided Discovery Approach, pupils need experiences that will drive them towards inquiry learning. Sunds & Carin (1985) pointed out that, the Guided Discovery Approach gets children actively involved in the process of discovering scientific ideas and concepts on their own with the teacher giving directions. This calls for the use of practical hands-on and minds-on activities.

Challenges Addressed by Headteachers and Circuit Supervisors

Since there were challenges teachers cannot solve themselves, a question was posed to find out how they are able to overcome those challenges. As outlined in Table 16, 10.5% of teachers indicated that their heads are able to assist them with TLMs. Further investigations revealed that these were mainly in the form of manilar cards used for drawings. Thirty percent of the teachers said their headteachers also offer assistance through the vetting of lesson notes in the form of suggestions.

Table 16

Responses of Teachers on Challenges Addressed by Headteachers and Circuit Supervisor (N=76)

Responses	No. of teachers	Percentage
Subject knowledge	8	10.5
Lesson notes	23	30.3
TLM preparation and usage	42	55.3
Practical work	3	3.9

To compare the views of teachers with that of headteachers and circuit supervisors, the latter were also asked the same question put to teachers about challenges that they were able to address. From Table 17, headteachers (50.0%) and circuit supervisors (55.6%) claimed that the challenges they addressed were mostly on teaching and learning materials. Forty percent headteachers and 33.3% of circuit supervisors tasked

themselves with addressing challenging topics because of lack of content knowledge.

Table 17

Challenges Addressed by Headteachers and Circuit Supervisors

Responses	Headteachers		Circuit supervisors	
	No. of HT	Percentage	No. of CS	Percentage
Subject knowledge	8	40.0	3	33.3
Practical work	2	10.0	1	11.1
TLM preparation & usage	10	50.0	5	55.6
Total	20	100.0	9	100.0

Practical work received the least attention by both headteachers (10%) and circuit supervisors (11.1%). This goes to confirm what teachers had about practical work.

According to the headteachers with the capitation grant they were able to purchase manilar cards for the construction of charts and diagrams as simple teaching and learning materials for teachers to use. According to the circuit supervisors they usually advised the teachers on the improvisation and effective use of the TLMs

Table 17 shows that both headteachers and circuit supervisors did not give much attention to the challenge of practical work to teachers. This could be due to the fact that headteachers and circuit supervisors themselves lacked the requisite knowledge in organizing practical activities.

How Headteachers and Circuit Supervisors Addressed Challenges Facing Teachers

Most headteachers (75.0%) indicated that they used school-based INSET to address challenges faced by teachers in teaching science. A third of the circuit supervisors also adopted the same strategy in addressing challenges. Unlike the headteachers, most of the circuit supervisors (66.7%) engaged in interpersonal discussions with the teachers in order to address their challenges. This is because they had limited time to spend in each school visited. However only 15.0% of the headteachers used this approach. Ten percent of headteachers, accordingly addressed challenges during staff meetings but none of the circuit supervisors used this approach (Table 18). However, in-service training is seen as a better way of addressing teacher's challenges as other teachers may also learn during the training.

Table 18

Forum for Addressing Challenges

Responses	Headteachers		Circuit supervisors	
	Frequency	Percentage	Frequency	Percentage
Staff meeting	2	10.0	0	0.0
School-based INSET	15	75.0	3	33.3
Personal discussion	3	15.0	6	66.7

Further interactions with teachers also revealed that teachers were learning from each other during INSET which surprisingly is contrary to

Castro (1991) and Davini (1995), who identified in Latin America that, the content of in-service courses does not cater for the needs of teachers.

Monitoring of Instructional Delivery

There was the need to find out from teachers if there was effective and efficient monitoring system of science teaching in the schools. All the teachers indicated that both headteachers and circuit supervisors monitored their work.

To confirm further that headteachers and circuit supervisors monitored classroom work, a question was posed to teachers to solicit for responses on classroom visits. According to Table 19, 73.3% of teachers said that headteachers visit their classrooms for lesson observation 1-2 times in a term. Twelve (15.8%) teachers also responded that headteachers visits amounted to 1 or 2 times a month.

Table 19

Classroom Visits for Lesson Observation by Headteachers and Circuit Supervisors

Responses	Headteachers		Circuit supervisors	
	Frequency	Percentage	Frequency	Percentage
1 a week	2	2.6	0	0.0
1-2 a month	12	15.8	4	5.3
1-2 a term	56	73.7	52	68.4
3 times a term	6	7.9	20	26.3
Total	76	100.0	76	100.0

On the part of the circuit supervisors and just like that of the headteachers, majority of the teachers 68.4% confirmed that circuit supervisors visits their classrooms once or two twice in a term.

This further goes to buttress the assertion made earlier that headteachers and circuit supervisors indeed supervise teachers work to give suggestions for improvement.

Competency of Headteachers and Circuit Supervisors in Monitoring

About 90% teachers asserted that headteachers were competent enough to offer the needed assistance to teachers whilst 10.5% of teachers saw their headteachers as not possessing the requisite knowledge and skills to assist them to deliver science lessons effectively in the classroom.

The conclusion that can be drawn is that, majority of the teachers have confidence in their supervisors and think they can give them the needed support in terms of making science lessons interesting and lively. In view of this headteachers and circuit supervisors were asked if they had received any training for capacity building to assist them in their work. A total of 17 headteachers (85%) indicated that they have gone through the GES/JICA STM Project capacity building in science teaching and learning. According to them this has enhanced their capacity to monitor and evaluate science teaching. Three headteachers (15.0%) who responded that they had not benefited from any capacity building were of the view that, if given the needed training they would also be in the position to assist teachers. All the circuit supervisors had benefited from the GES/JICA STM capacity building for effective monitoring of science.

Lieberman (1994) is of the view that for monitoring to be successful, a 'culture of support' must be established. This idea is also supported by Matsumoto (1999) who in a study to examine the support system needed by teachers, concluded that it requires a collaborative effort by teachers and principals to bring about changes in beliefs, attitudes and practices in science teaching. When focusing on teachers' needs alone, several studies (Bush, 1999; Clement & Vandenberghe, 2001; Fernandez, 2000; Moore, 2000) report that the leadership of principals is very crucial to support professional development in schools. The findings of the research are therefore in the right perspective.

Research question 3 looked at two major areas; Challenges identified by teachers, headteachers, and circuit supervisors and how these challenges were addressed and the type of monitoring undertaken by the supervisors.

From the analysis of the data, it was realised that the challenges that teachers came out with were at variance with that of the headteachers and circuit supervisors. According to the teachers their main area of difficulty was with the organization of practical activities (44.7%). But headteachers and circuit supervisors thought subject knowledge was the major challenge to the teachers (85.0% and 55.5%) respectively. They were therefore of the view that, the lack of content knowledge was a reflection of teachers inability to come out with practical activities.

Teaching and learning materials was an area that teachers said they could manage satisfactorily (63.2%). However practical work was seen to be an area that the teachers paid no heed to hence the neglect of activity

oriented science lessons. Ironically, headteachers and circuit supervisors also tackled the area of teaching and learning materials (50.0% and 55.6% respective) It was observed that of the capitation grant for the purchase of manila card and felt pens promoted the preparation of charts and diagrams which were mostly the teaching and learning materials used by teachers. But in science teaching, teaching and learning materials must go beyond charts and diagrams to include real and improvised materials.

Teachers were able to tackle some of these challenges themselves whilst those beyond them, headteachers and circuit supervisors had to assist. The support to teachers in the teaching of science was not adequately meeting their needs in terms of subject knowledge and organization of practical work. This situation is in line with Damtse (2000), who, on his part conducted a study and found that most of the teachers did not utilize methods of teaching science which make learners to participate actively in the lesson.

Headteachers and circuit supervisors confirmed that they monitored the progress of teachers' performance mainly in the area of lesson notes preparation and lesson observation to offer the needed support for improvement in lesson delivery. This they were able to do effectively and efficiently due to capacity building received from the STM Project.

Constraints to Effective Monitoring of Teachers in Science Teaching

Research question four looked at the constraints to effective monitoring of teachers in science teaching. Effective supervision depended on supervisor-teacher ratio. The smaller the number of teachers to a

supervisor, the more efficient the supervision and the greater the number, the more difficult it is for effective and efficient monitoring to be done.

Table 20 gives an idea of the number of teachers in the schools. According to the headteachers, sixty percent of them had between 7 and 10 teachers in their school. Most of the schools therefore had the required number of teachers to handle all the classes.

Table 20

Number of Teachers in School

No. of teachers	Frequency	Percentage
1- 6	6	30.0
7-10	12	60.0
10-20	2	10.0
Total	20	100.0

The number of teachers to be monitored was therefore not so large for effective monitoring by headteachers. But there were isolated cases where headteachers played a dual role as classroom teachers and supervisors, hence, the problem of supervision arose.

Circuit Supervisors have quite a number of schools under their jurisdiction. Their efficiency and effectiveness depended on the number of teachers in the circuit. Out of the nine circuits in the district none of the circuit supervisors had less than 100 teachers. Five circuits had between 100 and 150 teachers to monitor and four circuits had between 151 and 200 teachers (Table 21).

The implication here is that if a circuit supervisor decided to monitor every teacher even once in a term it would even not had been possible for him/her to do so considering the number of days in a term. The number of teachers in the circuit is therefore seen to be too many for the nine circuit supervisors.

Table 21

Number of Teachers in the Circuit

No. of Teachers	Frequency	Percentage
100-150	5	55.6
151-200	4	44.4
Total	9	100.0

Other Constraints to Effective Supervision and Monitoring Activities.

Further interactions with the supervisors also revealed that, circuit supervisors, most especially, were constrained with logistics to make them effective. Generally, they complained of money for fueling their motor bikes and lack of transport in the office to embark on such activities. This was common to all of them. Headteachers were of the view that lack of continuous INSET programmes for them to update their knowledge and competencies was a major set back for them.

On the issue of constrain to monitoring of effective science teaching, it was realized that the number of teachers in a school as well as in the district played a crucial role. Headteachers did not have much problem like the circuit supervisors because the circuit supervisors had more teachers to monitor than time could allow them. Five circuits had

between 100 and 150 teachers and four other circuits had between 151 and 200 teachers.

Non-timely release of budget from the government also prevented circuit supervisors from being effective.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The notion of school improvement has evolved more or less from the tradition of research into school effectiveness where attempts have been made to isolate critical inputs and processes that are likely to produce the best outcomes in terms of achievement results. The Education Reform Review Committee of the Ministry of Education and Sports (2004) in its report to the Government of Ghana among other things emphasized the importance of the teacher. It remarked that the quality of human capital of any nation depends upon the quality of education it offers, and the quality of education given is also determined by the quality of teachers who teach in the schools. It has been recognized globally that the development and application of science and technology are vital to a country's overall economic development.

The purpose of the study therefore was to find out about monitoring of science teaching in basic schools in the Akuapem North District. This chapter contains;

- (a) The summary of the study
- (b) Conclusions drawn from the study and
- (c) Recommendations based on the conclusions drawn.

The study specifically tried to find answers to the following research questions:-

- i. What is the background of teachers, headteachers and circuit supervisors at the basic schools level,
- ii. What is the kind of monitoring that headteachers and circuit supervisors undertake at the basic level in science,
- iii. To what extent are headteachers and circuit supervisors able to offer the necessary support to their teachers in terms of science lesson planning and delivery during monitoring?
- iv. What are the constraints to the effective monitoring of science teaching?

To find answers to the outlined questions, the descriptive survey design was adopted. Data were provided by stratified, systematic and purposive sampling comprising 105, made up of 76 teachers, 20 headteachers and 9 circuit supervisors. Questionnaires and interview schedules were the main data collection instruments. These were supported by document study. The researcher personally administered the questionnaires and conducted the interviews. Qualitative data were analyzed by the use of Statistical Product for Service Solutions (SPSS) and the resulting summary statistics were used to answer the research questions. The analysis was mostly based on simple frequencies and percentages.

Summary of Key Findings

1. a) Majority of teachers (86.2%) were Certificate “A” teachers. Most of the headteachers, (75%) also had the same qualification as teachers (Certificate “A”). The rest of the headteachers had diploma certificate. Circuit Supervisors were mostly diploma or degree holders (77.8%). The majority of teachers were therefore within the lowest acceptable qualified category of teachers and puts them in a better position to accept criticisms and constructive suggestions.
 - b) Ninety-five percent of headteachers and 66.7% circuit supervisors did not have any background in science. In terms of subject content knowledge, they have very little to offer the teachers.
 - c) Majority of headteachers and circuit supervisor have long service and on the job experience than the teachers they supervise (75.0% and 88.9% of the headteachers and circuit supervisors taught for more that 20 years compared to (86.8%) of teachers who had taught for only a little above 3 years.
2. Headteachers and circuit supervisors monitored lesson notes and classroom teaching. However, both headteachers (75.0%) and circuit supervisors (66.7%) were more interested in observing classroom lessons than vetting of lesson notes. The frequency of supervision was mostly twice in a term by headteachers and circuit supervisors. This was as a result of the dual role headteachers play as both classroom teachers and supervisors coupled with meetings and school management.

3. a) The challenges that teachers came out with were at variance with that of the headteachers and circuit supervisors. According to the teachers their main area of difficulty was with the organization of practical activities (44.7%) but headteachers (85.0%) and circuit supervisors(55.0%) were of the view that subject knowledge was the main problem of the teachers.

Teaching and learning materials was an area that teachers could manage satisfactorily (63.2%). Organization of practical work for pupils was also seen to be an area that the teachers mostly neglected.

b). Headteachers (48%) and circuit supervisors (63.2%) gave professional support to teachers in the area of teaching and learning materials. However, support to teachers in the teaching of science was not adequately meeting their needs in terms of subject knowledge and organization of practical work.

4. Lack of continuous professional development (CPD) for headteachers and circuit supervisors was one of the major hindrances to effective monitoring of science teaching. It was observed that number of schools under the supervision of circuit supervisors was too many for them to do any effective work. Lack of logistical support for circuit supervisors to enable them visit the schools was a major drawback to to effective monitoring and supervision.

Conclusions

1. Majority of the primary school teachers in this study did not possess the appropriate background to teach science in the primary schools. The teachers were however aware of this handicap and were willing to upgrade their knowledge and accept any innovations that would help them teach science effectively in the primary schools. A number of weaknesses observed include the extensive use of the ‘chalk and talk’ method of teaching; low frequency in the use of teaching and learning materials to facilitate pupils’ understanding of lessons; teachers’ inability to provide teaching and learning materials to make science teaching and learning activity oriented and child-centered. These weaknesses no doubt would make it difficult for pupils to understand science lessons and apply them in their daily lives.
2. Headteachers and circuit supervisors did not have the requisite background to monitor science teaching effectively or give the necessary assistance to teachers to improve their teaching. The lack of logistical support with about 13 primary schools under the care of one circuit supervisor did not make monitoring and supervision very effective.
3. The lessons from selected schools in the Akuapem North District show that it is not enough to enforce monitoring and supervision of schools as a way of improving teaching and learning of science.

What is equally important is the qualification of headteachers and circuit supervisors with the relevant experience and knowledge to help teachers to make science teaching very interesting. Also, important is the logistical support needed for the monitoring and supervision of the teaching and learning of science at the primary school level. However this study has shown that logistical support was lacking. Without logistical support, monitoring and supervision of schools will continue to be ineffective and teachers will continue to deliver poor quality science lessons in schools.

Recommendations

The following recommendations are aimed at helping to improve upon the teaching and supervision of science in primary schools.

1. Science should be seen as subject which requires a specialist in the field to teach. If this situation will be difficult to achieve then there should be continuous professional development for teachers, headteachers and circuit supervisors by the Ghana Education Service to update their knowledge and competencies for effective delivery.
2. The Ghana Education Service should consider re-introducing Basic Science Kits to primary schools to facilitate the teaching and learning of science by making it activity oriented and child-centered. GES can also provide adequate funding to schools to support the design and development of teaching/learning materials to improving science teaching and learning.

3. The Ghana Education Service should employ more circuit supervisors to reduce by half the number of schools currently being handled by circuit supervisors for effective monitoring supervision.
4. Logistics and other support services needed by circuit supervisors should as a matter of urgency be provided by Ghana Education Service. Transport or fuel allowance should be paid to circuit supervisors regularly and on time to enable movement to the schools for monitoring and supervision.

Suggestions for Further Research

The study basically looked at the effective monitoring of science teaching and the assistance that can be offered teachers by headteachers and circuit supervisors to improve classroom delivery in some selected schools in the Akuapem North District. It is suggested that the study should be replicated in other districts which have not had the opportunity of the STM Project. This will enable a comprehensive picture about monitoring and supervision of schools to be painted for redress.

REFERENCES

- Adesina, S. (1990). *Educational management*. Enugu: Fourth Dimension Publishers Co Ltd.
- Agboola, D. (1984). *Activities for developing critical thinking skills*, Zaria: Ahmadu Bello University.
- Avalos, B. (1991). *Approaches to teacher education: Initial teacher training*. London: Commonwealth Secretariat.
- Anamuah-Mensah, J. , Asabere-Ameyaw, A. and Mereku, K. D. (2003). *Results from Ghana's participation: Trends in International Mathematics and Science Study*, Accra; Ghana Education Service.
- Asiedu-Akrofi, K. (1978). *School organization in modern Africa*. Tema: Ghana Publishing Corporation.
- Awuku, K. (1981). *Current structure and development in basic teacher education*. Paper presented at Institute of Education Test Development Workshop. Saltpond, Ghana.
- Basic Education Sector Improvement Programme (1996). *Policy document: Free compulsory universal basic education (fCUBE)*. Accra: Ministry of Education.
- Benito, E. N. Carale, L. R. Galvez, E. R. Magno, M. C. Pabellon, J. L. Talisayon, V. M. Tan, M. C. and Treyes, R. S. (2003). *Supervision of science and maths teaching*. Quezon : Deliman
- Bloom B.S. (1956). *Taxonomy of educational objectives*. London: Longmans.

- Bush, T. (1999), "Introduction: setting the scene", in Bush, T., Bell, L., Bolam, R., Glatter, R., Ribbins, P. (Eds), *Educational Management: Redefining Theory, Policy and Practice*. London: Paul Chapman
- Campbell, R.F., Bridges, E.M., & Nystrand, R.O. (1977). *Introduction to educational administration*. Boston: Allyn and Bacon.
- Carin, A. A. & Sund, R. B. (1989). *Teaching science through discovery*. Columbus: Merrill Pub. Company.
- Castro (1991) & Davini (1995), *Teacher professional development. An international review of literature*. Paris: UNESCO
- Chayter, D.E. (1975). *Science teaching source book for science teachers*. Accra: SEPA
- Centre for Continuing Education, (2000). *Basic education administration and supervision: Education course book for diploma in basic education*, Cape Coast: University of Cape Coast.
- Chang, R. (1995). *Continuous process improvement*. London: Kogan Page
- Chiapperra, E. L. & Koballa, (2002). *Teaching science through discovery*. Columbus: Merrill Publishing Co.
- Clements, P. & Vandenberghe, R. (2001). How school leaders can promote teachers' professional development: an account from the field of " . In: *School leadership and Management* , 21(1), 43-57.
- Commonwealth Secretariat (1991): *Improving the quality of basic education; survey of commonwealth experiences*. London: The Commonwealth

- Commonwealth Secretariat (1993). *Policy and practice in initial teacher training: quality in basic education. professional development of teachers*. London: The Commonwealth
- Converse, R. E. & Contant, T. L. (1993). Working with principals. In G Madrazo & L. Motz (Eds.), *Source book for science supervisors* (pp. 61-77). Arlington, VA: National Science Teachers Association.
- Damtse, E. F. (2000). *Adapting innovative approaches to science teaching in the primary school*. Unpublished Project Work, University of Education, Winneba.
- Esler, W. K. & Esler M. K. (1988). *Teaching Science by inquiry: Teaching elementary science*. California: Wadsworth Publishing Company Inc.
- Education International (1999) *Structural adjustment, education reforms and trades union strategies: Ghana as a case study*, Brussels: Education International.
- Education Strategic Plan (2003). *Policies, Target and Strategies Volume 1* Accra: Ministry of Education.
- Eminah, J.K (2004). A survey of perceived hindrances to junior secondary science teaching. *African journal of educational studies in mathematics and science*. 2(4),51-64
- Farrant, J.S. (1997). *Principles and practice of education* (13th ed.) Singapore: Longman.
- Fayol, H. (1983). General and industrial management. In: G. A. Cole, *Management theory and practice*. Essex: Spottiswood Ballantyne.

- Finandez, C. (2000). Learning from the Japanese approach to professional development. *Journal of teacher education*, 53(95), 393-405
- Fullan, M. (1991). *The new meaning of educational change*. London: Cassell.
- Gega, P.C. (1990). *Science in elementary education*. New York: Macmillan Company.
- Gay, L. R. (1987). *Educational research* (3rd ed.). London: Merrill Publishing Company.
- Ghana Education Service (2002). *Circuit supervisors' handbook*. Accra: Ghana Education Service.
- Ghana Education Service (2002). *Headteachers' handbook*. Accra: Ghana Education Service.
- GES-JICA Science Technology and Mathematics Project (2005). *Final evaluation report*. Accra : Ghana Education Service
- Ghana Statistical Service (1997) *Ghana core welfare Indicators Questionnaire (CWIQ) Survey*. Accra; Statistical Service
- Herbert, D. T. (1970) *Teaching Elementary School Science. A Laboratory Approach*. Yale: University Press.
- Herzberg, B. Mausner, R. Peterson & Capwell, (1996) Job attitude: Review research and opinion. In W. C Hamner, and D. W. Organ (Eds.) *Organizational behaviour: An Applied Psychological Approach* (pp. 226-227). Ontario: Business Publication Inc.

- Horsley, S. & Pratt, H. (1993). Implementation of a science curriculum for the middle grades: Progress, problems and prospects. In G Madrazo & L. Motz (Ed.), *Sourcebook for science supervisors* (pp. 61-72)). Arlington, VA: National Science Teachers Association.
- Humphrey, B. & Stokes, J. (2000). The 21st century supervisor: *Nine essential skills for frontline leaders*. San Francisco, CA: Jossey-Bass/Pfeiffer.
- Isenberg, J. P. & Altizer-Tuning, C. J. (1984). The mathematics education of primary grade teachers: *Arithmetic Teacher*. 31 (5), 23-27.
- Jacobsen, D. (1981). *Teaching Strategies: Method for teaching* Columbus: Merrill Publishing Company.
- Jacobson, S. L. (1989). The Effects of Pay Incentives on Teacher Absenteeism." *Journal of Human Resources* 24(2):280-286.
- Kuhn, T. S. (1962). *The structure of scientific revolution*. Chicago: University Press.
- Lieberman, A. (1994). "Teacher Development: commitment and challenge". In: P.P. Grimmett & J. Nuefeld (Ed). *Teacher development and the struggle for Authenticity: Professional growth and restructuring in the Context of change*. New York: Teachers College Press.
- McComas, W. F. (1993). The nature of science supervision: A review of the literature with implications for practice. In G. Madrazo & L. Motz (Ed), *Sourcebook for science supervisors* (pp. 19-29). Arlington, VA: National Science Teachers Association.

- Matthews, M. (1994). *Science teaching: The role of history and philosophy of science*. New York: Routledge Press.
- Matsumoto, C. (1999). Principals as colleagues in the reshaping of science teaching and learning”. In: Solomon M. Z. (Ed.), *The diagnostic teacher: constructing new approaches to professional development*, New York: Teachers College Press.
- McWilliam, H. O. A. & Kwamena-Poh, M. A. (1975). *The development of education in Ghana*. London: Longman Group Ltd.
- Mechel, E.L. & Oliver, B. (1983) *Science processes: Characteristics of a good elementary science program*. New York: Routledge and Keegen.
- Ministry of Education (2003), *Annual education sector operational plan*. Accra : Ghana Education Service.
- Ministry of Education (2000), *Assessment of basic schools*. Accra: Ghana Education Service.
- Ministry of Education (2001). *Policies and strategic plan for the Education sector*. Accra: Ghana Education Service.
- Ministry of Education (2000). *GES-JICA Science technology and mathematics project baseline survey*. Accra : Ghana Education Service.
- Ministry of Education (2003). *Education strategic plan 2003-2005 Volume 1, policies targets and strategies*. Accra: Ministry of Education

- Ministry of Education and Sports (2004). *Education reform review committee report to the Government of Ghana*. Accra: Ghana Education Service.
- Ministry of Education (2003), *Annual education sector operational plan*. Accra : Ghana Education Service.
- Moore, K. B. (2000). “Successful and effective professional development”. In: *Early Childhood Today*, 15(3), 14-15.
- Musaazi, J. C. S. (1982). *The theory and practice of educational administration*. Hong Kong: Macmillan Publishers.
- Neagley, R. L. & Evans, N. D. (1980). *Handbook for effective supervision of instruction*. (3rd ed.) Englewood Cliffs, N. J.: Prentice Hall
- Okumbe, J. A. (1999). *Educational management. theory and practice*, Nairobi: University Press.
- Oliva , P.F. & Pawlas, G. (2001). *Supervision for today’s schools* (6th ed.) New York: John Wiley & Sons.
- Ossei-Anto, T. A. (1999). Management and integration of science resource in Ghana’s educational reform programme. *Journal of Educational Management*, 2, 42-66.
- Osuala, E. C. (1987) *Introduction to research methodology* (2rd ed.). Onitsha: Africana – FEP Publishers Limited.
- Penick, J. E. (1996). *Creativity and the value of questions in science, technology and society as reform in science education*. Iowa City: University of Iowa.

- Reavis, C. A. (1978). *Teacher improvement through clinical supervision*. Indiana: Phi delta Kappa.
- Sharma, R.C. (1995). *Modern science*. Delhi: Dhanpat Rai & Sons.
- Stone, L. (1984). *Results from a global curriculum project evaluation: practical problems – theoretical questions*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.
- Surd, R. & Carin, A. A. (1985). *Science- What is it. Teaching science through discovery*. New York: Kogen Paul.
- Tamakloe, E.K. (1997). *An evaluation of the national conference on teacher education*. Accra: Ghana University Press.
- Tymms, P. (1999). *Baseline Assessment and Monitoring in Primary Schools*. London: David Fulton Publishers.
- Vasquez, J. & Cowan, M. B. (2000). Moving teachers from mechanical mastery: The next level of science implementation. In J. Rhoton and P. Bowers (Eds.), *Professional development leadership and the diverse learner* (pp. 11-22). Arlington, VA: National Science teachers Association.
- Wiles, J. & Bondi, J. (1991) *Supervision A guide to practice* (3rd ed.) New York: Macmillan.
- Xedzro, A. K. (1995). *Problems affecting the teaching and learning of science in some selected primary schools in Sogakope in the South Tongu District of the Volta Region*. Unpublished Project Work, University of Education, Winneba.

Yager, R. E., & McCormack, A. J. (1989). Assessing teaching/learning successes in multiple domains of science and science education. *Science Education*, 73,

- Diploma
- Three-Year Post Sec Cert “A”
- Two-Year Post Sec Cert “A”
- Four-Year Post Middle Cert “A”
- Two-Year Post Middle Cert “B”
- DBS (Polytechnic)
- HND
- Senior Secondary School Cert.
- Other (s) (specify)

8) What is your area of specialization? (Please tick)

- Arts
- Science
- No specialization but General Studies
- Others (specify:

9) Number of schools in your circuit []

10) Total number of teachers, excluding headteacher

Total: [] Female [] Male []

INITIAL TRAINING AFTER APPOINTMENT

11) Did you receive any training on your appointment as a circuit supervisor?

Yes No

If 'Yes' what was the nature of the training?

.....
.....
.....

TYPE OF MONITORING

12) What type of monitoring do you normally undertake of your teachers?

Impact Process Others (Specify: _____)

13) What instruments do you use for monitoring science lessons?

Lesson plan assessment sheet Lesson Presentation assessment sheet

Others (Specify: _____)

14). Give a short comment on the instruments for monitoring science lesson.

.....
.....
.....
.....

TEACHING OF SCIENCE

15) Do teachers use TLMs in their science lessons?

- Yes No

16) If yes to what extend?

- Very Often Often Not often Rarely

17) Do teachers carry out group activity?

- Yes No

18) How many groups do they normally put the class and how many pupils are normally in the group?

- Less than 5 between 5 and 7 More than 7

19). Do you find the grouping convenient and why?

.....
.....
.....
.....
.....

20. Do you think that science should be taught by a specialist? Give reasons for 'Yes' or 'No' answer.

.....
.....
.....

CHALLENGES IN SCIENCE TEACHING

Please tick the appropriate response

21). What are the challenges of the teachers in your circuit with regards to teaching and learning of science? (Tick as many as you can.)

- Subject knowledge and skills
- Modern method of teaching
- Use of activity method
- Systematic and accurate presentation of lesson
- Subject challenging topics
- Construct of TLMs using improvised materials
- Effective use of TLMs
- Good lesson notes
- Study of curriculum materials
- Practical lesson delivery
- Child-centered approach
- Effective group working in the class
- Other (s) (specify:

22). What forum do you normally use to address the challenges mentioned above?

- Staff meeting Center-based INSET School-based

INSET

- Other(s)

23). How do you address the challenges?

.....
.....
.....
.....

24). What follow up measures do you put in place?

.....
.....
.....

PROFESSIONAL DEVELOPMENT TO ENHANCE WORK

SCHEDULE

25). Mention the workshops that you have attended to enhance your monitoring activities?

- (i)

- (ii)
- (iii)
- (iv)
- (v)
- (vi)
- (vii)
- (viii)
- (ix)
- (x)

26. What aspect of the workshop did you find beneficial to your job?

.....

.....

.....

27. Suggest ways by which the monitoring of science teaching and learning can be improved.

.....

.....

.....

APPENDIX B

QUESTIONNAIRE FOR HEADTEACHERS.

This is a study to find out about the effect of Monitoring in enhancing teaching and learning of science in the basic schools. Your response to the questions below will be treated as confidential and used for research purposes only. Your identity is not required so kindly respond to the items as truthfully as possible.

1. BIO DATA

1. Gender (Please tick) ¹ Female ² Male

2. Age range? (Please tick)

21-25 26-30 31-35 36-40 41-45 46-50

51-55 56-60

3. Number of years of teaching experience ()

4. Number of years as headteacher? [] years

5. Number of years as headteacher at your current school? [] years

6. What is your highest Educational Qualification? (Please tick)

Science

No specialization but General Studies

Other (specify:

7) What is your area of specialization?

sheet

Others (Specify: _____)

13). Give a short comment on the instruments for monitoring science lesson.

.....
.....
.....
.....

TEACINIG OF SCIENCE

14. Do teachers use TLMs in their science lessons?

Yes No

15. If yes to what extend?

Very Often Often Not often Rarely

16. Do teachers carry out group activity in science lessons?

Yes No

Please tick the appropriate response

17. Do teachers carry out group activities?

Yes No

18). Do you find the group convenient and why?

.....
.....

.....
.....

CHALLENGES IN SCIENCE TEACHING

19). What are the challenges of the teachers in your school with regards to teaching and learning of science? (Tick as many as you can.)

- Subject knowledge and skills
- Modern method of teaching
- Use of activity method
- Systematic and accurate presentation of lesson
- Subject challenging topics
- Construct of TLMs using improvised materials
- Effective use of TLMs
- Good lesson notes
- Study of curriculum materials
- Practical lesson delivery
- Child-centered approach
- Effective group working in the class
- Other (s) (specify:

20). What forum do you normally use to address the challenges mentioned above?

- Staff meeting Center-based INSET School-based

INSET

- Other(s)

21). How do you address the challenges?

.....
.....
.....

22). What follow up measures do you put in place?

.....
.....
.....
.....

23). Mention the workshops that you have attended to enhance your monitoring activities?

- (i)
- (ii)
- (iii)
- (iv)
- (v)
- (vi)
- (vii)

(viii)

(ix)

(x)

24). What aspect of the workshop did you find beneficial to your job?

.....
.....
.....

25). Do you think that science should be taught by a specialist? Give reasons for 'Yes' or 'No' answer.

.....
.....
.....
.....
.....

a. Suggest ways by which the monitoring of science teaching and learning can be improved.

.....
.....
.....
.....
.....
.....
.....

APPENDIX C

UNIVERSITY OF CAPE COAST
INSTITUTE OF EDUCATION, FACULTY OF EDUCATION
QUESTIONNAIRE FOR PRIMARY SCHOOL TEACHERS

This is a study to find out about the effect of **Monitoring** in enhancing teaching and learning of science in the basic schools. Your response to the questions below will be treated as confidential and used for research purposes only. Your identity is not required so kindly respond to the items as truthfully as possible.

1. BIO DATA

1. Gender (Please tick) Female Male

2. Age range? (Please tick)

21-25 26-30 31-35 36-40 41-45 46-50

51-55 56-60

3. Number of years of teaching experience ()

5. Number of years at your present school? [] years

6. Highest Educational Qualification? (Please tick)

First degree or higher

- Diploma
- 3-Yr Post Sec Cert “A”
- 2-Year Post Sec. Cert “A”
- 4-Year Post Middle Cert “A”
- 2 Yr. Post Middle Cert “B”
- DBS (Polytechnic)
- HND
- Senior Secondary Sch Cert.
- Other(s) (specify.....)

SCIENCE TEACHING

8. How do you identify the challenges of science teaching and learning?

.....

.....

.....

9. What are your challenges with regards to teaching and learning of Science?

(Tick as many as you can.)

- Subject knowledge and skills
- Modern method of teaching

- Use of activity method
- Systematic and accurate presentation of lesson
- Subject challenging topics
- Construct of TLMs using improvised materials
- Effective use of TLMs
- Good lesson notes
- Study of curriculum materials
- Practical lesson delivery
- Child-centered approach
- Effective group working in the class
- Other(s) (specify:

10. How do you address the challenges mentioned above?

- Staff meeting Center-based INSET School-based INSET
- Other (specify).....

11. Do you use TLMs in science lessons?

- Yes No

12. If yes to what extend?

Very Often Quite Often Quite Often

Not often Rarely

13. What three key problems/challenges do you face in trying to

incorporate TLMs in your science lessons?

(i)

.....

(ii)

.....

(iii)

.....

.....

14. Do you normally carry out group activity?

Yes No

15. What are the major problems associated with group work?

.....

.....

.....

.....

16 Which of the problems /challenges associated with science teaching are
you not able to address and why?

.....

.....

.....
.....
.....

17. Mention the workshops that you have attended to enhance the teaching and learning of science?

- (i)
- (ii)
- (iii)
- (iv)
- (v)

18. List the kinds of support you expected to receive from the following people.

- (i) Headteacher.....
.....
.....

- (ii) Circuit Supervisor
.....
.....
.....

19. Which of the supports are you provided with and by whom?

.....
.....

.....
.....
.....

20. Do you think that your headteacher and circuit supervisor are in the position to help you address most of your problems in science teaching and learning.

.....
.....
.....
.....
.....

APPENDIX D

UNIVERSITY OF CAPE COAST

INSTITUTE OF EDUCATION, FACULTY OF EDUCATION

INTERVIEW GUIDE FOR HEADTEACHERS AND CIRCUIT

SUPERVISORS ON MONITORING OF SCIENCE TEACHING

This interview aims at collecting information about monitoring of science teaching by circuit supervisors and headteachers at the Akuapem North District of the Eastern Region of Ghana.

It would be very much appreciated if you could answer the following questions as frankly and truthfully as possible. Your responses are confidential and your anonymity is assured.

What are your views on the following items:

Competency of teachers/headteachers/Circuit Supervisors

1. Initial Training after Appointment

- a. How do newly appointed teachers/headteachers/ Circuit supervisors given orientation on the position they are assigned to.
- b. How do headteachers/Circuit Supervisors monitor science teaching and learning.

2. Staff Development.

- a. How is staff development carried out in your district?
- b. Is there any structured or institutionalised INSET carried out in the district?

3. Science teaching and monitoring.

- a. How often do you observe classroom teaching?
- b. Do you have the opportunity to observe teachers teach science?
- c. How do you rate their competency
- d. In your view do teachers have much challenge in teaching science?
- e. How do you assist them in overcoming some of the challenges?

4. Challenges in monitoring science teaching.

- a. What are some of the problems you encounter in performing your duty as headteacher or circuit supervisor in instructional supervision?
- b. How do you overcome some of these challenges?

