A STUDY OF THE ADEQUACY OF RESOURCES OF THE BORNO STATE PRIMARY SCHOOL TEACHERS FOR SCIENCE TEACHING

BY

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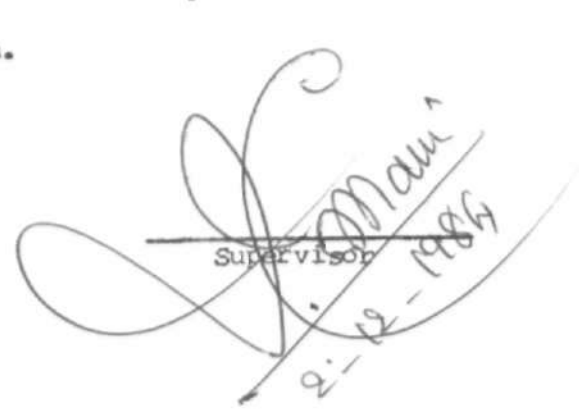
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APPROVAL SHEET

The undersigned certify that they have read, and have recommended to the Faculty Board of Education for acceptance, a research study entitled "A Study of The Adequacy of Resources of The Borno State Primary School Teachers for Science Teaching" submitted by Ishaku Dalo, in partial fulfilment of the requirements for the degree of Master of Education.



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DEDICATED

TO MY BELOVED WIFE,

HALIMA ISHAKU DALO.

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ABSTRACT

The study reported was an investigation of the adequacy of the resources available to primary school science teachers in six Local Government Areas of the Borno State. The resources selected for investigation were:

l. The professional equipment of the teacher.

2. Administrative support given to the teacher.

3. Material resources available as science teaching aids.

The data for the study were gathered through questionnaires and interviews- A total of 120 respondents from 57 primary schools suppled the data. The findings of the study suggested the following:

l. Even the certificated science teachers had no specific preparation to cope with the implementation of the Primary Science Currilum.

2. The administrative support for the teachers in the schools were inadequate, non-uniform, and haphazardly provided.

3. Though the teachers claimed they used simple visual aids, syllabus, and textbooks in science instruction, no school had any of the standard type of audio-visual equipment and materials for use with them as science teaching aids,

Chapter 1

THE STUDY PROBLEM

1.1 Introduction

Within any classroom, the science taught and the the way it is done is dependent primarily on what the teacher believes, knows, and does. Research studies indicate that the type of instruction does affect student learning and the teacher is the most important instructional variable. Even with the best of facilities and the most ideal learning environment, the best of science teaching objectives could be frustrated if the teachers do not understand them or are not competent to attain them. At the same time, many of the obstracles to effective science teaching at any level can atleast be reduced to a minimum if teachers will refuse to accept them as barriers that are unsurmountable.

If the teachers in our schools have to possess the confidence they need, to refuse to accept the existing obstacles to effective science instruction in our schools, they need to be educated appropriately.

All the improved science courses introduced into our schools, from the primary level, are trying to help pupils learn science content compatible with the practicing scientist's view of science. This view of science requires

a non-traditional teaching approach characterised by openness, flexibility, inquiry and pupil involvement in more than just reading about science and watching teacher demonstrations. Science educators in Nigeria have recently acknowledged the key role, teachers at all levels have to play, in the science classrooms in the country. As a consequence a number of continuing conferences and workshops are being held to reconsider the content and method of educating teachers to cope with the demands of the new approach to science and science teaching in schools.

Take for example, the meeting of the Primary School Science Curriculum Panel held in Jos Teachers Resource Centre between 24th and 27th of October in 1978. The deliberations at the meeting centred round the objectives and the content of the several existing Primary Science Programmes in the country. The meeting critically examined the relevance and usefulness of the existing programmes to attain the general national objectives of primary education. An attempt was also made at identifying the materials and equipment needed for teaching primary school science. The science programmes reviewed included: the Niger State Primary Science , the Lagos State Primary Science, the Primary Education Improvement Programme Science, the Anambra State Primary Science, and The Oyo State Primary Science. The

recommendations of the Jos meeting were deliberated upon and accepted at the meeting of the Joint Consultative Committee on Education in Port Harcourt in February, 5-10, 1979. The most significant outcome of the series of such meetings was the development and the adoption by the National Council on Education, in 1980, of the Core-Curriculum for Primary Science.

The development of the Core-Curriculum for Primary Science initiated further curriculum development activities at the National level to meet the need for evolving another core-curriculum for Teachers' Grade Two Science. The initiative for the curriculum development activities came from several quarters including the Nigerian Educational Research Council, the Federal Ministry of Education, the State Ministries of Education, and the University Faculties and Institutes of Education. Their efforts resulted in the workshop held in Kano from 13th to 17th of September, 1982 and the National Critique Workshop in 1983. These continuing curriculum development activities are a reflection of the concern at the National level for introducing science properly at the grass-roots level in the educational system. The activities are based on the belief that a meaningful take off of technological development in the country is possible only after science education is effectively introduced into our schools.

The core-curriculum for Teachers' Grade Two Science, that is being perfected is meant to enable the primary school teachers to handle effective teaching of science at the primary school level by taking the teachers to move through a science curriculum that is comprehensive, detailed and carefully spelt out for effective use. The curriculum builds on the core-curriculum for integrated science for Junior Secondary School content-wise. The method focuses on content of core-curriculum for primary science. The topics under method are carefully selected and clearly spelt out to suit the desire for effective and meaningful teaching of primary science. The objectives of the curriculum as selected are in line with the National Policy on Education.

Inspite of the curriculum development efforts for improving the content and quality of primary science in the country, will the primary school teachers in Borno State be able to cope with the demands of the evolving core-curriculum for science? Are the Teacher Training Colleges in Borno up to the task of preparing primary school teachers who are competent to handle effectively the new core-curriculum for primary science? What sort of primary school teachers are being turned out by the Teacher Colleges at the moment? These were the questions this independent study set out to investigate.

1.2 Statement of The Problem

Curriculum theorists have all along expressed the fear that any curriculum might have a dual existence. On the pages of the curriculum document it exists as the intentions and the specifications of the required instructional facilities and resources. In the actual classrooms where the curriculum is used, it takes on an operational form. The curriculum as intentions is the intended curriculum. The form in which it is implemented in the classrooms is the curriculum in operation. The problem for the study was the assessment of the adequacy of the resources of the Borno State primary school teachers to meet the instructional demands of the Primary Science Core Curriculum. Do the Borno State primary school teachers have adequate resources to ensure minimum divergence between the intended and the operational forms of the Primary Science Core Curriculum?

1.3 The Study Questions

In order to assess the adequacy of the primary school teachers' resources to meet the demands of the Primary Science Core Curriculum a number of related questions were raised to be answered through the study. The following were the study questions.

1. How adequate is the professional equipment of the Borno State primary school teachers to implement the Primary Science Core Curriculum?

2. How adequate is the administrative support available to the Borno State primary school teachers to implement the Primary Science Core Curriculum?

3. How adequate are the material resources available to the Borno State primary school teachers to implement the Primary Science Core Curriculum?

1.4 Assumptions of The Study

1. To teach the Primary Science Core Curriculum effectively the teacher should have competence in atleast three different are as

2. One area of competence is the content of the Nigerian Integrated Science Project Curriculum.

3. The second area of competence is the philosophical, psychological, sociological and the curricular foundations of science teaching.

4. The third area of competence is the technical skills of planning, presenting and evaluating science lessons.

5. A teacher with the competencies in the three areas listed above need administrative support through supervision, provision of adequate science teaching time, and opportunities to attend in-service training sessions to continue to keep up with new trends in science instruction.

6. Teachers need a certain number of minimum physical facilities to help their pupils learn science effectively.

1.5 Purpose of The Study

The assessment of the adequacy of the resources available to the primary school teachers in Borno State for teaching science effectively is carried out for the

specific purpose of highlighting the strengths and weaknesses of the primary school system in the state in the context of the implementation of the Primary Science Core Curriculum. There are several agencies whose contributions are necessary for the successful implementation of any curriculum innovation. As for the Primary Science Curriculum, the State Ministry of Education, the Local Government Education Authorities, the Grade II Teacher Colleges, the Headmasters, the parents, and the teachers have all to play their own roles before the curriculum is successfully used in the State primary schools. The study was for the purpose of educating all those concerned about the prospects and problems of teaching science in the State primary schools according to the expectations of the Federal Ministry of Education. Ignorance is no excuse for inaction. There is every need for science education based research studies to generate information about situations that need improvement or modification for the purpose of enhancing the quality of instruction in our classrooms. The study was undertaken to produce information for the purpose of changing the quality of science instruction in the Borno State primary schools.

1.6 Significance of The Study

Curriculum development activities generally end on a note of optimism and satisfication as soon as the curriculum document is ready. It is at time like this, curriculum

research studies are needed to draw the attention of curriculum implementation agencies to the enormity of the task yet to be accomplished before the curriculum improvement efforts begin to bear tangible fruits for the society. If the curriculum developers rest on their oars, congratulating themselves for producing the intended curriculum, the society at large that controls the affairs of the schools have yet to be goaded into action to make the curriculum work within the classrooms. Until such time that the operational curriculum very closely relate to the intended curriculum, nothing much substantive can be claimed to have been achieved. The study was undertaken to predict the the degree of success of the implementation of the Primary Science Curriculum in the Borno State schools. The advance knowledge about the prospects or the problems of implementating the curriculum should help all concerned to adopt necessary measures for ensuring the success of the science curriculum.

1.7 Limitations of The Study

1. The study was restricted to involve 120 primary schools chosen from 6 local government areas in Borno State. A total number of 20 primary schools were chosen from each local government area. The choice of the local government areas and the primary schools was based on their accessibility.

2. Though there were several Grade II Teacher Training Colleges in Borno State, only those 8 colleges producing trained teachers as long ago as three years from the year of the study were included in the study.

3. The study was limited to cover three aspects of primary school science teaching. The aspects were:

   (a) the professional equipment of the teachers.

   (b) the administrative support available to the teachers.

   (c) the material resources at the disposal of the science teachers.

1.8 Definitions

The technical terms used for the purpose of reporting the study were operationally defined as given below:

1. The intended curriculum. The curriculum specifications including the curriculum objectives, study content, instructional methods and materials, and the evaluation measures to be used by the teachers.

2. The operational curriculum. The description of what is achieved by the pupils, the course content actually taught, the instructional methods and materials and the evaluation measures used in the real classrooms when taught.

3. The Primary Science Core Curriculum. The core curriculum for Primary Science that was approved by the National Council on Education of Nigeria in 1980.

4. The professional equipment of the primary school teacher. The competence in atleast the three areas of:

   (a) Integrated Science content

   (b) Foundations of science teaching

   (c) Technical skills of planning, presenting and evaluating science lessons.

5. Administrative support for science instruction

   The administrative measures taken to provide:

   (a) teaching time and pupils per class

   (b) supervision of teachers

   (c) in-service training of teachers.

6. Material resources. The science teaching resources including:

   (a) Pictures, models, objects

   (b) Syllabus

   (c) Science textbooks,

   (d) Science equipment such as apparatus, and audio or visual science teaching aids.

7. Instruction. Instruction is defined as the implementation of the intended curriculum. Instruction usually but not necessarily involve teaching. Teaching is the pupil - teacher interaction phase of instruction (Saylor, Alexander, 1974).

8. Core Curriculum For Teachers Grade Two Science. The science curriculum developed for the Grade II Teacher Colleges by the Federal Ministry of Education, Lagos.

Chapter 2

REVIEW OF LITERATURE

2.1 The Review

The literature review was for the purpose of finding what research studies have so far revealed about the classroom behaviours of the science teachers inspite of the curriculum improvement efforts. Consideraable volume of science curriculum improvement efforts were so far undertaken in U.S.A. How did the efforts affect the performance of classroom teachers in that country? In Nigeria too science curriculum improvement efforts were in progress at both the secondary and the primary school levels? What do we know about the classroom behaviours and the instructional competencies of the teachers who ultimately have to transform the curriculum intentions into pupil behaviours? What are the expectations about the competencies and the classroom behaviours of the primary school science teachers in Nigeria?

2.2 How did Science Curriculum Improvement Affect Science Teaching In The American Schools?

The National Science Foundation (NSF) of America requested several organizations in that country to evaluate a three-part series of studies published by them on the status of science, mathematics, and social studies education in American schools. De Rose, Lockard, and Paldy (1979),

reported on science education specifically. Some of the findings of the De Rose report dealing with several aspects of school science instruction were as follows.

How do teachers teach? Though there was evidence about more use of the laboratory and the hands-on-instruction than was the case before the advent of improved science curricula, at all levels, the prominent method of teaching was discussion. The teacher was in control all the time. The textbook was the basis of reading. Most discussions concerned definitions and information taken from the textbooks. Individual thought and inquiry followed by discourse were rarely observed in science teaching.

What do teachers teach? Even those teachers with the best intentions of using laboratory investigation and inquiry techniques were forced to adopt more passive, text-oriented approaches because of such barriers as insufficient teaching time, inadequacy of classroom facilities and the scarcity of instructional materials. Lack of student motivation and the demanding nature of inquiry teaching were also equally responsible for the text-oriented teaching methods.

How are teachers educated? Improved science teacher education, both pre- and in-service, has become an important need. This need poses a challenge to the teacher training

institutions to work in closer collaboration with the school districts where their graduates are employed. Very little of the post-training qualifications of the science teachers is in academic sciences. So there is still a need for pre-service and in-service training to enable science teachers overcome the fear of teaching science. While the NSF-sponsored summer and the in-service courses were considered as major help for science teachers, the majority of teachers of science did not make use of them. It was found absolutely necessary for the primary school science teachers to be provided continuous in-service and supervisory consultant help in science and in the teaching of science since their education does not include any significant study in these areas.

Who helps the teacher? Only one in five of the school districts surveyed employed full-time science supervisors or co-ordinators and that two in five school districts had none. More and more, two separate systems- management and instructional - were found to develop within the schools and were found to be interacting less and less among themselves.

With what do teachers teach? Relatively few schools had specific budgets for science equipment and supplies. Teachers considered inadequate facilities, insufficient funds for purchasing equipment and supplies, and lack of materials for individualized instruction as three most

serious problems affecting science instruction. Insufficient time to teach science was considered a more serious problem in lower than in upper grades.

2.3 The Classroom Behaviours And The Instructional Competencies of Science Teachers In Nigeria

Several field studies were reported carried out mostly in schools and teacher colleges in Nigeria. The studies had some bearing on the competencies of science teachers.

(a) In a study involving 383 primary school teachers and 834 of their pupils from schools in Zaria, Metropolitan Kano, Yerwa, Katagum, Katsina-Ale, Kagoro, Muri, Argungu, Mubi, Oturkpo, and Borno Divisions of the Northern States of Nigeria, Malgwi (1975), investigated

(a) the teachers' perceptions on primary school science goals,

(b) their pupils' understanding of the benefits and nature of science.

The schools were distributed over geographically well separated zones and the pupils were interviewed in their mother tongue. There was a visible gap between the teachers' perceptions and their pupils' understanding. When the majority of the teachers selected as appropriate the right goals from a given list, the majority of pupils had no ideas about the benefits of science to them or

what science was all about.

(b) In another study involving science teachers in secondary Form 1, 2, and 3 in 53 secondary schools from Kano, Kaduna, and Kwara States of Nigeria, Umar (1976), evaluated the science programmes in the schools using an adapted version of A Suggested Checklist for Assessing a Science Program, U.S. Office of Education, Document OE-29034A, 1964, pp. 1-19. The ten aspects of the programme assessed included,

1. Foundations for planning,
2. Public responsibility and goals,
3. Curriculum,
4. Teaching - learning,
5. Evaluation,
6. Youth Activities,
7. Staff,
8. Administration,
9. Finances, and
10. Facilities, equipment and teaching aids.

Many strengths and weaknesses of the science programmes were identified. But what interested us was the identified areas where science teachers could have contributed to remedy the deficiencies, but did not. Such for example, were the following instances:

Using local science related resources available for improving science teaching.

Using educators and professional scientists in the vicinity to talk to the pupils or for consultation.

Co-ordinating the teaching of English, Mathematics, and Science, the most commonly taught subjects in schools.

Providing science for all pupils.

Emphasising the process skills of scientific inquiry in science teaching.

Providing firsthand experiences and apportunities for the pupils to engage in laboratory work.

Using teacher and pupil demonstrations to promote critical thought and discussion.

Using anecdotal records, observations of laboratory procedures, rating scales, performance tests in pupil evaluation.

Evaluating their own teaching procedures.

Providing for youth activities such as science clubs, science seminars, annual exhibits.

Attending meetings of professional organizations.

Subscribing to or reading educational journals, science teaching journals.

Assuming responsibility for career guidance of pupils interested in sciences.

Working with other staff members to co-ordinate teaching learning activities.

(c) In a study to assess the availability of standard audio visual teaching aids in schools and the skills of the practicing teachers to use them Olorunleke (1978), administered to 181 teachers from secondary schools, teacher colleges, advanced teachers colleges, and colleges of arts, science and technology in Benue, Borno, Kaduna, Kano, Kwara, Niger and Plateau States, checklists of standard audio visual aids and the skills required to operate them. The teachers were also given a set of statements dealing with the usefulness of the aids to teaching, to record their agreement or disagreement with them on a five-point scale.

The audio visual aids were,

1. readily accessible resources,
2. lettering devices,
3. sketching and drawing devices,
4. bulletin boards,
5. graphic materials,
6. still pictures,
7. audio equipment,
8. demonstration equipment, and
9. printed texts.

The skills related to

1. the use of radio, record players, tape recorders,

2. use of projection equipment,

3. use of Television receivers,

4. use of duplicating devices,

5. use of photographic cameras,

6. planning facilities, and

7. producing graphic materials.

It was found, that though the teachers in the sample recognised the usefulness of audio visual aids to teaching, lacked the skills of handling them and their schools did not have the equipment.

(d) In three separate studies Nyam (1979) Mohammed (1979), Abdulkadir (1979), investigated the practices and preferences of 314 science teachers in junior secondary forms in the twelve northern states of Nigeria. The practices included,

1. the teacher and pupil activities in science lessons, and

2. the type of questions set in teacher-made classroom tests.

The preference was that the junior secondary pupils. The teachers listed among their activities lecture-type lessons, teacher demonstrations, and guiding student experimentation, 47.8%, 32.6%, and 19.6% times respectively.

When 300 ramdomly selected teacher-made test questions were analysed in three different ways:

i. 29.3% and 70.7% of them belonged in the divergent and convergent categories.

ii. 82%, 12.3% 5.7% of them respectively were found to test the pupils on recall, comprehension, and application of knowledge.

iii. 10% of them dealt with the process skills of observing, hypothesising, designing experiments, setting experiments, and inferring.

14% of the sample of teachers considered integrated science as the most suitable science course for the junior secondary pupils.

(e) An ex post facto study of the instruction of the Nigerian Integrated Science Project Curriculum was carried out during the school sessions 1978/79 and 1979/80 (Mani, 1981). The study evaluated the

> teaching of the innovatory curriculum to see how far its intended and the operational forms were alike. The study revealed considerable information about the classroom behaviours of science teachers in Nigerian schools.

The description of the curriculum intentions was derived from the curriculum proposals as contained in the teacher's guides. The description of what was taught and learned and how was obtained through an ideology, consensus, behaviour study among classroom teachers who used the curriculum. The ideology, consensus, behaviour study sought the answers to two different questions.

1. Did consensus exist among the teachers about the NISP curriculum ideology?
2. If such consensus existed, did the teachers subscribe to specific behaviours implied by the curriculum ideology?

The study sample consisted of 58 secondary schools selected through proportional random sampling procedure. A multi-purpose questionnaire was given out to 58 teachers, 43 science lessons routinely taught by the teachers were observed, 1998 pupils who learned the curriculum materials for one school year were tested, documents in the form of 36 teacher-made science examinations consisting of 1195 test items were analysed. The study instruments were:

1. the Teacher Questionnaire
2. the Objectives Analysis Schedule
3. the Classroom Activities Analysis Schedule
4. the Science Quiz.

The analysis of the study data led to the following findings (Mani, 1981, 154-208). Was there consensus among the teachers about the curriculum ideology?

1. The teachers preferred organising and presenting the science course content for the junior secondary pupils using the integrated approach. The teachers agreed that the Science Teachers Association of Nigeria (STAN) version of the NISP curriculum was:
2. Enjoyable for the teachers to teach
3. Enjoyable for the pupils to learn
4. Not more expensive than the other science courses known to them as suitable alternatives for junior secondary pupils.
5. The teachers also thought that they understood the implications of teaching what science is and how the scientists work.
6. The teachers throught that they had sufficient training in physics, chemistry, and biology to teach the basic unity of science.

On the basis of what the teachers said and felt it was concluded that they were positively disposed to the curriculum materials and the curriculum ideology.

Did the classroom behaviour of the teachers conform to those implied by the curriculum specifications?

1. The Science lessons taught by the teachers were more often teacher-centred.
2. On the basis of the teachers' description of the classroom activities that happened in science lessons taught by them and on the evidence derived from observing what transpired during forty-three science lessons taught by the teachers it was reasonable to conclude that more often expository instruction rather than inquiry type was going on in the classrooms where the teachers taught. In expository instruction the opportunities available for discovery-inquiry learning and open-ended problem solving experiences were fewer than those expected by the curriculum intentions.
3. On the basis of the observations made about the forty-three science lessons taught by the teachers and the information derived from the analysis of thirty-six class examinations set by the teachers it was concluded that the teachers were not emphasising all the possible instructional objectives, more especially the higher order cognitive, process skill, and the attitude objectives.
4. The pupils' test scores suggested that they attained learning outcomes that were normally the result of instruction through telling and showing. The

pupils' performance also suggested that they did not attain behaviours that are nromally accomplished through learning by doing. The classroom behaviours of the teachers did not conform with those implied by the curriculum ideology to the extent expected by the curriculum specifications.

Mani, T.C. A Study of Some Aspects of the Intended and Operational Forms of the Science Teachers Association (STAN) Integrated Science Curriculum. Unpublished Ph.D. Thesis, Ahmadu Bello University, 1981.

The Gap Between The Intended And The Operational Forms of The Nigerian Integrated Science Project (NISP Curriculum.

(f) Another survey study relating to the instruction of science in primary schools was reported (Karaye, 1983).

The study was a survey of the state of science teaching in the Kano City Primary Schools. The purpose of the study was the assessment of the extent of preparedness of the primary schools in Nigeria to take on the science teaching responsibilities allocated to them by the National Policy on Education (1981).

The study method was the collection of information in respect of the physical facilities and other science teaching resources available in the schools through school visits, interviews with school staff and pupils. The

collected information was used to compute several indicators of the quality of science teaching in the primary schools.

The interpretation of the study findings led to the conclusions that the primary schools were grossly ill-equipped to teach science in line with the expectations of the National Policy on Education.

The findings of the study led to five recommendations for improving the teaching of science in the Primary Schools.

The Conclusions

The conclusions of the investigation were the following:

(i) The majority of the thirty three Kano City Primary Schools did not provide ideal classrooms for the science lessons.

(ii) The schools under investigation did not employ teachers with adequate education and professional training for the teaching of primary school science.

(iii) Basic additional science teaching facilities were inadequate in the schools.

The Implications

For the kind of science teaching in the primary schools that would prepare the school products for living fully in the present age of technology or for benefitting from secondary and tertiary levels of education in science and technology, the 33 Kano City Primary Schools are grossly ill-equipped. The National Policy on Education

anticipates technological, industrial, economic, and social revolution through a reorganised system of education. As far as science teaching in our primary schools is concerned, a teaching approach that is a combination of the conceptual and - the process

Recommendations

(i) The classrooms presently available in the majority of primary schools in our country are not ideally suited for activity - based science learning. The recommendation is for providing a science room each in the primary schools with the following facilities:

(a) The teacher's corner

(b) The demonstration area

(c) The pupils work area

(d) Storage cupboards for pupils' collections

(e) Display area for exhibition of pupils' work

(f) The workshop corner with water, heat, and electricity provisions.

(ii) Until such time the curriculum of Grade II teachers are modified to make science a compulsory option for all of them, a small number of science specialist teachters be employed in all primary schools.

(iii) Ministries of Education provide all the primary schools a selected collection of science teaching equipment and audio-visual equipment.

(iv) Grade II teacher courses include science teaching equipment improvisation skill training as a basic element of the teacher education programme.

(v) The primary school child is slowly moving towards the stage of abstract thinking ability through the earlier stages of concrete operations. The child needs first hand experiences with the living and non-living objects around them. Science should be learned through activities involving doing. Let it be accepted by all primary science teachers that all science lessons should be in the field or the school science room.

2.4 The Expectations About The Classroom Behaviours And The Instructional Competencies of The Primary School Science Teachers in Nigeria

The core-curriculum for Teachers' Grade Two Science, a decument carefully compiled by the Federal Ministry of Education, Lagos, describes the expecations about the classroom behaviours and the science teaching competencies of the primary school science teachers in Nigeria (Core Curriculum, 1982).

The Special Circumstances Surrounding The Training of The Grade II Science Teachers

The ideal entrant into the grade II Science Teachers course for Primary Science Teacher is the JSS graduate who has completed the integrated Science programme. During the transitional period however, entrants will continue to be drawn from candidates with very mixed degree of preparedness. These include:

1. Primary School Leavers
2. Modern III/S.75 Holders
3. WASCfailure/pass in only one science subject
4. WASC pass in two science subjects

Table 1 shows various entry points for these various categories of entrants.

Table 1

		DURATION			REMARKS
	Entry Qualification	Period To Cover Content	Period To Cover Method	Total	
	Primary 6	3 Years	2 Years	5 Years	The work of 1 term to be covered in 1 year at this level.
A	Modern 3	2 "	1 Year	3 Years	Entrants expected at this level is minimal.
	WASC FAILED	1 Year	1 "	2 Years	They are expected to work more on methodology as they should have previously covered the content of the syllabus when they were in secondary school.
	WASC PASSED (No Science)	1 "	1 "	2 Years	
	WASC PASSED (One science subject)	1 "	1 "	2 Years	
	WASC PASSED (Two science subjects)	1 term	2 terms	1 Year	As above
		155 Contact Periods	100 Contact Periods	255 Contact Periods	The periods are to be spread out to suit different levels of in-takes
B	JSS	1 Year	2 Years	3 Years	The curriculum is ideal for this level of entrants.

It appears that part of the training of the student teacher should aim at producing teaching guide that include prepared lessons and other professional components (charts and visual-aids) for different topics.

The minimum number of contact periods (40 mins) required for meaningful coverage of various topic have been indicated. It is expected that this would be a guide to the various institutions in allocating Science periods in the time-table. This introduces some flexibility on the duration of the course since an intensive contracted course may be offered provided the minimum number of contact hours for effective coverage has been adhered to.

GENERAL OBJECTIVES FOR PRIMARY SCIENCE TEACHER EDUCATION CURRICULUM

The objectives of this programme are as follows:

(A). To provide the teacher with the functional knowledge of science concepts, principles and processes.

(B) To inculcate in the teacher the appropriate scientific skills and attitude essential for teaching primary science.

(C). To provide relevant professional background for effective teaching of science in the primary school.

(D). To enable the student teacher to recognise the role of science in understanding himself and his environment.

GENERAL OBJECTIVE A

The Primary Science Teacher Education programme should:

Provide the teacher with function knowledge of science concepts, principles and processes. Specifically the student-teacher should acquire the

(i) basic science knowledge and facts needed to explain natural phenomena.

(ii) concepts that underlies the fundamental unity of science.

(iii) basic science process skills of observation, manipulation, classification, identification, communication, inferring, hypothesizing, ordering, interpreting data, formulating models etc.

GENERAL OBJECTIVE B

The Primary Science Teacher Education Programme should:

inculcate in the teacher the appropriate scientific skills and attitudes essential for teaching primary science.

Specifically, the programme should

1. stimulate the teacher to explore and raise question about the environment.

2. develop in the teacher the habit for keen observation.

3. develop in the teacher the ability to recognise hypothesis - opinion and facts, in everyday life.

4. inculcate in the teacher respect for persons in patience, listening, perseverance.

GENERAL OBJECTIVE C

The Primary Science Teacher Education Programme should:

Provide relevant professional background for effective teaching of science in the Primary School. In this connection, specifically, student teachers should be:

1. Familiar with the different stages and aspects of child development and the practical implications for teaching science in the primary school.

2. Familiar with the different aspects of cultural factors in the environment as they effect teaching and learning of science in the primary school.

3. Identify, select and use local resources and materials for teaching science in the Primary School.

4. Familiar with, and use different approaches to teaching of primary science (Traditional topic concept and process approaches etc.)

5. Plan and teach primary science lessons, using simple activities based on instructional objectives, action - stimulating questions and effective evaluation strategies.

GENERAL OBJECTIVE D

The Primary Science Teacher Education Programme should:

enable the student teacher to recognise the role of science in understanding himself and his environment.

In particular, the student teacher should:

(i) understand and appreciate the role of science in everyday by life (e.g. home, industry, etc.)

(ii) recognise/identify the environmental problems created by the applications of science.

(iii) take responsibility for an exercise leadership role in finding solutions to identified science related problems in the environment.

(iv) participate effectively in promoting scientific literacy.

CONTENT SYLLABUS FOR INTEGRATED SCIENCE (YEAR ONE)

First Term

I You As A Living Thing

1. Characteristics of living things
2. Characteristics of animals
3. Human beings as intelligent animals
4. Know your body
5. Feeding

II You And Your Home

Health of the family

III Living Components of The Environment

1. Classification of matter
2. Grouping of organisms
3. Activities of living things

IV Non-living Components of The Environment

1. Observing samples of non-living things
2. Classification of non-living components
3. Measurements
4. States of matter
5. Air
6. Water
7. Man and space.

V. Saving Your Energy

1. Science related occupation

3. Tools (machines) for work

3. Force

VI. Controlling The Environment

1. Environmental sanitation

2. Sowage

3. Disease vectors

4. Preventive medicine - clean water and immunization.

Second Term

I. You As A Living Thing

1. Movement

2. Excretory system

3. Reairatory system

4. Circulatory system

5. Digestive system

II. You And Your Home

1. Growth and development

2. Energy and appliances in the home - forms of energy

III. Living Components of The Environment

Ecology

IV. Non-Living Components of The Environment

1. Physical and chemical changes

2. Elements, compounds and mixtures

3. Further investigation of air and water

4. Hydrogen

5. Rusting

6. Energy

7. Measurement

V. Saving Your Energy

1. Force

2. Simple machines

3. Maintenance of machines

IV. Controlling The Environment

1. Maintaining balance in the environment.

2. Pollutants in the environment.

Third Term

I. You As A Living Thing

1. Food storage

2. Sense organs

3. Reproductive system

4. Health

II You And Your Home

1. Continuity of the family

2. Care of the child

3. Energy and appliances in the home

III Living Components of The Environment

Resources from living components of the environment.

IV. Non-Living Components of The Environment

1. Chemical symbols, formulae and equations.
2. Atomic structure
3. Metals and non-metals
4. Activity series
5. Acids, bases and salts
6. Energy conversion and transfer
7. Energy and work
8. Kinetic theory
9. Man in space.

V. Saving Your Energy

Work and energy

VI. Controlling The Environment

1. Our disappearing forests
2. Monitoring our weather

CONTENT SYLLABUS FOR METHODOLOGY (YEAR TWO)

A. Philosophical Basis For Science Teaching

1. What is science?
2. Evolution of Primary Science in Nigeria.
3. Contribution of Science to basic goals of education in Nigeria.
4. Unifying general objectives for teaching primary science.

B. Psychological Basis For Science Teaching

1. The nature of the child.

2. Process of learning (Brunner, Piaget, Gagne, Institute of Child Health; Department of Education etc.).

3. The role of the class teacher in promoting learning (questioning, empathy).

C. Sociological Basis For Science Teaching

1. The role of science in the development of society

2. Beliefs, superstition and science

3. Language and the learning of science

D. Various Approaches To Teaching Science(Use contemporary programmes as illustration)

1. Different approaches

2. Advantages/Disadvantages of various approaches.

3. Implications for developing personal approach to teaching primary science.

CONTENT SYLLABUS FOR METHODOLOGY (YEAR THREE)

A. Planning For Primary Science Teaching

1. Familiarity with the syllabus

2. Designing the scheme of work

3. Features of a good lesson plan:

(i) formulation of objectives

(ii) design of activities

(iii) pupils activities

(iv) teacher's activities: diagnostic evaluation, use of questions and resources (materials).

(v) content: (key scientific information)

(vi) follow up activities.

B. Evaluation In Primary Science Teaching

1. Rationale for evaluation:

   Functions/Role of evaluation in primary science teaching.

2. Evaluation Strategies:

   (a) Techniques

   (b) Instruments

   (c) Preparation of evaluation instrument

3. Record Keeping:

   (a) Children's records (notes, drawings, models, check-list, effective outcomes etc.)

   (b) Teachers' self evaluation.

C. Resources For Science Teaching

1. Human resources in local community e.g. relevant professionals, local crafts' men.

2. Selecting materials for teaching: (Criteria for

   (1) Texual materials
   (2) Non texual materials.).

3. Improvisation

4. Collecting and preserving specimens

5. Other resources for teaching science (field trips, visual aids, science corner, garden, science club, science fairs, pets, toys etc).

6. Professional growth for science teaching.

2.5 The Classroom Behaviours And The Instructional Competencies of Science Teachers in Nigeria

2.5.1 The literature review showed that the realities of the science classrooms even in a very advanced country, as the U.S.A., where better teacher education and curriculum

implementation techniques are employed were the following:

(a) Inspite of all the improved curriculum guide lines available to the teachers, they taught science through exposition, using the textbook as the resource for teaching.

(b) The text-oriented teaching was used by the teachers because of the following barriers in their way to teach otherwise.

1. Insufficient teaching time
2. Inadequacy of classroom facilities
3. Scarcity of instructional materials
4. Lack of student motivation
5. Demanding nature of inquiry teaching

(c) The non-availability of in-service training opportunities and the inability of teachers to utilise such opportunities when they were provided.

(d) Non-availability of supervisory and consultancy help.

2.5.2 The evidence derived from the findings of the field studies in Nigeria suggested the following problems for science teaching.

(a) Primary school teachers, though knowledgeable about the goals of science teaching, could not communicate to their pupils the meaning of science or the benefits of science in a manner comprehensible to them.

(b) Secondary school teachers, though aware of the weaknesses of the science programmes in their schools were unable or unwilling to improve the programmes.

(c) Teachers in the secondary and post-secondary institutions, though aware of the advantages of using audio-visual teaching aids, did not have the skills to handle them.

(d) Most schools did not possess the audio-visual teaching aids.

2.5.3 A close scrutiny of the Kano City primary schools showed the following:

(a) The majority of them did not provide the ideal science learning environment.

(b) The schools did not have teachers with adequate education and professional training for teaching primary science.

(c) Basic additional science learning facilities were generally absent in the schools.

2.5.4 The literature review helped in identifying the variables selected for scrutiny during the study. They were:

(a) The professional equipment of the primary school science teacher.

(b) Administrative support for science instruction in the primary school.

(c) The material resources needed for science teaching in the primary school.

2.5.5 The literature review also helped to select the method of data collection, namely, through interviews and questionnaires.

Chapter 3

DATA COLLECTION AND ANALYSIS

3.1 The Data Collection Procedure

The study data were collected through face to face interviews and through responses to questionnaires distributed by hand.

Two levels of personnel were chosen for the interviews and the completion of the questionnaires. They were:

1. the Headmasters of the primary schools/the Principals of the Grade Two teacher colleges;
2. Primary school and science teachers.

From 6 Local Government Areas (LGA) in the Borno State of Nigeria 20 primary schools each were selected for the study. The choice of the schools was dictated by the accessibility of the schools. From each Local Government Area, 10 heads of schools, and 10 teachers from another set of 10 schools were interviewed and given the questionnaires (Appendix 1).

At the conclusion of the data collection exercise, it was found that through interviews and questionnaire responses from 120 respondents, 57 primary schools were studied.

There were three types of questionnaires given out:

(1) Questionnaire for Headmasters of Primary Schools.

(2) Questionnaire for Science Teachers in Primary Schools

(3) Questionnaires for Principals of Grade Two Teacher Colleges. (Appendix 2,3,4).

3.2 The Collected Data

The data sought by the study consisted of information about the following:

1. The professional equipment of the primary school science teacher in the area of:
   - (a) Integrated Science content
   - (b) Foundations of science teaching
   - (c) Technical skills of planning, presenting, and evaluating science lessons.
2. The administrative support for science teaching through:
   - (a) Providing adequate teaching time
   - (b) Supervisory and consultancy help
   - (c) In-service training facilities
   - (d) Manageable class strength of pupils.
3. Material resources for science instruction including:
   - (a) Pictures, Models, Objects
   - (b) Syllabus
   - (c) Science textbooks judged by the teachers as suitable
   - (d) Other audio-visual science teaching aids and apparatus.

3.3 The Professional Equipment of The Primary School Science Teacher

3.3.1 The data. The data in this respect are presented in Table I to Table V.

Table I

The List of The Borno Primary Schools Observed During The Study

Local Government Area	Name of The School	Serial Number by which The School is Identified
1. Bama	1- Hausari	B 1
	2- Shettimari	B 2
	3- Old Bama	B 3
	4- Central Primary	B 4
	5- Jaudiri	B 5
	6- Gulumba	B 6
	7- Goniri	B 7
	8- Mbliya Jebura	B 8
	9- Kotembe	B 9
	10- Gonikurmi	B 10
2. Fika	1- Lewe	F 1
	2- Race Course	F 2
	3- Kukar Gadu	F 3
	4- Duddaye	F 4
	5- Garin Gambo	F 5
	6- Garin Abba	F 6
	7- Balde	F 7
	8- Bwaima	F 8
	9- Sabon Gari	F 9
	10- Dagare	F 10
	11- Yindiski	F 11
	12- Mamudo	F 12

Table I contd...

Local Government Area	Name of The School	Serial Number by Which The School is Identified
3. Gwoza	1 - Kiwa	G 1
	2 - Wala-A	G 2
	3 - Gadamayo	G 3
	4 - Gwoza Wakane	G 4
	5 - Lagwa	G 5
	6 - Ajiyari	G 6
	7 - Guduf-A	G 7
	8 - Sabon Gari	G 8
	9 - Guduf-B	G 9
4. Maiduguri Town	1 - State Low Cost	M 1
	2 - Zayiri	M 2
	3 - Bolari	M 3
	4 - Federal Low Cost	M 4
	5 - Lamisala - 1	M 5
	6 - Abbaganaram	M 6
	7 - Gamboru Alhajiri	M 7
	8 - Gamboru-1	M 8
	9 - Wulari-2	M 9
	10 - Police	M 10
	11 - Mafoni	M 11
	12 - Fogobi	M 12
	13 - Galtimari	M 13
	14 - G.R.A.	M 14
5. Uba/Askira	1 - Mbilatagu	U 1
	2 - Uba Margi	U 2
	3 - Uba Central	U 3
	4 - Giwi	U 4
	5 - Kuma	U 5
	6 - Kwabi	U 6
	7 - Piza	U 7

Table I contd...

Local Government Area	Name of The School	Serial Number by Which The School is Identified
5. Uba/Askira	8 - Walafa	U 8
	9 - Uda	U 9
	10 - Uvu	U 10
	11 - Kurghu	U 11
	12 - Giwadu	U 12

Table II

Education And The Number of Years of Teaching of Primary School Science Teachers

Identity of the Teacher	Education	Years of Teaching
B1	Gr.2 F	5 years
B2	Gr.2 P	10 years
B3	Gr.2 P	10 years
B4	Gr.2 P	7 years
B5	Gr.2 P	5 years
B6	Gr.2 P	8 years
B7	Gr.2 P	9 years
B8	Gr.2 F	6 years
B9	Gr.2 P	8 years
B10	Gr.2 F	2 years
F1	WASC/GCE	3 years
F2	Gr.2 F	1 year
F3	Gr.2 P	5 years
F4	Gr.2 R	10 years
F5	Gr.2 R	21 years
F6	Gr.2 R	20 years

Table .I contd....

Identity of The Teacher	Education	Years of Teaching
F7	Gr.2 P	5 years
F8	Gr.2 R	10 years
F9	Gr.2 F	5 years
F10	Gr.2 P	8 years
F11	Gr.2 F	7 years
F12	Gr.2 P	21 years
G1	WASC	6 months
G2	Gr.2 P	8 years
G3	Gr.2 P	5 years
G4	Gr.2 P	15 years
G5	Gr.2 R	10 years
G6	Gr.2 P	10 years
G7	Gr.2 P	5 years
G8	Gr.2 F	5 years
G9	Gr.2 F	1 year
M1	Gr.2 P	10 years
M2	Gr.2 P	2-5 years
M3	Gr.2 P	5-10 Years
M4	WASC/GCE	2-5 years
M5	Gr.2 P	5-10 years
M6	Gr.2 R	5-10 years
M7	Gr.2 P	5-10 years
M8	Gr.2 P	2-5 years
M9	Gr.2 P	2-5 years
M10	Gr.2 P	2-5 years
M11	Gr.2 P	2-5 years
M12	Gr.2 P	2-5 years
M13	WASC/GCE	2-5 years
M14	Gr.2 P	2-5 years

Table II contd...

Identity of The Teacher	Education	Years of Teaching
U1	Gr.2 P	5 years
U2	N.C.E	10 years
U3	Gr.2 P	5 years
U4	Gr.2 P	5 years
U5	Gr.2 P	5 years
U6	Gr.2 P	8 years
U7	Gr.2 P	8 years
U8	Gr.2 P	2 years
U9	Gr.2 P	7 years
U10	Gr.2 F	3 years
U11	Gr.2 P	4 years
U12	WASC/GCE	7 years

Key: Gr.2 P - Passed Grade II Certificate Examination
Gr.2 F - Failed Grade II Certificate Examination
Gr.2 R - Referred in Subjects in Examination
WASC/GCE - Passes in some subjects at the West African School Certificate Examination

Table III

Education of The Primary School Science Teachers

No	Qualification	Number
1.	West African School Certificate/ General Certificate of Education	6
2.	Grade II Teacher Certificate Failed	11
3.	Grade II Teacher Certificate Referred	6
4.	Grade II Teacher Certificate Passed	33
5.	Nigerian Certificate in Education	1
	Total	57

Table IV

Percentages of Educationally Qualified And Unqualified Teachers

(Percentages rounded off to the nearest whole number).

No	Type	Proportion	Percentage
1.	Educationally qualified with NCE Certificate	1 in 57	2
2	Educationally qualified with Gr.II Certificate	33 in 57	58
3	Educationally unqualified including Gr.II Failures and References	23 in 57	40
	Total	57	100

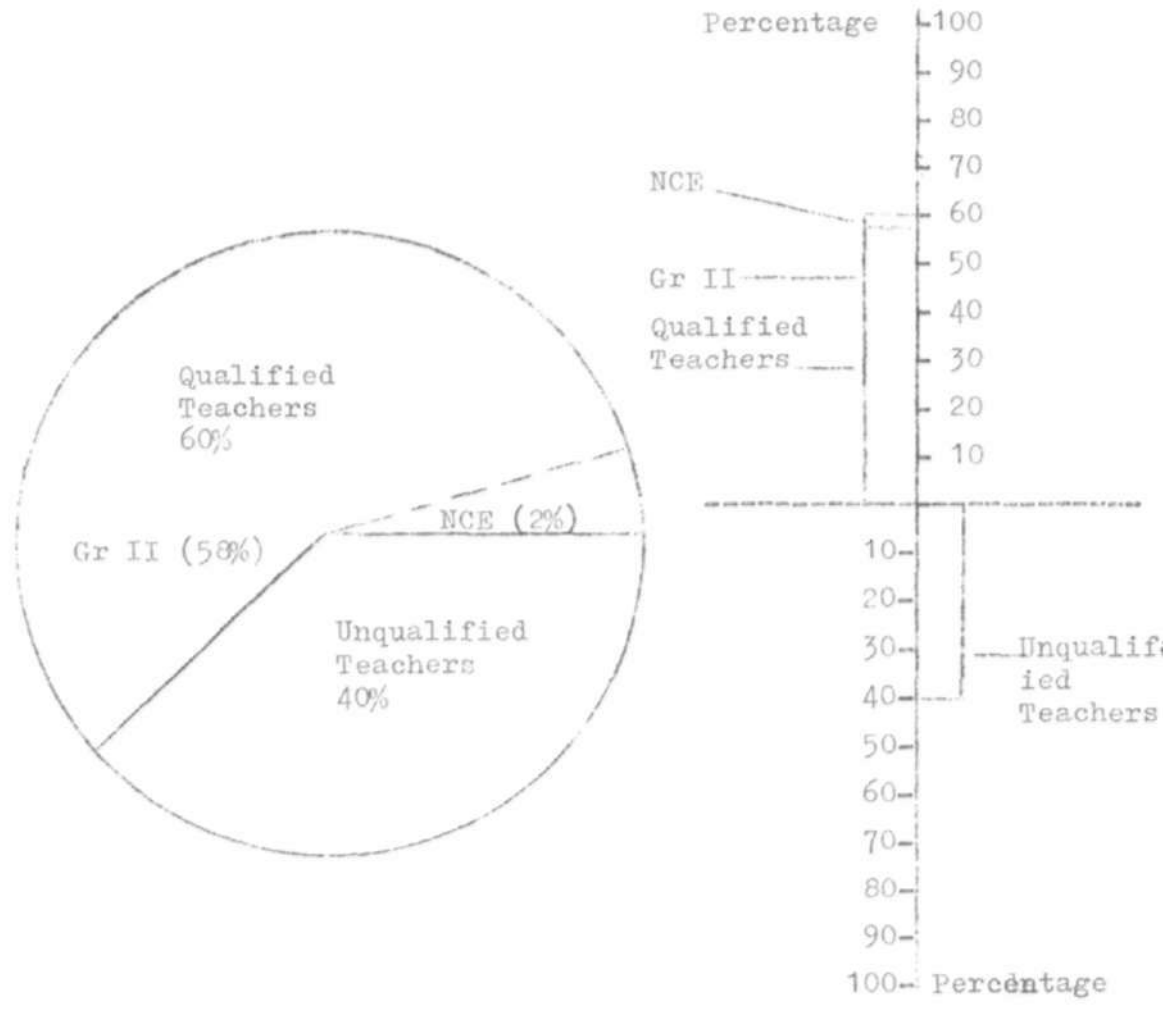


Figure 1 The percentages of the qualified and the unqualified primary school science teachers.
Source - Table IV

Table V.

Years of Teaching Experience of The Primary School Science Teachers

(Percentage rounded off to the nearest whole number.)

No	Experience	Proportion	Percentage
1.	Under 2 years	5 in 57	9
2.	Between 2 and 5 years	22 in 57	39
3.	Between 5 and 10 years	18 in 57	32
4.	Over 10 years	12 in 57	20
	Total	57	100

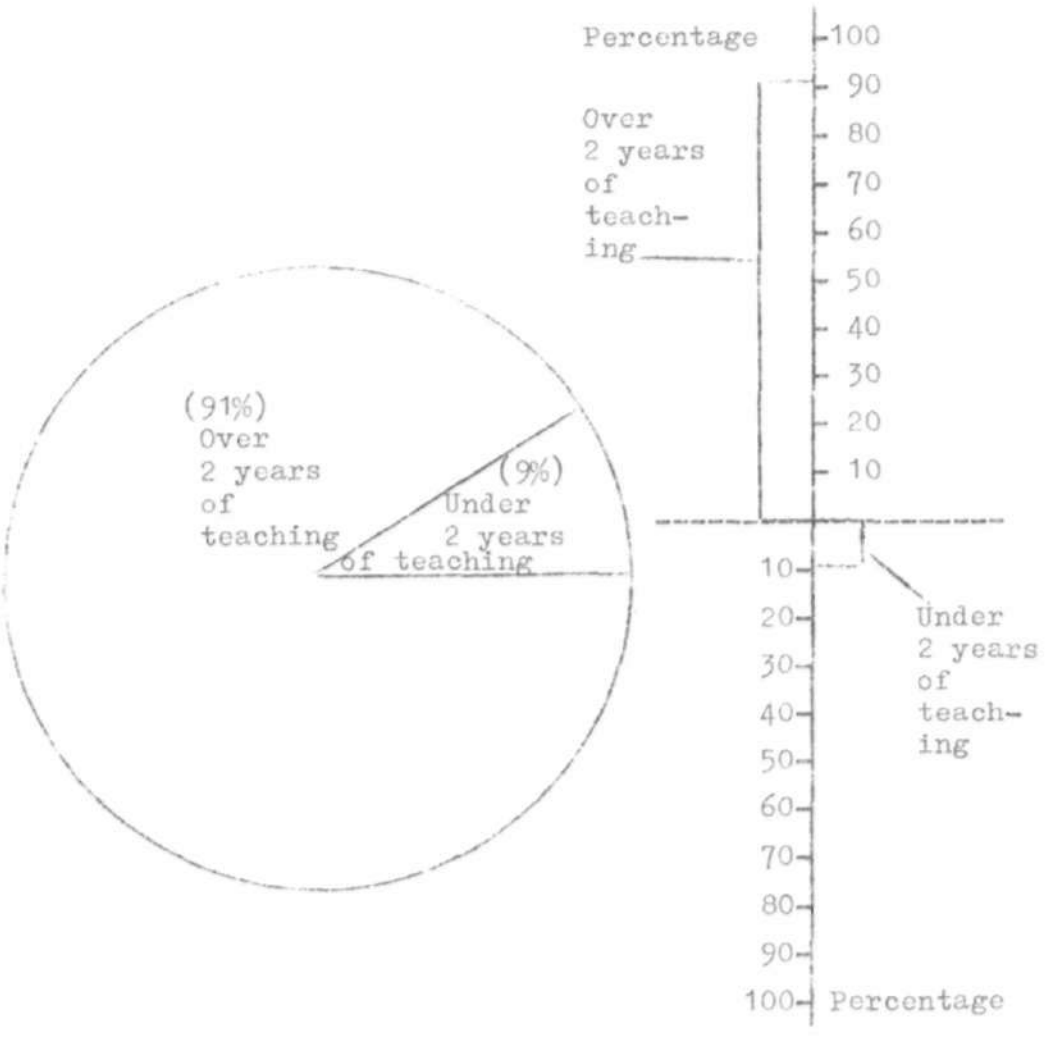


Figure 2 Categorisation of the primary school science teachers according to teaching experience.
Source - Table V

3.3.2 Professional Equipment Data Analysis.

Table IV summarised the educational qualifications of the teachers.

(a) Only 1 teacher out of the total of 57 had the Nigerian Certificate in Education (NCE) qualification, that is, 2 percent of the sample.

(b) Out of the remaining teachers, 33 had the Grade II Teacher Certificate. They came from a total of 57 teachers. The Grade II Teachers Certificate holders represented 58 percent of the sample.

(c) From among the total number of 57 teachers, 23 had virtually no teacher education qualification. The teachers without teaching qualification constituted 40 percent of the sample.

(d) Table V summarised the teaching experience of the teachers expressed in number of years. Teachers with experience of fewer than 2 years made up 9% of the sample. Teachers with more than 2 years of teaching totalled to 91% of the sample.

3.4 The Administrative Support For Science Teaching

The data in this respect were shown in Table VI to Table XI.

Table VI

The Distribution of Science Lessons Per Week
In The Primary Schools

No	The School	Number of Science Lessons Per Week					
		0	1	2	3	4	More than 4
1.	B1				x		
2.	B2					x	
3.	B3					x	
4.	B4				x		
5.	B5					x	
6.	B6					x	
7.	B7				x		
8.	B8				x		
9.	B9					x	
10.		x					
11.	F1					x	
12.	F2			x			
13.	F3				x		
14.	F4				x		
15.	F5				x		
16.	F6			x			
17.	F7			x			
18.	F8			x			x
19.	F9				x		
20.	F10				x		
21.	F11				x		
22.	F12			x			
23.	G1				x		
24.	G2				x		
25.	G3				x		

Table VI contd..

No	The School	Number of Science Lessons Per Week					
		0	1	2	3	4	More than 4
26.	G4				x		
27.	G5				x		
28.	G6				x		
29.	G7				x		
30.	G8					x	
31.	G9					x	
32.	M1				x		
33.	M2				x		
34.	M3				x		
35.	M4		x				
36.	M5					x	
37.	M6				x		
38.	M7			x			
39.	M8		x				
40.	M9				x		
41.	M10			x			
42.	M11		x				
43.	M12				x		
44.	M13				x		
45.	M14				x		
46.	U1				x		
47.	U2				x		
48.	U3				x		
49.	U4				x		
50.	U5				x		
51.	U6		x				
52.	U7		x				
53.	U8				x		
54.	U9				x		

No	The School	Number of Science Lessons Per Week					
		0	1	2	3	4	More than 4
55	U10				x		
56.	U11				x		
57.	U12					x	
Total	(57)	2	10	2	33	10	0

Table VII

The Break-down of The Primary Schools According To The Availability of Science Teaching Time Available

(Percentages rounded off to the nearest whole number.)

No	The School Type	Proportion	Percentage
1.	Where no science lessons are scheduled	2 in 57	
2.	Where 1 science lesson per week are scheduled	9 in 57	21
3.	Where 2 science lessons per week are scheduled	1 in 57	
4.	Where 3 science lessons per week are scheduled	34 in 57	79
5.	Where 4 science lessons per week are scheduled	11 in 57	
	Total	57	100

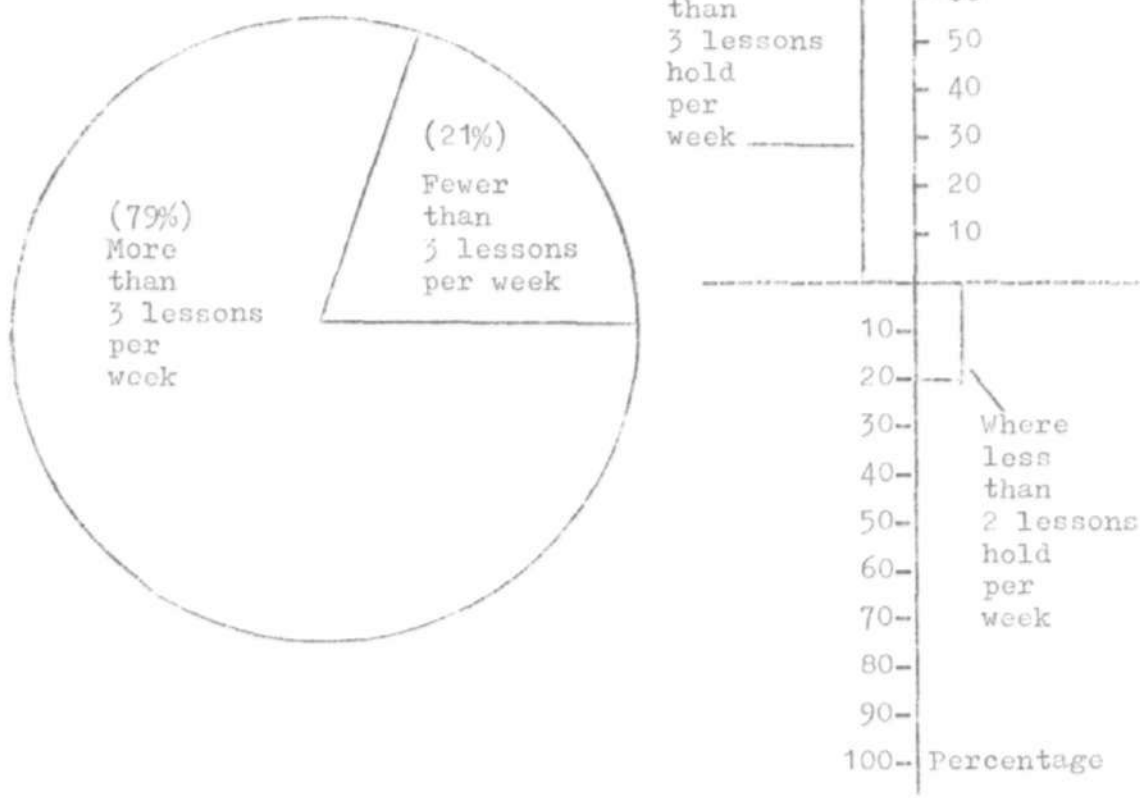


Figure 3 The percentages of schools where 3 or more science lessons were scheduled per week.
Source - Table VII

Table VIII

Availability of(1) Supervisory/Consultation And(2) In-Service Training Facilities Are Available To Teachers

No	The School	Availability of Supervision or Consultation		Teachers who had in-service training	
		Yes	No	Yes	No
1.	B1	x			x
2.	B2	x		x	
3.	B3	x		x	
4.	B4	x		x	
5.	B5	x		x	
6.	B6	x			x
7.	B7	x			x
8.	B8		x		x
9.	B9	x			x
10.	B10	x			x
11.	F1		x		x
12.	F2		x		x
13.	F3	x			x
14.	F4		x		x
15.	F5	x			x
16.	F6	X			x
17.	F7	x			x
18.	F8		x		x
19.	F9	x			x
20.	F10		x		x
21.	F11		x		x
22.	F12	x			x
23.	G1	x		x	
24.	G2	x		x	
25.	G3	x		x	
26.	G4		x	x	
27.	G5		x		x
28.	G6		x		x

Table VIII contd...

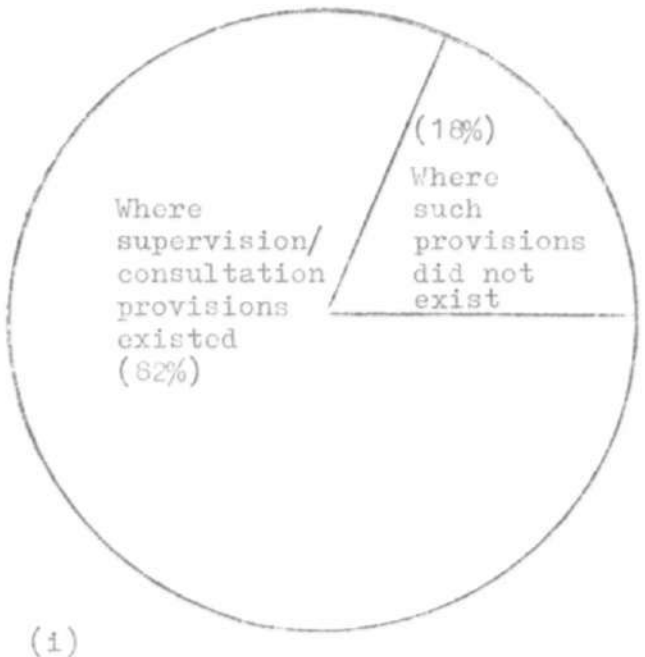
No	The School	Availability of Supervision or consultation		Teachers who had in-Service Training	
		Yes	No	Yes	No
29.	G7	x		x	
30.	G8		x		x
31	G9	x		x	
32.	M1	x			x
33.	M2	x		x	
34.	M3	x		x	
35.	M4	x			x
36.	M5	x		x	
37.	M6	x		x	
38.	M7	x			x
39.	M8	x			x
40.	M9	x		x	
41.	M10	x			x
42.	M11		x		x
43.	M12	x			x
44.	M13	x			x
45.	M14	x			x
46.	U1	x			x
47.	U2	x		x	
48.	U3	x		x	
49.	U4	x		x	
50.	U5	x			x
51.	U6		x		x
52.	U7	x			x
53.	U8	x		x	
54.	U9	x		x	
55.	U10		x	x	
56.	U11	x		x	
57.	U12	x			x
	Total (57)	43	14	Total(57)22	35

Table IX

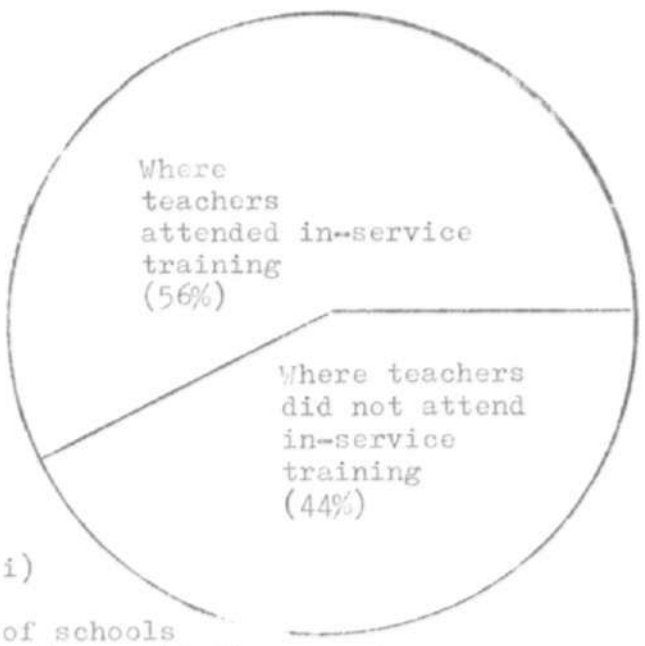
Break-down of The Primary Schools According To The Provision of (1) Supervision And (2) In-Service Training of Teachers

(Percentages corrected to the nearest whole number).

No	School Type	Proportion	Percentage
1.	Schools with supervision /consultation services	47 in 57	82
2.	Schools without supervision/ consultation services	10 in 57	18
	Total	57	100
3.	Schools where teachers had in-service training	32 in 57	56
4.	Schools where teachers had no in-service training	25 in 57	44
	Total	57	100



(i)



(ii)

Figure 4 (i) The percentage of schools where supervision/ consultation services were available to the teachers.
(ii) The percentage of schools where science teachers attended in-service training.

Source - Table IX

Table X

The Number of Science Teachers Available And The Total Number of Pupils Taught in The Primary Schools

No	The School	Number of teachers	Number of pupils	The ratio of teachers to pupils rounded off the whole number
1.	B1	6	250	1/42
2.	B2	7	250	1/28
3.	B3	3	250	1/84
4.	B4	7	1,000	1/143
5.	B5	4	250	1/63
6.	B6	5	250	1/50
7.	B7	3	250	1/84
8.	B8	3	250	1/84
9.	B9	3	100	1/33
10.	B10	3	300	1/100
11.	F1	3	100	1/23
12.	F2	9	1,000	1/111
13.	F3	5	300	1/60
14.	F4	3	980	1/327
15.	F5	3	100	1/33
16.	F6	3	1,000	1/333
17.	F7	3	100	1/33
18.	F8	4	300	1/75
19.	F9	2	200	1/100
20.	F10	6	750	1/125
21.	F11	4	97	1/24
22.	F12	6	456	1/76
23.	G1	3	250	1/83
24.	G2	3	250	1/83
25.	G3	3	768	1/256

Table X contd..

No	The School	Number of Teachers	Number of Pupils	The ratio of teacher to Pupils Rounded off to whole Number
26.	G4	7	856	1/122
27.	G5	6	1,000	1/167
28.	G6	3	300	1/100
29.	G7	3	300	1/100
30.	G8	7	1,000	1/143
31.	G9	6	980	1/163
32.	M1	10	750	1/75
33.	M2	10	750	1/75
34.	M3	10	460	1/45
35.	M4	7	200	1/29
36.	M5	5	750	1/150
37.	M6	5	100	1/20
38.	M7	10	500	1/50
39.	M8	10	1,000	1/100
40.	M9	10	1,000	1/100
41.	M10	10	1,000	1/100
42.	M11	10	1,000	1/100
43.	M12	10	1,000	1/100
44.	M13	10	500	1/50
45.	M14	20	1,000	1/50
46.	U1	6	500	1/84
47.	U2	3	250	1/84
48.	U3	3	250	1/84
49.	U4	3	450	1/150
50.	U5	2	250	1/125
51.	U6	3	300	1/100
52.	U7	3	72	1/24
53.	U8	7	285	1/41
54.	U9	3	250	1/84
55.	U10	7	448	1/164
56.	U11	3	300	1/100
57.	U12	2	246	1/123

Table XI

Categorisation of The Primary Schools According To Teacher - Pupil Ratio Values

(Percentages rounded off to the nearest whol number).

No	The Type	Proportion	Percentage
1.	The Schools where the teacher - pupil ratio is 1/40 or more	8 in 57	14
2.	The schools where for teacher - pupil ration is less than 1/40	49 in 57	86
	Total	57	100

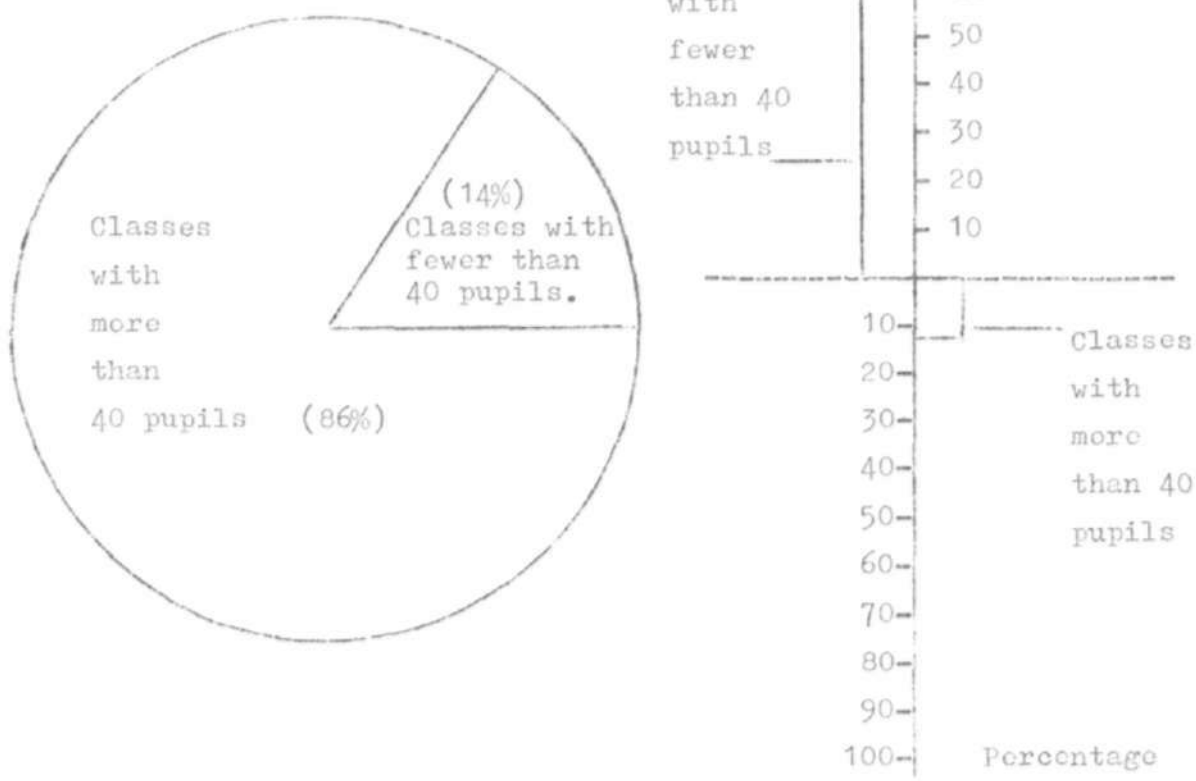


Figure 5 The percentages of schools where science teachers taught classes with fewer than 40 pupils.

Source - Table XI

3.42 Administrative Support Data Analysis

(a) Table VII summarised the distribution of the schools according to the number of science lessons scheduled per week.

Fewer than 2 lessons per week were scheduled in 21% of the schools. More than 2 lessons per week were scheduled in 79% of the schools.

(b) Table IX summarised the proportion of schools where:

(1) Supervisory/Consultancy services were available;

(ii) Teachers had in-service training.

Schools with some sort of supervision/consultancy was provided constituted 82% of the sample. Schools where such provisions were absent totalled to 18% of the sample.

(c) Teachers had some in-service training in 56% of the schools. In the remaining 44% of the schools teachers did not benefit from the help.

(d) Table XI summarised the information about schools where the pupils per class exceeded 40. Fewer than 40 pupils per class were found in 14% of the schools. More than 40 pupils per class were found in 86% of the schools.

3.5 Use of Material Resources By The Science Teachers

3.51 The Data. The data in this regard were shown in Table XII to Table XVI.

Table XII

The Availability of Material Resources In The Primary Schools

(*See the keys for the items below)

No	The School	Description of the available resource			
		A*	B*	C*	D*
1.	B1	x	x	x	-
2.	B2	x	x	x	-
3.	B3	x	x	x	-
4.	B4	x	x	-	-
5.	B5	x	x	-	-
6.	B6	x	x	-	-
7.	B7	-	x	x	-
8.	B8	x	x	x	-
9.	B9	x	x	x	-
10.	B10	x	x	x	-
11.	F1	-	-	-	-
12.	F2	x	x	x	-
13.	F3	x	x	x	-
14.	F4	x	x	-	-
15.	F5	-	-	-	-
16.	F6	x	x	x	-
17.	F7	x	x	x	-
18.	F8	x	x	x	-
19.	F9	x	x	x	-
20.	F10	x	-	x	-

Table XII contd...

No	The School	Description of the Available Resource			
		A	B	C	D
21.	F11	x	x	x	-
22.	F12	x	x	x	-
23.	G1	x	x	-	-
24.	G2	x	x	-	-
25.	G3	x	x	x	-
26.	G4	x	x	-	-
27.	G5	x	x	x	-
28.	G6	x	-	x	-
29.	G7	x	x	-	-
30.	G8	x	-	x	-
31.	G9	x	x	-	-
32.	M1	x	x	x	-
33.	M2	x	x	x	-
34.	M3	x	x	x	-
35.	M4	x	x	x	x
36.	M5	x	x	x	-
37.	M6	x	x	x	x
38.	M7	x	-	x	-
39.	M8	x	x	x	x
40.	M9	x	x	x	-
41.	M10	x	x	x	-
42.	M11	x	-	x	-
43.	M12	x	x	-	-
44.	M13	x	x	-	-
45.	M14	x	-	-	-
46.	U1	x	x	x	-
47.	U2	x	x	x	-
48.	U3	x	x	x	-
49.	U4	x	x	x	-
50.	U5	x	x	x	-

Table XII contd..

No	The School	Description of The Available Resource			
		A	B	C	D
51	U6	x	x	x	-
52	U7	x	x	x	-
53	U8	x	x	x	-
54	U9	x	x	x	-
55	U10	x	x	x	-
56	U11	x	x	-	-
57	U12	x	-	x	-

Key: A - Pictures, models, objects
B - Syllabus
x-Avail. C - Textbooks judged by the teachers as suitable
- Not Avail. D - Other audio-visual science teaching aids and apparatus.

Table XIII

Classification of The Primary Schools According To The Use of Pictures, Models, Objects By Science Teachers

(Percentages rounded off to whole numbers)

No	The School	Proportion	Percentage
1	Schools where pictures, models, objects were used by the science teachers	53 in 57	93
2.	Schools where pictures, models, objects were not used by the science teachers	4 in 57	7
	Total	57	100

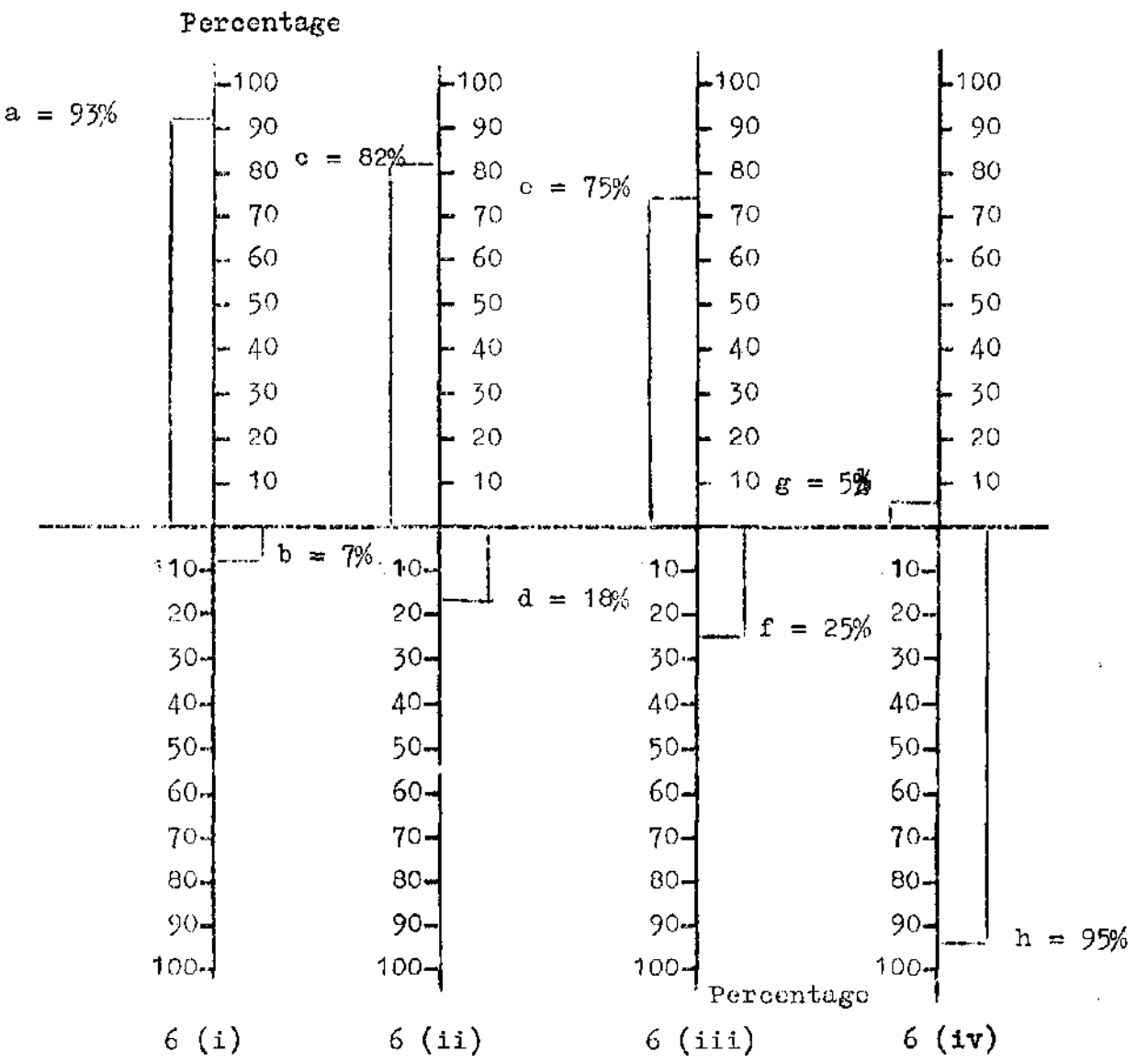


Figure 6 The use of material resources by the primary school science teachers.

6(i) a = 93% of the schools used pictures, models, objects.
b = 7% of the schools did not use such.

6(ii) c = 82% of the schools had science syllabus available.
d = 18% of the schools did not have.

6(iii) e = 75% of the schools had textbooks judged by the teachers as easy to read.
f = 25% of the schools had difficult-to-read textbooks.

6(iv) g = 5% of the schools had more sophisticated science teaching aids.
h = 95% of the schools had none.

Source - Table XIII - Table XVII

3.52 Material Resources Data Analysis

(a) Table XIII summarised the information about the use of science teaching aids such as pictures, models, and objects.

From among the sample of the primary schools studied, 93% used pictures, models, and objects as science teaching aids. The remaining 7% did not.

(b) As for the use of the science syllabus by the teachers, 82% of the schools used them. The remaining 8% did not.

(c) On the use of the science textbooks, the teachers rated them in the following manner. Teachers in 75% of the primary schools rated the books as easy-to-read. The other 25% rated the text books in use in their schools as difficult-to-read.

(d) As for the use of other audio-visual science teaching aids, (excluding pictures, models and objects) none of the schools claimed they used such aids.

Chapter 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 Discussion of The Results

The study was carried out to answer the question whether the Borno State Primary School teachers have adequate resources at their disposal to reduce the divergence between the intended and the operational forms of the Primary Science Core Curriculum to the minimum. The resources of the primary school teachers listed for the purpose of the study were the following:

1. The professional equipment of the teacher.
2. The administrative support given to the science teacher.
3. The material resources available to the teachers.

The results of the analysis of the respective data gathered to examine the three types of resources listed above were as follows:

4.1a. The Primary School Teachers' Professional Equipment

The National Policy on Education (1981) specifies the educational qualification of the primary school science teachers as that of Grade II teacher certificate, at least for the present. It also stipulates that ideally, the primary school teacher should have the N.C.E. certificate.

In the context of the improved Primary School Science Core Curriculum, the Federal Ministry of Education sponsored the Core Curriculum For Teachers Grade Two Science. The Grade II science teacher education curriculum identified four areas in which the primary school teacher should be competent. Accordingly the primary school science teacher should understand the philosophy and the objectives of primary science teaching. The teacher should cover the syllabus content of integrated science prescribed for the Grade II certificate examination. The teacher should be acquainted with the philosophical, psychological, sociological, and the curricular foundations of primary lelvel science teaching. Additionally, the teacher should also acquire the technical skills needed for planning, presenting, and evaluating science lessons for primary school children.

The data analysis gave the following results. The sample of teachers were made up of 2% N.C.E. holders, 58% Grade II Certificate holders, and 40% unqualified teachers (see Fig.1). On the basis of this break-down, one could easily conclude that a total of 60% of the teachers were qualified and

were competent in the four areas listed above. But in reality, it could not have been so.

A critical examination of the years of post-qualification teaching experience of the teachers yielded the following result. Of the teachers 91% of them had over 2 years of teaching experience after graduating. The remaining 9% had less than 2 years of teaching experience (see Fig.2). The Core Curriculum For Teachers Grade Two Science that identified and prescribed the areas of competence specifically needed to teach the primary school integrated science was in the making during the years of 1982 and 1983. For this reason, it was very unlikely that all Grade II teachers who graduated before 1982/1983 could have followed the prescribed teacher education syllabus. Even though 60% of the primary school teachers had certificates, it was doubtful whether they were actually exposed to the curriculum that is recommended as the proper preparation for teaching primary school level integrated science.

4.1b. Administrative Support

1. Supervision and Consultancy. Feed-back of information about the way a teacher performs helps him to improve performance. Supervision by expert science

inspectors, and the opportunities to consult with the experts are helpful in providing the feed back. Fig 4 (i), (ii) summarised the results derived for the purpose. From among the schools 82% were supervised, and 56% had provisions for consultations. The picture appeared healthy. However some schools had only annual or termly visits by the experts. There was no evidence to show that the administration had any plan for continuing and sustained supervision and consultation. The study could not also collect information about the nature and content of the supervision and consultation activities.

2. Science Teaching Time. Fig.3 (i) represented the results of the data analysed for the purpose. From among the schools 79% had more than three lessons scheduled per week. The other 21% had fewer than 3 lessons per week. Again the picture looked satisfactory. However the study could not observe the classes to find out what activities actually transpired during the scheduled science lessons. Only such information could be used to judge the quality of instruction that went on during the scheduled lessons. The number of lessons scheduled in itself could not indicate whether the time was effective utilised.

3. In-service Training. Fig.3 (ii) showed the results of the analysis of data collected for the purpose. While 56% of the teachers had some sort of in-service training experience, 44% had none. The study did not ascertain whether the in-service experiences were before the introduction of the Primary Science Curriculum. As was already pointed out, since 91% of the teachers graduated two or more years back, the in-service training experiences could have been also earlier than the introduction of the Primary Science Curriculum. In-service training experiences are essented in the context of the implementation of improved curriculum. The study could not find out for certain, if the teachers are provided such opportunities for in-service training after the introduction of the new science curriculum in the primary schools.

4. Pupils Per Classroom. The number of pupils that a teacher has to attend to during a lesson is a factor that determines the effectiveness of the lesson. Fig. 5 showed the results of the analysis of the data collected for the purpose. Ideally, a class of 30 pupils, is the one that is easily teachable. In the context of developing countries teachers are compelled to accommodate as many as 40 pupils in a

class. The results showed that 86% of the schools had more than 40 pupils. Only 14% of the schools had fewer than 40 pupils in a class.

4.1c Use of Material Resources

What a teacher actually did in the classroom during instruction was also relevant to determine the effectiveness of the science lessons. The freedom of the teacher to use different teaching aids depended on which type of materials were available to the teachers.

Fig. 6 showed the results of the analysis of the data collected for the purpose. Fig. 6 (i) revealed that 93% of the schools had pictures, models, other objects used during science lessons. That information was encouraging. But the study could not assess how appropriate the aids were for the lessons concerned, or how effectively the teachers used them during the lessons.

Fig. 6 (ii) revealed that 82% of the schools had some sort of science syllabus to follow. This information was also not adequate to assess the use of the syllabus. The study could not determine what specific syllabus each school followed, and how faithfully the syllabus was adhered to.

Fig. 6 (iii) gave the availability of science textbooks to teachers and the assessment by them of the ease or difficulty of reading them. In the schools 75% expressed the personal opinion that the textbooks were easy for the pupils to read. The remaining 25% of schools used science textbooks, which in the opinion of the science teachers were difficult for the pupils to read. The study could not identify the text-books by name. The judgment of the textbooks were not based on any reading difficulty test.

Fig. 6 (iv) showed the situation concerning the availability of more sophisticated audio-visual equipment and materials in the schools. The picture was very bleak. All the schools in the sample did not possess them. The picture that emerged in respect of the availability of sophisticated audio-visual equipment was very typical of what obtained in most developing countries.

4.2 The Conclusions

The conclusions of the study were stated in respect of the questions the study set out to answer.

What kind of teacher education did the primary school science teachers undergo?

1. More than half of the primary school science teachers were holders of either Grade II or N.C.E. certificates.

2. It was very likely that a greater proportion of the certificate holders did not acquire the competencies specifically recommended for the teaching of the Primary School Science Curriculum sponsored by the Federal Ministry of Education.

What administrative support did the primary school science teacher get?

3. Though many of the teachers had in-service training experiences, such were not available on a regularly sustained pattern. In the context of the implementation, the provision made for such in-service training seems to be grossly inadequate.

4. Most of the schools had more than three science lessons scheduled per week.

5. Most of the schools provided supervisory and consultancy provisions.

6. Majority of the schools had more than 40 pupils per teacher to cope with during science instruction in a week.

What were the material resources available to the primary school science teachers?

7. Most of the schools had such teaching aids like pictures, models, and objects.

8. Though most of the schools had science syllabus and text-books for the use of teachers, there seems to have been no uniformity in their use and choice.

9. All the schools did not have sophisticated and standard audio-visual equipment and materials to be used as science teaching aids.

4.3 The Recommendations

Measures For Improvement of Instruction

1. Much has been achieved in providing curriculum materials to teach science in the integrated way in the primary schools. The curriculum intentions will be frustrated if the classroom teachers are not familiarised with the intentions. Practice follows conviction. The teachers need to be convinced about the advantages of the new approach of teaching science. To this end, all Grade Two teacher colleges should utilise the Core Curriculum For Teachers of Grade Two Science. The medium is the message. Unless the teachers are taught the integrated manner, they will not be able to teach science the same way.

2. For the benefit of teachers who graduated earlier than the introduction of the Primary Science, continuing and sustained in-service training experiences should be provided.

3. Unformity in practices in the primary schools should be ensured in respect of the following.

    (a) Use of syllabus and textbooks

    (b) Availability of teaching time

    (c) Number of pupils per teacher in a class

(d) The type and frequency of school visits by experts for supervision and consultation.

4. A pool of sophisticated audio-visual equipment and materials should be made available to the primary schools in each Local Government Area.

For Further Research

Sufficient information about the lack of infra-structural facilities science teachers have to face in the classrooms is now available as a result of some field survey studies. Though these restraints including, scarcity of teaching materials, insufficient teaching time, overcrowded classrooms and so on are serious enough, there is a way of reducing their devastating effects. A teacher who is adquately prepared educationally for his specific task could reduce the severity of the restraints under which he has to work. The solution then, is to determine the strengths and weaknesses of the practising science teachers in the primary schools through research studies carried out for the purpose. The present study suggested the need for further research in respect of the following using the practising primary school science teachers as the subjects of the studies.

1. Evaluating of the understanding of the teachers of the philosophical, psychological, sociological, and the curricular foundations of science teaching.

2. Assessment of the attitude of the primary school teachers to the integrated science teaching.

3. Assessment of the skills of the primary school teachers to plan, present, and evaluate science lessons.

4. Identification of science teaching related problems that can be remedied by enforcing uniform measures across the school system.

4.4 Summary

The study reported was an investigation of the adequacy of the resources available to primary school science teachers in six Local Government Areas of the Borno State. The resources selected for investigation were:

1. The professional equipment of the teacher.

2. Administrative support given to the teacher.

3. Material resources available as science teaching aids.

The data for the study were gathered through questionnaires and interviews. A total of 120 respondents from 57 primary schools supplied the data. The findings of the study suggested the following:

1. Even the certificated science teachers had no specific preparation to cope with the implementation of the Primary Science Curriculum.

2. The administrative support for the teachers in the schools were inadequate, non-uniform, and haphazardly provided.

3. Though the teachers claimed they used simple visual aids, syllabus, and textbooks in science instruction, no school had any of the standard type of audio-visual equipment and materials for use with them as science teaching aids.

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APPENDIX A

QUESTIONNAIRE FOR PRIMARY SCHOOL TEACHERS

Preparing Teachers For Teaching Science In Primary Schools In Borno State.

1. Name of School _____

2. Local Government _____

3. Location City Town/Village/Hamlet.

4. How old are you?

   Below 20 years _____

   Between 20 and 30 years _____

   Between 30 and 40 years _____

   Above 40 years _____

5. Years of teaching experience in primary school.

   Less than 2 years _____

   Between 2 and 5 years _____

   Between 5 and 10 years _____

   Above 10 years _____

6. Qualifications.

   N.C.E. and Above _____

   Grade II passed _____

   WASC/GCE passed _____

   Grade III _____

   Grade II _____

   Grade II referred _____

   GraWASC/GCE failed _____

7(a) Did you study science in your Grade II. Yes/No

(b) Do you personally teach science? Yes/No

8. What classes do you teach?

_____

_____

9. Do you have a copy of the official syllabus for primary schools? Yes/No

10. If yes, is science included in this official syllabus? Yes/No

11. What is your opinion about the present primary science syllabus?

Difficult to teach _____

Satisfactory _____

Too simple to use _____

12. What would you say about the suitability of this syllabus from the stand point of students learning?

Suitable _____

Just fair _____

Not suitable _____

13. How many periods of science do you teach per week in classes in which you teach?

Class	No of Science Periods Per week
1.	
2.	
3.	
4.	
5.	
6.	

14. How adequate are the number of periods allocated to the teaching of science?

Adequate _____ Inadequate _____

Ideas presented in teachers' books

Difficult Not difficult.

20. Which of the following do you have in your class for science teaching? Tick as appropriate.

Science corner _____

Science/Discovery Table _____

Acquarium _____

Models _____ _____

Science Charts/Pictures _____

21. Do you have a room set apart for teaching science teaching? Yes No

22. Do you use the following facilities for teaching science in your school?

School Grade	Yes/No
School Farm	Yes/No
Poultry Farm	Yes/No
Pond	Yes/No
Weather station	Yes/No

23. Do you make any science equipment/apparatus from locall available materials? Yes/No

24. Who supervises/inspects your science classes?

Headmaster	Yes/No
Inspector/Supervisor	Yes/No
Education Secretary	Yes/No

Any other (please specify) _____

_____

25. How regularly is the supervision done?

Monthly Termly Yearly Never.

26. In what ways have the inspection helped you in the past?

_____

_____

_____

27. Which of the following have you attended/participated in the past?

In-service courses in science Yes/No

Science workshops Yes/No

Conference on Science related topics Yes/No

28. Which of the following have you received in the past as special inducement for science teaching?

Allowance Yes/No

Accelerated promotion Yes/No

Further training Yes/No

29. Which of the following do you use in determining pupils' progress in science?

Home work Yes/No

Classwork Yes/No

Projects Yes/No

Tests/examinations Yes/No

30. *Indicate how often you assess your pupils by each method* you use (tick the appropriate column against each method you use.).

Method	Yearly	Daily	Weekly	Forth Night ly	Monthly	Termly
Frequency						
Tests/Exam						
Home work						
Class work						
Projects						

31. What language do you mostly use in teaching science in your classes?

Class	Language Mostly Used
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____

32. Do you organise the following activities in science for your class/school?

Science debates	Yes/No
Science exhibitions	Yes/No
Science quiz	Yes/No
Science excursions	Yes/No

33. Which professional organisations do you belong to?

(a) (b)

(c) (d)

34. Are you aware of the existance of the Science Teachers Association of Nigeria? Yes/No

35. Suggest ways of improving primary science learning and teaching in Nigerian schools.

_____

_____

_____

_____

APPENDIX B

QUESTIONNAIRES FOR HEADMASTERS

Preparing Teachers For Teaching Science In Primary Schools In Borno State

1. Name of School _____

2. Local Government Area _____

3. Location of School

   City ☐ Town ☐ Village ☐

4. Does your school possess on official copy of the primary school syllabus? Yes ☐ No ☐

5. If yes, is science included to science teaching in the syllabus? Yes ☐ No ☐

6. How many periods were allocated to science teaching in each of the classes.

   Less than 2 periods a week ☐
   Three periods a week ☐
   Four periods a week ☐
   Above 4 weekly ☐

7. How are science books obtained?

   Supplied by authorities ☐
   Purchased by pupils ☐
   Any other source? (please specify) ☐

8. Do you have a library in your school? Yes No

9. If yes, are there science books in it? Yes No

10. Do you have any room set apart for Teaching Science? Yes No

11. Has science equipment been supplied to your school in the past 5 years. Yes No

12. What would you say about the suitability of this syllabus from the stand point of students learning?

    Suitable _____ Just fair _____ Not suitable _____

13. How many periods of science do you teach per week in the classes in which you teach?

Class	No of Science Periods per week
1.	_____
2.	_____
3	_____
4	_____
5	_____
6	_____

14. How adequate are the number of periods allocated to the teaching of science?

Adequate _____ Inadequate _____

15. Which of the following approaches (methods) do you use in teaching science? (Rank the most appropriate one) as 1(one) and the next most appropriate 2(two) etc.

Teaching/Talking and writing on the down to 6(six) blackboard _____

Pupils talking among themselves and with the teacher _____

Teacher demonstrating something (an experiments) to pupils _____

Pupil carrying out activities (experiments) on their own _____

Pupils going on field trips, tours and so on _____

16. Do your pupils regularly view or listen to any television or radio programmes in science? Yes No

17. List the science books in your class.

Title of The Book	Author
(a)	_____
(b)	_____
(c)	_____
(d)	_____

APPENDIX C

Preparing For Science Teachers in Primary Schools (For Principals of Teachers Training Colleges)

1. Name of school _____

2. Is Teaching of Science compulsory in School? Yes No

3. Does your state have a recommended syllabus for Teaching Science in Teachers' Training Colleges in Borno State

   Yes No

4. Do you know of any other syllabus being used for Teaching Science in Teachers' Training Colleges in Borno State?

5. If yes, which? _____

6. How do you rate the present syllabus being used for Teaching Science in Teachers' Training Colleges in Borno State? (Tick)

   a. Not satisfactory
   b. Fair
   c. Fairly satisfactory
   d. Satisfactory

7. How many periods are allocated to science per week?

Form	No of Periods per week
1	
2	
3	
4	
5	

8. List the science textbooks used by the Science Teachers in your school.

_____

_____

_____

_____

9. Who is responsible for supplying science textbooks in your school? (Tick as appropriate)

Ministry of Education ☐
P. T. A. ☐
Local Government ☐

10. What problems do you have in supplying science books to your students? (Tick the most serious)

No transport to distribute materials ☐
No appropriate textbooks to buy ☐
In sufficient Funds to buy books ☐
How other (please specify) _____

_____

11. Which of the following facilities are provided in your school?

Science room	Yes ☐	No ☐
Library	Yes ☐	No ☐
Science equipments	Yes ☐	No ☐

12. How often do science Inspectors/supervisers inspect science in your school in a session? (Tick as appropriate)

Quarterly Twice Once Very occasionally.

13. State the number of science teachers in your school with the following qualifications: (NYSC Indusive)

1. Graduates only (i.e. no teaching qualification_____
2. N.C.E. and above _____
3. N.C.E. only _____
4. Others (please specify) _____

14. Are you science teachers given the chance to attend workshops in science?_____

15. If so, how often? (Tick as appropriate)

Once a year ☐
Twice a year ☐
Three times a year ☐

16. Who sponsors the in-service training?

Federal Government
National Education Research Council
State Government
University
National Teachers Institute (NTI)
Borno State Education Centre
Science Teachers Association of Nigeria

17. What iducement do you give to your Science Teachers?

Special Allowance ☐
Accelerated promotion ☐
Opportunity for further training ☐
Any other (please specify) ☐

18. State the number of students in Form V who offered science in their Grade II Exams for the following years.

Year	No of Candidates
1982	_____
1983	_____
1984	_____

19. As a Principal, what future plans do you have for improving science teaching/bearing in your school?

Syallabus _____
Equipment/Facilities _____
Textbooks _____
In-service training _____
Others (please specify) _____

20. Comment on the rate of passing of science in your school for the passed ten (10) years.

_____

_____

_____

_____

21. Rank the following (as 1 2 3 4 5 etc) as reasons for passing science subject in your school.

1. I have qualified teaching staff
2. My laboratory is fairly equiped
3. My students go to field trips occasionally.
4. We have fairly enough science materials
5. Students are interested in learning science
6. Our Ministry's Science Inspectors give us useful advice.

22. Compare the candidates who pass science and arithmetical processes (Education III).

Note: Only those who sat for science and compare the result of the same people for maths methods.

Do you consider five years preparation for Teaching science in primary school to be: inadequate adequate.

If you said inadequate, how many years do you recommend? supply the information as required in the table below: (For science subject only for your school.

Year	No of Candidates enrolled in science	Number Passed	Number Failed
1983			
1982			
1981			
1980			
1981			

Year	No of Candidates enrolled in science	Number Passed	Number Failed
1979			
1978			
1977			
1976			
1975			
1974			

Year	Pass	Failed	Pass	Failed
1983				
1982				
1981				
1980				
1979				

For Teachers College Waka Only.