TYPOLOGY OF SECONDARY SCHOOL STUDENTS BEHAVIOURS IN SCIENCE CLASSROOMS IN NIGERIA

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APPROVAL SHEET

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DEDICATION

This study is affectionately dedicated to Ọrẹbọdẹ, my husband; Yeside; Oluseye; Olufunmilọla; Mojisọla and Olutayọ, our children;

and

To the Memmory of My Beloved Mother, Mrs. V.I. Awokoya.

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O.O. Martins
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ABSTRACT

Direct classroom observation studies by participant and non-participant observers have been in vogue since Flanders work in classroom Interaction Analysis was first published two decades ago. Reports of such observations have been a matter of suspect, as observed teachers are often reported as saying that the reports of such observations hardly reflect their intentions and perceptions of what transpired in the observed classrooms. The present study was undertaken to identify the prevalent behaviours among the Nigerian secondary school students in their science classes.

A major use of classroom observation studies has been to describe typical classroom behaviours as models for teacher preparation. To add to the abundant published works in this area, the present study was undertaken as an indirect approach to identify the prevalent behaviours among the Nigerian secondary school students in their science classes. Instead of an outside observer, 94 science education student teachers in the Faculty of Education, Ahmadu Bello University, Zaria, were requested to imagine and describe five typical students in their science classes. Each respondent has had at least one year teaching experience. The assignment was given during the second week of December 1963 and the students were allowed one week during which to complete the assignment.

A total of 54 behavioural adjectives appeared in the student-teacher descriptions. The list of adjectives was submitted to the Language Arts division of the Department of Education for clustering. An eight-paired category system (each pair is a word-opposite) emerged from these clustering.

The student-teachers descriptions of their students were subsequently classified according to these eight-paired category system. The X^2 -statistic was used to test the differences between the paired-proportions (negative - positive) in each category.

Results showed that most Nigerian secondary school science students are percieved and described by their teachers as rurable, self-centered and of above average intelligence. However, most science classrooms in Nigeria are filled with students who are not interested in science work, who lack creativity and have negative 3elf-concept of themselves.

The classroom behaviours which emerged from this open-ended indirect approach to classroom interaction analysis are hardly reflected in the "Mirrors for Behaviour" that are currently in use.

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CHAPTER 1

THE PROBLEM

1.1 Introduction

This study is concerned with experience teachers image of students behaviours in the science classroom. The main focus of the study is on the behaviours of students in the science classroom.

Direct observational studies have been pursued vigorously by various researchers over the past two decades. In the United States of America, classroom researches have been extensively funded and vigorously promoted (Tisher, 1971; Delamont and Hamilton, 1976). However it had not produced the revolution in educational understanding which its proponents expected. The failure has been attributed to an over-emphasis on one type of Interactional Analysis, the direct observational studies, at the expense of other kinds.

Delamont and Hamilton (1976) argued in their paper that the direct observational study contains a number of severe biases and limitations when used as a research tool. They believed that the approach risks furnishing only a partial description. Furthermore, they are of the opinion that direct observational studies may divert attention from initial problems towards the search for 'objectivity' and 'reliability'.

Direct observational studies have also been criticized more especially by the observees that their intensions or actions have often been misrepresented. Very often, violent disagreements have arisen between observers and observees after observees have had opportunities to reassess recorded observations about them (Shuaibu, 1979).

Louis Smith (1968) has rightly pointed out that teaching must be viewed as an intellectual cognitive process. According to Smith,

> The way the teacher poses his problems, the kinds of goals and sub-goals he is trying to reach, the alternatives he weighs --- are all aspects of teaching which are frequently lost to the behavioural oriented empiricist who focuses on what the teacher does, to the exclusion of how he thinks about teaching.

Another major argument put forward by the observees is that observers are often casual and infrequent visitors who are not familar with the classroom setting. Very often, the observee, who is a teacher, will further claim that his actions are dictated by the exigencies of the classroom situations. Because of these various problems and claims by the observees in observational studies, it was considered necessary to do an "indirect" observation study based on teachers own imaginations and descriptions.

In a classroom setting, a vast number of transactions occurs, between the teacher, the students and the available learning materials. The teacher is the key to

the success or failure of this instructional system as she is faced with the task of conveying the desired massage in the form of knowledge, attitudes and skills as well as directs the class activities. She is therefore in the best position to supply information about classroom transactions.

The present study still focuses on the teachers. This time, the emphasis is on their perceptions and imaginations, as additional information to data obtainable from direct observations.

The advantages of these are:

1. Teachers are given the opportunities to describe the behaviours of their pupils rather than having an observer in the classroom,
2. Teachers are more conversant with the children in the classrooms and are therefore likely to give better descriptive behaviours of their students,
3. There is less chance of an observer misinterpreting a student's behaviour towards the teacher in a classroom setting and
4. Biases are limited now to the teacher rather than the observer.

1.2 Statement of the Problem

Research evidences in Nigeria have shown that there is a decline in the science enrolment of students at the tertiary level of education, in particular the University (Ozoro, 1977; Shuaibu, 1983).

1. What are the most prevalent behaviours exhibited by Nigerian Secondary School students in their science classes?

2. Is there a pattern in the type of behaviours exhibited?

3. To what extent does an indirect approach corroborate with the report of those studies employing direct observations?

1.3 Need for the Study

Recent changes in the Nigerian educational system have created new challenges for the educationists, the teachers and the students. As the present five-year secondary school programme is gradually being replaced by a two-tier system of three year duration each, in the junior and the senior secondary schools, the role of the science teacher is further stretched. Science Education is now an integral part of the junior secondary school curriculum. The government is aware of the important role of science in the general education of children as well as part of its equipment for national development.

The Nigerian National Policy on Education (revised 1981) also emphasised the need for more science students for national development. The success or failure of

science teaching is recognised as the responsibility of the science teachers.

It is important that teachers recognise individual variation in the acquisition of knowledge so that they may select instructional materials and pace instructions to suit the variations in the class. Teacher education may be improved by knowledge of the types of student behaviours that teachers are likely to encounter in the science classroom. The researcher believes that a prior knowledge of students behaviours is likely to prepare a new teacher towards the expected classroom situation.

Furthermore an identification of students behaviours may in fact determine the methodology of instructional transactions which is likely to enhance meaningful learning in science. This may in turn yield an increase in the number of students taking science at the university level. A study of the various types of student behaviours, if it provides any discernable pattern, can contribute to the understanding of the nature of the science classrooms as well as instruct educators on the nature of teacher education that is appropriate for science education students.

1.4 Delimitation of the Study

The subjects of the present study are the 1983/84 final year B.Ed. (Science Education) and B.Sc. Education students in the Faculty of Education, Ahmadu Bello University, Zaria.

The choice of the subjects is based on the fact that:-

1. The faculty produces a large enough number of science student teachers to provide an adequate number of science teachers for the study.

2. The subjects are drawn from different states of the federation as admission is done through a Joint Admission and Matriculation Board (JAMB) to ensure national representation.

3. Teachers are in the best position to give accurate descriptions of their students' behaviours, even if by inference.

Since most of the students had a teachers certificate prior to entry into the faculty, it was assumed that subjects will be able to reflect on the nature of the science classrooms from hindsight.

1.5 Basic Assumptions in the Study

1. The behaviours of the secondary school students in the science classroom will not vary much from the descriptions given by their teachers.

2. Students' behaviours can be categorized from teachers imaginations and perceptions of their students' behaviours.

3. It was assumed that perceptions of student teachers approximate the perceptions of teachers in the field. This assumption is probably justified in that more than eighty percent of the student teachers have had at least one year teaching experience.

1.6 Definition of Terms

1. Typology: refers to a classification or a taxonomy of a group of objects or things. In this case, the search for a pattern of behaviour in the science classroom is implied.

2. Interaction Analysis refers to a technique for studying the chains of classroom events which can be categorised or measured. In this study the term refers to the nature of the exchanges between the major components of an instructional setting: teachers versus students, students versus students,

students versus instructional materials and teachers versus instructional materials.

3. Direct Observational Studies - are based on observations in the classroom in which the observer(s) or his substitute must be physically present.

4. Indirect Observational Studies - are based on the imaginations and perceptions of teachers who, in this case, are the "observers" of their own students. Teachers were asked to reflect on their own experiences and write up the behaviours of five students which are typical of the behaviours in their science classrooms.

5. Students' Behaviours - are defined as behaviours manifested in the course of teaching, which have direct bearing on students' learning.

6. A Pattern - is a chain of identifiable events which occur frequently enough to be of interest and can be given a name (label).

7. Secondary Education: According to the National Policy on Education (1981 revised), is the form of education children receive after primary education and before the tertiary stage.

CHAPTER 2

2.0 REVIEW OF RELATED LITERATURE

It was noted that very little has been reported in the literature on the use of an indirect approach to observe the behaviours of secondary school students in their science classrooms. However, direct classroom observation studies had been extensively investigated in Nigeria and elsewhere.

In this chapter, the relevant literature concerning classroom observational studies are reviewed. The second part deals with the role of observation studies in education. This is followed by the problems arising from direct observational studies. A summary of this chapter and a critique of reviewed works which lead to the indirect approach to classroom observation are given.

2.1 General Literature

There is currently an increased interest in research on teaching, in particular in the nature of interactions in the classroom (Simon and Boyer, 1970; Boehm and Weinberg, 1977).

Observations have been made use of in a wide variety of interactive settings and the classroom is one of these settings. Observation has been recognised as an important tool for gaining information, drawing inferences and

generating ideas. It is generally accepted that observation is the more obvious approach to research on teaching (Medley and Mitzel, 1963). It is through the direct observation of the behaviours of teachers while they teach and pupils while they learn that various researchers have tried to explain the situations as they exist in many classrooms today. Some of the well-known research studies in the field of direct classroom observation include the works of Flanders (1966), Fischler and Zimmer (1968), Eggleston (1975), Shuaibu (1979), Eggleston (1980) and Howe et al (1983).

However, there are many researchers in education who do not employ observation techniques in their investigations (Medley and Mitzel, 1963). This is because classroom events are so complex that several facets are available for study at any given time.

Observation is considered as an invasion to privacy that teachers and administrators resent and resist. To many teachers, the presence of an observer in the class is very disturbing and any behaviour seen may not necessarily be generalised as typical of the behaviours which go on when an observer is not p

2.2 Direct Classroom Observations and Analyses

Systematic classroom observations began as far back as 1939 with the work of Anderson. He studied the interaction between teachers and children, and between the children themselves. Anderson, in his study, investigated the dominative and integrative behaviours amongst children. The children observed were of kindergaten age and were usually above average I.Q. Observers worked in pairs and observed children for five minutes at a time. The dominative acts shown by children are use of force, threats, blaming, snatching toys; while the integrative behaviours shown include sharing, cooperating and playing harmoniously etc.

Anderson's important findings were:-

1. The teacher sets patterns. When teachers were dominative or integrative the children by and large, followed the pattern.

2. When teacher's integrative contacts increased, the children showed more spontaneity, initiative and greater problem - solving ability.

3. When teacher's dominative contacts increased the pupils could more easily distract from what they were doing.

Although, Anderson's study was done on a small scale, his conclusions were supportive of the assertion that students behaviour in the classroom are largely dictated by the teacher.

Many more classroom research studies were vigorously pursued in the 1950's and 1960's. Simon and Boyer (1970) have indicated that Flanders' system is one of the most widely used observation system in the classroom.

Flanders studied patterns of teacher influence in the classroom. He identified different verbal statements which teachers used and developed a system of interaction analysis composed of ten categories. Seven categories describe teacher-talk, two categories describe pupil-talk and the tenth category is used to designate silence or confusion in the classroom.

Flanders considered that a teacher's verbal statement represented some part of a continuum of influence. At one end of the continuum was the influence which restricts the freedom of action of the student, making him more or less dependent on the teacher. At the other end was the teacher's indirect influence which encourages student's self-initiation thus giving him a chance to express his freedom of action. Flanders maintained that no teacher employed a pure pattern of influence, direct or indirect, but that all teachers establish some kind of balance based on a combination of direct and indirect approaches.

Teacher influence patterns relates to classroom climates. Verbal statements classified as "direct influence" directly relate to a problem, interject teacher authority, or both, thereby restricting freedom of action. Statements of these types include lecturing, giving directions, criticizing or justifying the teachers use of authority. On the other hand, statements categorized as relating to "indirect influence" encourage student active participation verbally and allow them to show their initiative behaviours, thus expanding their freedom of action. Therefore, teacher indirect influence indicates the extent to which the teacher reacts to the ideas and feelings of the pupils. The teacher question category relates to when the teacher is using questions to guide part of a class discussion in which the pupils show their initiative.

Nearly, all pupil-talk is determined by the nature of teachers question. Flanders considered it a necessity for a professional teacher to evaluate the consequences of his professional behaviour in a fashion which is as objective and constructive as possible. To ignore this responsibility is to act unethically, since teachers are paid to influence the behaviours of others (Flanders, 1970; 345).

Flanders used "indirect influences" to describe the extent to which the teachers responses to students

actions, prompt further desirable participation in the lesson. In the present study, an "indirect approach" to observations is descriptive of the method employed by the "observer" rather than the teacher, to get at the nature of interactions going on in the science classroom through the eyes of the teacher. "Indirect observation" focuses on teacher's own perceptions of their students' behaviours in the science classrooms.

Flanders' FIAC is designed for a classroom that is dominated by verbalization. This system is least appropiate for a science classroom which is dominated by activity. In order to cope with the nature and demands in the science classroom, a new Interaction Analysis System appropriate to science classroom, was needed.

Fischler and Zimmer (1968) studied the change in the teaching methods of teachers as they teach science to children with different ability levels. In order to do this study, an observational instrument for science teaching was developed. The science teaching observation instrument, one of the first to focus exclusively on science teaching, had the following features:

1. Observation was by an eye witness;
2. The behaviours observed were defined in terms of overt action;

3. Behaviour of an individual or group was observed for stated unit of time;

4. There were a number of repetitions of the time unit employed;

5. An individual score was based upon the number of times in which the defined behaviour occurs.

The instrument had a two dimensional check-off sheet on which observed behaviours were recorded by time interval.

The observation consisted of 25 categories divided into 3 parts. Part I had to do with the techniques which the teacher uses in teaching. This consisted of 14 categories with 4 subdivisions; teacher-talk, teacher-student talk, teacher does and students do. Part II had 5 categories devoted to teacher questions while Part III dealt with characteristics; method, subject-matter and pupil activity each consisting of one category each. The last category in the instrument was designated misconceptions. A five minute interval of recording was found to be satisfactory. However, in the part I, the recording time was halved. In this section, Fischler and Zimmer attempted to classify the teaching techniques and to group them according to whether they are verbal or doing and according to the extent of student participation. It was recognised

that science teachers often lecture and use demonstration as part of the lecture, or they may conduct a recitation using audio-visual aid. It was also found that junior secondary school teachers seldom lecture; rather they frequently ask questions with their lectures. In such a situation, the observer was asked to record only one dominant technique for each time interval.

It was hypothesized that the kind of questions teachers asked play an important role in the outcomes of science teaching. The definition of teachers' questions was based on the kinds of responses expected from students. The five categories of questions concerned were:

1. recall questions,
2. questions requiring understanding relationship,
3. questions requiring to make an observation,
4. questions requiring students to formulate hypothesis,
5. questions requiring students to test a hypothesis.

It was recognized that such classification requires subjective decisions on the part of the observer, since he cannot look into the student mind to see what mental process occurs in answering. As such the reliability in this part of the instrument is relatively low.

The part II of the instrument which dealt with the lesson characteristics had 3 categories:

1. those having to do with communication of the lesson, whether concrete or abstract;

2. those having to do with the nature of subject matter being taught;

3. those having to do with the teacher's relationship with student activity, whether teacher directed or non-directed.

The final category of misconceptions was for recording observation such as when a teacher admitted he did not know, but would try to find out. Fischler and Zimmer found that most teaching learning situations can be characterized by placing them on one or more continua. Three such continua which are believed to have significances in teaching ability levels are:

1. Concrete $\rightleftharpoons$ abstract: This continuum refers to the technique which the teacher uses to impart knowledge and understanding. At the abstract end the instructor uses verbal and written symbol while at the other end real objects are used.

2. Practical $\rightleftharpoons$ theoretical: This continuum has to do with the subject matter taught. At the practical end, applications of principles to

subject matter are within the experience of the learner and is used by him while at the other end theory is presented with no application.

3. Direct ⟷ Non-directed: This continuum applies only to student activity and the extent to which the teacher actively directs the student actions.

In the analysis of data, graphical method was used and as such requires no computation. Such a method provides a constant control of reliability when two observers are working together as the plotted points show immediately where disagreements are occuring and steps are taken to correct them. It also shows if one observer is recording many more items than the other. This is a unique feature of Fischler and Zimmer scheme that should be further tried.

A Science Teaching Observation Schedule was developed under the leadership of Eggleston during the period 1970 - 1973. The Science Teaching Observation Schedule (STOS) focused on the intellectual transactions in the classroom. It shared in common with other observation instruments the following characteristics:

1. the presence of an observer in the classroom,
2. the recording of behaviours in some systematic manner as they take place and
3. the coding of these behaviours with some unambiguous set of categories.

STOS had 23 categories and each category of behaviour is recorded only once, on the first occassion it occured during any given three minute interval. The overall count for any category represents the minimum frequency of occurrence of that behaviour.

The observation schedule was divided into two major parts:

1. Teacher talk and
2. Talk and activities initiated by the pupils.

Teacher talk consisted of seven categories of questions, four for teacher statements and another three for teacher directives. Pupils activities are classified into eight categories with four under consulting and referring and four dealing with reference back to teacher.

Forty teachers were trained as observers and they worked in more than a hundred randomly selected schools (Eggleston, 1980). All the classes observed were in their fourth year of secondary education and

Shuaibu (1979) developed a Science Teacher Observation Schedule (STOS), specifically to measure the teaching methods of teachers in their science classrooms. Seven methods, namely: expository, teacher demonstration, discussion, students demonstration, experimentation, problem solving (project), inquiry/ discovery were coded and placed on a continuum according to the extent of student participation in each. There were also a column for methods not identifiable with other classes, and three others relating to the extent that science process skills were employed. The time interval used was five minutes which according to the researcher was the optimum time which the teacher would effectively exhibit a teaching behaviour that could be approximately coded as one of the methods described in the instrument. Altogether a total of 57 science teachers from various secondary schools in Kaduna State were observed.

STOS scores were used to calculate reliability coefficient for paired observations between two observers. Every five minutes each observer recorded independently under appropriate column and row, the predominant teaching method exhibited by the teacher. Shuaibu's most important finding was that most science teachers in Kaduna State spent more time in expository behaviours than in any other teaching behaviours.

Besides he noted that STOS instrument was reasonably reliable instrument to describe teacher instructional behaviours as it shows a high positive correlation with teachers self-percieved behaviours as shown by HOSTTS (How Our Science Teacher Teaches Science) in the same study.

Shuaibu, unlike Fischler and Zimmer (1968) and Eggleston (1975 and 1980), had focused on just one component of the classroom notably the teaching behaviour of teachers. Besides, teachers are prone to debate the validity of recorded observations or their interpretations. Perhaps more light would be shed into the already complex situations that exist in the science classrooms, if we capitalize on teachers supplied data.

2.3 The Role of Observation Systems in Education

The earliest systematic observation were designed for gaining informations about the child development. Very often observations made were unsystematic, biased and selective. However, more recently, the detailed recordings of observations of children by Piaget (1960), Bruner (1966), Lytton (1971), Taiwo (1976), Medinnus(1976), Bamidele (1978), Sternberg et al. (1983) to cite but a few, have provided further insights into the cognitive, social, language and emotional development in children.

The use of observation techniques is particularly crucial in facilitating a match between a child's current level of cognitive functioning and educational experiences to which he or she is exposed (Bloom, Hasting and Madaus, 1971). Perhaps the most useful resources for helping to evaluate a given procedure of an observational system are the Mirrors for Behavior anthologies by Simon and Boyer (1967, 1970) and Rosenshine and Fursts (1973) in the second Handbook of Research on Teaching. Four classifications of purposes appeared to have emerged from the various systems recorded in the Mirrors. These are:

1. to describe current classroom practice,
2. to train teachers,
3. to monitor instructional practice and
4. to investigate relationships between classroom activities and student growth (Rosenshine and Furst, 1973; 147).

Flanders Interaction Analysis Category System (FIAC) which has been earlier reviewed in this chapter and has been extensively used by other researchers have been used for all the four purposes. At least thirty-seven of the systems in the "Mirrors for Behavior" appear to fall in the first classification as individual researchers overwhelmingly avowed that their purpose is to describe, or observe classroom settings. In some other systems

"to analyze" or "analysis of" classroom events has been stated as the main purpose of the instruments.

At least ten category systems in the Mirrors appear to have been developed primarily for teacher training. The training situations have been used in one or more of the following three ways:

1. to provide a teacher with a feedback on his behaviour,
2. to give a teacher a set of procedures by which to categorize instructional activities and
3. to provide a teacher with behaviours and activities which he can model during instruction (Rosenshine and Furst, 1973).

Other researchers have also attempted to develop systems which teachers could use to monitor their behaviours without depending on outside observers. Self-feedback appears to be the major purpose of the systems developed by Amidon and Amidon (1968) and Young (1968).

One of the more important purposes of the category systems is to monitor the implementation of educational programmes. There are at least five systems in the Mirrors developed for this purpose. A major advantage of category systems in this classification is that

the system can yield programme -specific information which can be used to revise the operation to conform to the intention of the developers (Siegel and Rosenshine, 1972; Soar, 1972).

Another area of classification in which the observation instrument was developed was to study the relationship between the classroom activities and student growth. At least seven studies in the Mirrors were developed for this purpose.

According to Rosenshine and Furst (1973), studies of teaching behaviours and student achievements appear to have yielded the most significant or consistent results in nine variables notably 1) Clarity, 2) Variability, 3) Enthusiasm, 4) Task-oriented/ or Business-like, 5) Criticism, 6) Student opportunity to learn criterion material, 7) The use of structuring comments and 8) Multiple levels of questions or cognitive discourse.

With the increase in the number of standard textbooks now available for use by teachers in Nigeria and elsewhere, there is need to continually evaluate such packages to discover their effects and effectiveness.

2.4 Problems Arising From Direct Observation Systems

The progress so far made in classroom observations has not been without its own problems. Research workers have pointed out that observations are expensive in terms of time, money and professional skills of observers (Fischler and Zimmer, 1968; Shuaibu, 1979).

According to Fischler and Zimmer, the length of time necessary to train a competent observer may vary with the complexity of the instrument. In general, they contended that about two weeks of observing was necessary to bring an inexperienced observer up to the level of an experienced one. Beside it was also necessary to appraise the degree of reliability reached as the training progressed. The two major problems in training a reliable observer as identified by Fischler and Zimmer were:

1. that of recognising behaviours and actions,
2. that of categorizing a behaviour or action after it had been recognised.

The first of these problems, they attributed to be partly a matter of mental alertness and partly a matter of becoming sensitized to recognition of the defined behaviours. They however, agreed that the problem of becoming sensitized to recognise behaviours require training. At the initial stages of training, the

observer often recognizes and records key questions and misses all the rest. They, therefore likened an experienced observer to a stenographer who gets every word down in shorthand but cannot tell what has been said without reading it back. The pointer is such as to cast some doubt on direct observation studies.

Medley and Mitzel (1963) admitted that observation data are difficult to obtain yet they dismissed it as a poor excuse for omitting observations from a study in which it can play an important part. They are convinced that teachers and administrators will cooperate once they are convinced that a study is well planned and capable of contributing important knowledge. Furthermore, they opined that knowledge of how teachers and pupils behave under investigation seems better than ignorance about how teachers and pupils behave.

> If an investigator visits a group of classrooms, he can be sure that regardless of his presence, he will see teachers teaching and pupils learning; he will see better and poorer teachers, effective and ineffective methods, skilful and unskilful use of theory. If he does not see these things, and measure them, it will not be that these things are not there to see, record and measure. It will be because he does not know what to look for, how to record it, or how to score the records; in short, he does not know how to measure behaviour by systematic observation (Medley and Mitzel, 1963 p. 248).

In recent study, Eggleston (1983) used numerical taxonomic method to sort lessons observed into 3 classes: Group (style) I: problem solvers, Group (style) II: fact

The invasion into teacher's traditional privacy is a necessary step towards meaningful description and analysis of teaching-learning settings.

A more recent criticism of observation system, in particular those which employ the three minutes time sampling units and 1 or 0 system of recording used on the sign systems, was that they yield inaccurate estimates of frequencies. One of such systems is that of Eggleston (1980), which has 23 categories. Eggleston (1983) admitted that the 23 categories of his Science Teaching Observation Schedule (STOS) are prone to variations which are not accurately known and that these may be potentially large in STOS records. STOS has also been criticized for lacking a theoretical base in the selection of the categories. Eggleston (1983) contended that this criticism was not constructive, otherwise those who propagate it should have been able to provide an acceptable explanation.

Classroom behaviours have been measured through direct observation studies. In most cases the observational instruments have been the interaction analysis of the type of Flanders (1966), which measured only verbal interactions in the classroom. This emphasis on verbal interaction appears to be the least appropriate for the typical science classroom engaged in enquiry teaching. Perhaps, one way of getting round some of

the problems and criticisms earlier discussed, is to adopt an indirect approach to the study of classroom settings. An indirect measure of students' behaviours through teachers' own perception of their students should throw more light on the realities as they exist in a typical science classroom in Nigeria. At least, such an approach can lend credibility or otherwise to data derived from alternative methods.

Summary

Most of the works reviewed in this chapter are concerned with direct classroom observation studies where the physical presence of an observer in the classroom is of paramount importance. The presence of an observer in the classroom appears to constitute a barrier to normal classroom teaching and any transaction that goes on may not be typical of what goes on when the observer is not there.

Eggleston (1983) has used an indirect approach to classify teachers teaching - styles by analysing recorded science lessons. This is a convenient alternative to having an observer physically present in the classroom.

In view of the various criticisms that have been levelled against direct classroom observations coupled with the problems encountered while obtaining the

observational data, the present researcher has thought it worthwhile to study classroom transactions from an "indirect" approach." It differs from Eggleston (1983) "indirect approach" in that no science classrooms were observed directly by the researcher. Rather classification of student behaviours was based entirely on teachers' perceptions of their students' behaviours. In other words, the teachers were in this study, the observers of their own students.

CHAPTER 3

3.0 DESIGN OF THE STUDY

The problem of the present investigation is to identify the prevalent behaviours in the science classes among the Nigerian secondary school students. It is hoped that a study of different types of student behaviours will provide a better understanding of the nature of science classrooms in Nigeria. Besides, a prior knowledge of students behaviours will prepare the mind of a student-teacher or new teacher towards the expected classroom situations.

3.1 Design

This study is an exploratory exercise to investigate the types of behaviours exhibited by Nigerian secondary school students in their science classes. The uniqueness of the study lies in the fact that the teachers themselves are the "observers" in this case and as such, the researcher need not be physically present in the classroom setting. It was felt that direct observation by researchers do have to put up with errors by trying to cope with more than one transaction at any given time and by creating unusual situations in the classroom. An alternative approach to science classroom investigation was therefore conceived.

This indirect approach to science classroom observation is a deliberate attempt to get around the various criticisms that have been levelled against direct observations of teachers and pupils in the classroom situations.

3.2 The Preliminary Study

A preliminary study was conducted between July and August 1983. The purpose of the preliminary study was:

(a) to determine the feasibility of the study,
(b) to see whether the student behaviours can be classified according to teachers own descriptions and
(c) to determine the appropriateness of the instrument to be developed.

The preliminary study involved 29 student-teachers in their second year of study in the university. Ten of these student-teachers were in their second long vacation term (L.V.T. II) and the remaining nineteen were in their third long vacation term (L.V.T. III)

These students were given an open-ended assignment in which they were to describe the behaviours of any five students A, B, C, D and E in their science classes. A copy of the open-ended questionnaire is in Appendix I. The responses were read, analysed and categorized into 54 classes, according to the various adjectives that

appeared in the student teachers' descriptions. Some of such adjectives include impulsive, careless, reflective, shy, imaginative, patient, bully, aggressive, quarrelsome, respectful, cooperative, attentive, inattentive, putting teacher to task, stubborn, talkative, authoritative, selfish, dishonest, playful, rude, truant and naughty

A 54 category system was considered too large and consisted of relatively empty columns. Therefore it was decided that the 54 categories be clustered into about 10 manageable categories.

It is noted that most of the observation schedules, especially those contained in the Mirrors for Behavior I and II (Simon and Boyer, 1967, 1970), are of the order of 10 categories. In particular, Flanders Interaction Analysis Categories (FIAC) system, which has been widely used by researchers, consists of 10 categories.

The 54 categories derived from the subjects descriptions during the preliminary investigation, were submitted to the language arts division in the Department of Education for further analysis. A post-graduate student with considerable experience in morphology was nominated to cluster the 54 categories into about 10 categories. Initially he made the 10 categories, most of them were word-opposites of each other. Some of the categories were not specific to science teaching. These categories were therefore revised during the main study.

3.3 The Subjects for the Study

The subjects of the present study are the final year B.Ed. (Science Education) and B.Sc. Education students in the Faculty of Education, during the 1983/84 session.

The study was conducted during the second week of December 1983. A total of 94 students took part in the study. Each student-teacher was requested to describe the behaviours of five typical students in his/her science classroom. A total of 5 x 94 (470) descriptions were so collected.

The subjects were of both sexes and it could be said that they were representative of student teachers across the federation, since admission was primarily determined by the Joint Admission and Matriculation Board (JAMB) and presumably, they reflected the federal character of Nigeria. Most of the student teachers had a teacher certificate before gaining admission into the Faculty of Education. Besides, more than eighty percent had at least one year teaching experience.

3.4 Procedure

Initially, ten categories were derived from the preliminary study. But these 10 categories were mainly descriptive of classroom management and only few describe behaviours that may be wholly reflective of

science activities. In order to get at some specific science behaviours, a structured questionnaire was then designed. This time the assignment was more specific in that it required each student teacher to make his/her description according to the following pre-specified format. The student behaviours in

(i) carrying out instructions given by the teacher

(ii) responding to questions of the teacher while introducing the lesson or assessing the achievement of the pupils during and after the lesson,

(iii) responding to assignments given to them and

(iv) other activities during the lesson.

Respondents were also expected to describe how they actually dealt with the different situations. A copy of the structured questionnaire is in Appendix II.

The main instrument was administered during the second week of December 1983 to final year B.Ed. (Science Education) and B.Sc. Education students in the Faculty of Education.

The responses given by the student teachers in relation to student behaviours were summarised, using the main adjectives in each description. The summary and the ten categories derived earlier in the preliminary study were submitted to the language arts

division for clustering. A sample of the respondents descriptions for one student is in Appendix III. Following the advice of the language arts division, eight paired - categories emerged from the analysis of the main study, namely: -

(i) Introvert - Extrovert

(ii) Self-concept, negative - positive

(iii) Intelligence, low I.Q - High I.Q.

(iv) Handicapped - creative

(v) Attitude towards science work, negative - positive,

(vi) Attitude in science work, negative - positive

(vii) Attitude to peer group and teachers, negative - positive.

(viii) Attitude to rules and regulations, negative - positive.

The researcher and her supervisor adopted the eight pairs of categories, after a lengthy examination of their value and relevance to science teaching.

Four of the eight paired categories are concerned with intellect, while the remaining four pairs are related to attitudes.

The first paired category, introvert - extrovert includes adjectives like reflective, thoughtful, unlively, gloomy, quiet, silent, cheerful, carefree, lively, noisy, impulsive, emotional and open.

The second paired category, self-concept, consists of adjectives like proud, arrogant, boastful, supercillious, self-important, busy-body, egoistic, selfish, mean, narrow-minded, gentle, humble, restrained and kind.

The third paired category, intelligence: low I.Q - High I.Q. axis, has adjectives such as unintelligent, weak, dull, stupid, intelligent, brainy, bright, sharp, quick, wise, clever, rational, objective, sensible, inquisitive, questioning, curious, ingenious, skilful, competent, and critical-mindedness.

The fourth paired category, handicapped - creativity axis, has adjectives like retarded, deficient, second-rate, inferior, discouraged and creative.

The fifth paired category, which is related to attitude, is concerned with students' attitudes towards science work. Clearly this marks the beginning of intentionality in science. Adjectives relating to this category are perserverance, hardworking, onthusiastic, passionate, devoted, lazy, sluggish, careless, playful, dull, truant and inactive.

The sixth category is specifically concerned with students' attitude in science work (in action).

Adjectives describing this category are honest, neat, frank, decent, fair, sincere, reliable, trustworthy, rude, disrespectful, insulting, naughty, distrustful and dutiful.

The seventh category relates to students' attitude to peer group and teachers (how well the subjects get on in a science community). Adjectives describing this category are aggressive, bully, mischievious, quarrelsome, domineering, destructive, disruptive, rash, rude, uncooperative, restless, wild, hyperactive, impatient, stubborn, lousy, notorious, cooperative, patient, respectful and responsible.

The eight and final category is concerned with students' attitude to rules and regulations. Adjectives describing this category are obedient, submissive, docile disobedient, argumentative, complaining, indisciplined and responsible.

3.5 Treatment of Data

Each respondent was asked to describe the behaviours of five typical students in his/her science classroom. There were 94 respondents in all. For each of the 94 descriptions, there could be more than one behavioural adjective for each student. Furthermore, the same adjective may be repeated in more than one

description. However, for a particular respondent, a behaviour is only scored once: the first time it occured.

For analysis, a frequency distribution table on the eight paired categories of behaviours was drawn up (Appendix IV). The summary is shown in Table 1 overleaf.

TABLE 1

Frequency Distributions for Paired Categories of Behaviours

No	Category of Behaviour	Extreme	Frequencies	
			Each pair	Total/ Category
1.	Personality	Introvert	62	95
		Extrovert	33	
2.	Self-concept	Negative	7	7
		Positive	0	
3.	Intelligence	Low I.Q.	29	94
		High I.Q.	65	
4.	Creativity	Handicapped	9	11
		Creative	2	
5.	Attitude towards Science	Negative	61	76
		Positive	15	
6.	Attitude in Science work	Negative	29	52
		Positive	23	
7.	Attitude to peer group and teachers	Negative	58	81
		Positive	23	
8.	Attitude to rules and regulations	Negative	55	119
		Positive	64	

The chi square statistic was then employed to test the equality of frequencies in which student teachers describe attitudes with negative and positive remarks in all the eight paired categories of behaviours.

CHAPTER 4

4.0 RESULTS, ANALYSES AND DISCUSSIONS

This chapter contains the results, analyses and discussions of the study. A non-parametric statistic was considered appropriate for the analysis, since the data were frequency counts only. The hypothesis being tested by chi square statistic was that the proportions of paired observations were equal. That is, observed frequencies in extreme descriptions of each category were equal. The level of confidence was set at 0.05.

4.1 Results and Analyses

The major concern of this study was to identify the prevalent behaviours of Nigerian secondary school students in their science classes, according to their teachers' descriptions.

For this purpose, a curriculum assignment requiring each student-teacher to describe the behaviours of any five students in his/her science classes, was given to each of the part III science education students in the Faculty of Education in December 1983.

The student-teachers' descriptions were read and data classified into eight paired categories, according to the various adjectives that appeared in the teachers' (respondents) descriptions. Of the total of 94 responses collected from the student-teachers, only

one indicated the complete lack of teaching experience and his response was ignored in the subsequent analyses. The remaining 93 respondents had at least one year of teaching experience.

The total frequency counts for each of the paired categories were summed up. For the purpose of counting, the responses were labelled into eight categories: personality was labelled 1, self-concept was labelled 2, intelligence was labelled 3, creativity was labelled 4, attitude towards science was labelled 5, attitude in science work was labelled 6, attitude to peer group and teachers was labelled 7, and attitudes to rule and regulations was labelled 8.

The descriptions that science teachers most frequently used for students in science classroom are in Table II below.

TABLE II

Percentage Distribution of Teachers' Behavioural Descriptions of their Students in Science Classrooms in Nigeria

No	Descriptions	Percent of total Frequencies of Descriptions
1.	Attitude to rules and regulation	22.4
2.	Personality	17.8
3.	Intelligence	17.6
4.	Attitude to peer group and teachers	15.1
5.	Attitude towards science	14.2
6.	Attitude in science work	9.7
7.	Creativity	2.1
8.	Self-concept	1.3
		99.9

The percentages were calculated for each category in relation to the total frequencies for all the eight categories. The highest percent 22.4 was for category 1, attitude to rules and regulations and the least frequently used category was 8, self-concept (1.3 percent)

Chi square test was done on all the eight categories at 0.05 level of significance. The null hypothesis to be tested is that the number of positive (+ ve) and negative (- ve) descriptions are equal.

The chi square is given by

$$\chi^2 = \Sigma \frac{(f_o - f_t)^2}{f_t}$$

Where χ^2 = chi square statistic

f_o = observed frequency

f_t = expected frequency

TABLE III

CHI SQUARE VALUES OF CATEGORY OF DESCRIPTIONS

No	Description	Extreme	Frequencies f_t	Frequencies f_o	χ^2	P
1.	Attitude to rules and regulation	Negative Positive	59.6	55 64	0.34	NS
2.	Personality	Introvert Extrovert	47.5	62 33	4.43	0.05
3.	Intelligence	Low I.Q High I.Q	47	29 65	6.89	0.02
4.	Attitude to peer group and teachers	Negative Positive	40.5	58 23	7.56	0.02
5.	Attitude towards Science	Negative Positive	38	61 15	13.92	0.01
6.	Attitude in science work	Negative Positive	26	29 23	0.34	NS
7.	Creativity	Handicapped Creative	5.5	9 2	2.23	NS
8.	Self-concept	Negative Positive	3.5	7 0	3.5	NS

Table III shows the results of the χ^2 test.

The critical χ^2 value is 3.84. The calculated χ^2 values for four categories namely 1, 6, 7 and 8 in Table III are therefore not significant at 0.05 level of confidence.

The result for category 2, on personality shows that the calculated χ^2 was 4.43 at df = 1. The calculated χ^2 value is statistically significant at 0.05 level of confidence.

For category 3, intelligence, the calculated χ^2 value was 6.89 at df = 1. This χ^2 value is satistically significant at less than 0.02 level of confidence.

Similarly, for category 4, attitude to peer group and teachers, the calculated χ^2 value was 7.56. This χ^2 value is statistically significant at less than 0.02 level of confidence.

For category 5, attitude towards science, the calculated χ^2 value is significant at 0.01 level of confidence since the critical value of χ^2 is 6.64 at the same level of confidence.

4.2 Discussions

The results in Table II suggest that science student-teachers most frequently describe their students by the students attitude to rules and regulations as against any other categories of behaviours: that is frequency counts of 119 representing 22.4 per cent. Students' personality and attitude to peer group and teachers are represented by 17.8 per cent and 15.1 per cent of the responses respectively. These categories of student behaviours reflect on the management problems which the student-teachers have encountered in the classroom situations.

In recent years, there has been increased interest on the nature of teachers concerns. Fuller (1969), contended that teachers exhibit professional growth in three stages which are experience dependent. These three stages are:

(i) concern about self (teacher-centered period),
(ii) concern about teaching tasks (content structure period) and
(iii) concern about children learning (student-centered period).

The result in the present study is in agreement with other studies conducted elsewhere (Fuller, 1969; Roberts et al., 1974: Smith and Bramblett, 1981 and

James and Hall, 1981) which suggest that most beginning teachers are more concerned with classroom discipline rather than the subject matter (contents) or the mode of learning of students.

Most of the student-teachers used in this study appear to be in stage I of Fuller's categorization: "concern about self". During this first stage, beginning teachers or student-teachers as it is the case in the present study, were more concerned on non-teaching issues of a personal nature. These non-teaching concerns, focusing on self, are to be expected since, these students have had little contact with children in school/classroom environments.

According to Roberts et al. (1974), as long as an individual's concerns are focused primarily on self, that individual will have difficulty focusing on teaching tasks as well as on the learning of students. If most beginning teachers, are likely to be concerned about self, then there will be little science taught during the earlier stages of their professional growth.

Another way of looking at the results of this study, is to say that the majority of the Nigerian secondary school students are indisciplined, and when this is expressed in the classroom situation it could be very embarassing for a beginning teacher. The consequences of this is that the teacher will want to exercise

his/her authority in the classroom situations. When the teacher is in full control of the class, that is, when the children are disciplined, then meaningful science can be taught to the children. Perhaps, more children will show more positive attitudes towards learning science then.

This study also suggests that there may be more introverted children than there are extroverted children in science classrooms in Nigeria. If this claim is correct, one would expect that beginning teachers will encounter fewer problems in the classroom situation. According to Eysencks (1967) arousal proposition,

> Children with extrovert qualities are more likely to wilt and become distracted during long periods of attentive activity and to work at lower level of sensory susceptibility than introverts.

Thus introverts are more likely to be able to concentrate for long periods of time in tasks requiring vigilance. However, such is hardly the case as this study suggests that students more often than not exhibit more negative than positive attitudes towards their peer group and teachers (71.6 percent: 28.4 percent) as well as in science work (55.8 percent : 43.2 percent). Teachers have reasons to be concerned with the negative attitude to professional colleagues in their work since a teachers professional status is

influenced by his/her reputation as a disciplinarian. Beginning teachers may therefore feel obligated to act in a controlling way as discipline is a primary factor in determining how a teacher is evaluated by an administrator (Johnson, 1979).

The researcher is of the opinion that when student-teachers are sufficiently informed about the expected behaviours of students in their science classrooms, then teachers will be in a position to cater for the differing personalities of the children they are expected to teach. Otherwise, the extroverted children may become bored and as a result resolved to distrupting the science classes. One way of getting round this problem is to ensure that lessons are well-planned and children are fully engaged particularly during practical classes.

Yet the result of this study may be a pointer to the fact that science teachers are inadequately equipped in terms of professional training, since the expressed areas of concern are rarely the focus of teacher education in Nigeria.

In the author's experience, science student teachers in the Faculty of Education, Ahmadu Bello University, Zaria, are generally expected to take a specialisation subject from the Faculty of Science, an elective course (subsidiary) from the same faculty and professional courses in educatic . from the Faculty of Education.

The emphasis in the professional courses is on the provision of basic information to function as a classroom teacher, regardless of how effective the teacher so trained might be.

Some of the courses taught in the professional area are:

i) general foundations of education (including philosophy, sociology and history of education),

(ii) general and educational psychology,

(iii) general methods (including instructional technology, introduction to curriculum theory and evaluation),

(iv) science teaching methodology and

(v) laboratory management.

According to Obioha (1980), the specialisation (teaching) subject and its enriching electives take about 60 percent of the total time of the teacher education programme in a university. The remaining 40 percent is shared variously for professional courses in education as listed above.

In the professional courses, student teachers are expected to acquire desired attitudes and skills through courses in the nature of science, in its historical, philosophical and social perspectives. Desired attitudes and skills are enhanced by encouraging students to use

"the very methods of science in the same fashion as the student would be expected to use them in his school of posting" (Obioha, 1980).

For most teacher training institutions, teaching practice is an important component of the teacher education programme in Nigeria. The curricula consist of general education, area of specialization, professional preparation and teaching practice. The focus of the teacher education programme in Nigeria is not much different from those of other countries save for the relative weighting of the component parts (Obioha, 1980)

However none of these areas can be said to emphasise exclusively the acquisition of desired attitudes (positive or negative), personality development or the more infrequently cited behaviours of creativity. Although some of these characteristics may be acquired through incidental learning, it is hardly stated as attainable goals of education. It is even more remote to expect student-teachers to handle situations in which these behaviours (positive or negative) are manifested.

Assuming that the teachers descriptions most adequately mirror the nature of science students behaviours in their classrooms in Nigeria, Nigerian students may be said to be rurable (a majority obeys science rules and regulations) and are self-centred

(introvert). Most classrooms are however, filled with students who are largely uninterested/dis-interested in science, lack creativity, of relatively above average intelligence and very negative self-concept of themselves.

Table IV shows chi square values of different mean proportions of paired categories of behaviours of Nigerian secondary school students in their science classes.

TABLE IV

Chi Square Values of Different Mean Proportions of Paired Catogory of Behaviours of Nigerian Secondary School Students in their Science Classrooms

Descriptions	1	2	3	4	5	6	7	8
Observed frequencies	119	95	94	81	76	52	11	7
Expected frequencies	67.13	67.13	67.13	67.13	67.13	67.13	67.13	67.13
χ^2	40.08	11.57	11.57	2.87	1.17	3.41	46.93	56.86

KEY

1 = Attitude to rules and regulations
2 = Personality
3 = Intelligence
4 = Attitude to peer group and teachers
5 = Attitude towards science
6 = Attitude in science work
7 = Creativity
8 = Self-concept

In this study, an eight-paired category system emerged from the classification of the Nigerian secondary school students behaviours in their science classrooms as perceived by their science teachers. The eight-paired categories compared with those categories derived from classroom observation studies. Flanders (1966) and Shuaibu (1979) employed ten category systems.

Flanders Interaction Analysis Category (FIAC) system is one of the most widely used system in the direct observation studies. The system is designed to classify verbal interactions involving more than one person: teacher and students, student and students. It is divided into two main parts: teacher talk and pupil talk. The teacher talk class is subdivided into indirect and direct influences of the teacher. The indirect influence of the teacher has four descriptors, while the direct influence of the teacher has three descriptors of the modes in which a teacher may elicit some responses from his students. There is no explicit assumption of the nature of the students (their attitudes, personality, self-concept and I.Q.) who are involved in the interactions. The student talk is subdivided into talk-initiated by the student and talk response. The tenth class is silence or confusion. Flanders FIAC, has been criticised for its unsuitability in science classrooms which are predominately dominated by activities and silence.

Flanders ten category system contrasts with the eight paired classification in the present study. Besides the fact that FIAC has little relevance to science classroom, the system makes no provision for describing students behaviours.

Eggleston (1980) similarly had two major classes of behaviours: teacher talk and student talk. However, Eggleston's STOS had extended version of the descriptors in these categories (fifteen for teacher talk and eight for pupil talk).

Shuaibu's (1979) STOS focused exclusively on implied method of instruction of the teacher as a result of the teacher-student and student-student interactions. Again, there is no category for students' behaviour.

It is possible that direct classroom observers (other than teachers) are presumptious and are pre-occupied with observing what they want to observe with a predetermined mirror, rather than what teachers observe.

CHAPTER 5

5.0 SUMMARY, GENERALISATION, LIMITATIONS AND RECOMMENDATIONS

5.1 Summary

In the past two decades, educational researchers in Nigeria and elsewhere have focused attention on direct classroom observation studies. In the present study, an indirect approach to classroom observation was employed to classify the behaviours of Nigerian secondary school students in their science classes. Little work has been reported in the area of indirect classroom observation especially in Nigeria.

The final year science education students in the Faculty of Education, Ahmadu Bello University, Zaria, were requested to give descriptions of five typical students A, B, C, D and E in their science classes according to the format in Appendix II. The student-teachers' descriptions of their students' behaviours were classified into eight-paired categories of students behaviours, Attitude to rules and regulations (1) Personality (2) Intelligence (3) Attitude to peer group and teachers (4) Attitude towards science (5) Attitude in science work (6) Creativity (7) and self-concept (8).

The students behavioural descriptions appeared as paired categories of word opposites.

A χ^2 test was used to analyse the data of the study. The χ^2 value for Personality (category 2), was found to be significant beyond 0.05 confidence level. The estimated difference in proportions was therefore real. This suggests that a majority of Nigerian secondary school students are perceived by their teachers as introverts.

The X^2 value for Intelligence (category 3) was found to be significant at 0.02 level. The estimated value of X^2 suggest that a majority of Nigerian secondary school students are seen as having above average intelligence.

The X^2 value for attitude to peer group and teachers (category 4) was also significant at 0.02 level. This implies that most Nigerian secondary school students show a negative attitude to peer group and teachers.

For description 5, attitude towards science, χ^2 value was 13.92 and this was significant at 0.01 level. The difference between the two proportions was very marked in this case and the calculated X^2 value confirmed that the Nigerian secondary school students have a negative attitude towards science.

The X^2 values of descriptions 1, 6, 7, and 8, that is attitude to rules and regulations, attitude in science work, creativity and self-concept did not show any significant difference between theirpaired descriptions

at 0.05 level of confidence. Therefore, the differences in proportions may in fact be due to chance.

The percentage distributions of the student-teachers descriptions of their students are shown in Table II with attitude to rules and regulations (22.4 per cent) topping the descriptions while self-concept (1.33 per cent) was least frequently used.

The descriptions, attitude to rules and regulations 22.4 per cent, personality 17.8 per cent and attitude to peer group and teachers 15.1 per cent are indicative of classroom management problems encountered by the student-teachers in the classroom environments. This result is in agreement with those of Fuller (1969) which suggested that most beginning teachers in their early stages of professional growth are more concerned with classroom discipline rather than the subject matter or how students learn. The results also show that a majority of the Nigerian students are of above average intelligence and yet a majority of them shows negative attitude towards science.

5.2 Generalisation

Within the limit of the present study the following generalisations may be made. Science student-teachers describe

i) a majority of the Nigerian secondary school students as introverts,

ii) a majority of the Nigerian secondary school students as above average intelligence,

iii) most Nigerian secondary students show more negative attitudes than positive attitudes to peer groups and teachers,

iv) large proportions of the secondary school students show a negative attitude towards science and

v) among those students that are interested in science work, the proportion of those with positive attitude is about the same as those showing negative attitude in science work.

Furthermore, there is hardly any overlapping descriptions of behaviours arising from direct observation and indirect (teacher inference) observations of science students in the science classroom.

5.3 Limitations of the Study

(i) The assignment emphasised the word "behaviour". This may have accounted for the student-teacher descriptions being focused on the nature of students and classroom discipline rather than on the verbal/non-verbal interactions which take place in the classrooms.

(ii) The student-teachers were given a time interval in which to complete their curriculum assignment. They were expected to describe the behaviours of any five typical students A, B, C, D and E in their sciences classes. It is therefore possible for some of the student-teachers to discuss among themselves, how to tackle the assignment. If this happens, students are more likely to give similar descriptions of their students behaviours.

(iii) There may be a more penetrating alternative to the treatment of data (see p. 40)

5.4 Recommendations

From the results obtained from this study, the following recommendations are made:

Firstly, the descriptions mostly used by science student-teachers to describe their students namely: attitude to rules and regulations 22.4 percent, personality 17.8 per cent and attitude to peer group and teachers 15 per cent are suggestive of management problems in the classroom settings. The fact that the student-teachers are particularly concerned about their students behaviours in the classroom setting suggest that these are the predominant characteristics of science classrooms in Nigeria.

The result is in support of the stage theory of professional teacher growth. In order that a teacher in stage I, "concern about self" may be accelerated to a more desirable stage, it is important that the teacher education programmes prepare student-teachers toward the expected classroom behaviour of children they are going to teach. One way of achieving this is to make micro-teaching a compulsory part of their science methods course. During the micro-teaching exercise, student-teachers should be able to acquire the experience required to enable them overcome the initial classroom management problems they are likely to face in the real classroom situations. This experience will hopefully hasten the move from "concern about themselves" to that of focusing on "learning tasks".

The fact that a majority of the Nigerian secondary school students are described as intelligent raises some hopes for the future of scientific and technological developments in the country. Investment in human resources is probably the wisest investment. It is even more heart-warming that the investment is made on youths that are still considered above average intelligent.

The result from this study suggests that students time in the classroom may not have been fully utilised since 22 per cent of the student-teachers describe their students by their attitude to rules and regulations as

compared to any other category of behaviours in the classroom situations. When teachers can fully engage students in the learning of science in a meaningful way, there will be an improvement in the quality of science being taught in the secondary schools. This may in turn result in an increased interests towards science subjects.

For further studies:

It is recommended that future studies should focus on the following.

1. In this study, it has not been possible to compare student-teacher descriptions according to their year of experience. It is recommended that this study be repeated with experienced graduate teachers to see whether there is a close match in the way student-teachers and experienced graduate teachers perceive their students in their science classrooms.

2. There is need to establish how science teachers from the different disciplines (Biology, Chemistry and Physics) of science percieved their students. A study of this kind may offer possible explanation as to why one science discipline Biology, is selected for study by students more frequently than physics. It may then be

possible, to design an appropriate curriculum for science disciplines such as physics to make it more attractive for students of science to pursue.

3. Could there also be a difference in the way female and male teachers of science perceive their students?

4. Future studies should specify the scientific attitudes that respondents are to describe in respect of their students' behaviours.

5. Modes of data gathering and treatment should be further reviewed in subsequent studies.

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APPENDIX I

MINI-TEACHING ASSIGNMENT

Imagine you are teaching a subject of your choice in your teaching area to a class of form III students. Describe as specifically as possible the behaviours of any five students, A, B, C, D and E and how you would handle each of them.

This assignment is to be submitted not later than the _____

APPENDIX II

CURRICULUM ASSIGNMENT

General Information:

1. NAME:

   In items 2 to 5 check (✓) the response that applies to you:

2. SEX: Male ( ) Female ( )

3. CLASS: LVT-2 ( ) LVT - 3 ( )

   B.Sc. (Ed) II ( ) B.Ed.(Sc.Ed) II ( )

   B.Sc.(Ed.) III ( ) B.Ed. (Sc.Ed) III ( )

4. Previous Teaching Experience:

   Level: Primary ( ) Secondary ( )

   Years: None ( )

   1 - 2 Years ( )

   3 - 5 Years ( )

   Over 5 Years ( )

5. SUBJECT TAUGHT:

   Primary Science ( )

   Junior Sec. Int. Sci. ( )

   Secondary Biology ( )

   Secondary Physics ( )

   Secondary Chemistry ( )

   Any other ( ) Please specify _____

6. Based on your actual teaching experiences, pick out five students A, B, C, D and E and describe as specifically as possible their behaviours such as in

   (i) Carrying out instructions given by the teacher

   (ii) Responding to the questions of the teacher while introducing a lesson, or assessing the achievement of the pupils during and after the lesson,

   (iii) Responding to assignment given to them and

   (iv) Other activities during the lesson

7. Briefly describe how you actually dealt with the situations etc.

8. Use separate paper to respond to items 6 and 7 in respect of students A, B, C, D and E.

   Attach this form also to your response.

APPENDIX III

A STUDENT TEACHER (RESPONDENT) DESCRIPTIONS
(Unedited)

A

The child is clever. She is an extrovert. She is very curious and always ready to help the teacher. She likes to be given responsibilities. The class monitorship is being rotated every month. The month she was given the chance, she did it very well.

She looked after the class, made sure the class was always neat and clean. Helped in cleaning the blackboard, teachers desk and chair, packing teachers books, distributing exercise books and other materials. She has a good sense of leadership. She hardly quarrels with her classmates and so she is well respected among them all.

She likes to respond to teachers questions in the class, being always attentive. But on a particular occassion, I asked a question to which she gave a partly correct answer. I accepted it but did not tell her the correct answer. I made other pupils in the class to supply the other information, after which she finally gave the right answer.

She is not always involved in other class activities during the lesson but on one occassion she was found cheating during a class test. I was surprised and shocked at this. She was punished there and then, stripped of her post as the class monitress and I started to investigate what made her do that. When I later discovered that it was rivalry with her friend, I warned her of the implications.

She does her assignments regularly. But there was a day she failed to do it, and because she had no good reason for not doing it, I made her do it in the class when others were doing something else.

B

This child is clever, bright but conservative. He is a typical introvert. He does not talk much.

Whenever put in charge of the class management, he does it well, and carries out my instruction. His main weakness is discrimination against the girls.

He does not bother so much to help the teacher, but whenever called upon to assist, he does it well.

He is attentive in the class and does not disturb much. He prefers to do some mathematical problems and this is about the only side activity that sometimes distract him from other lessons.

In my lesson one day, I asked him a question to which he gave a wrong answer I knew he must have been doing some other things. I then paused and asked him to repeat my question, which he could not do because he was not attentive. I then took his maths books from him, made him realise that all subjects should be made important and made him pay more attention.

He has a positive response to assignments, does it well and on time. There was a particular maths problem we found a bit difficult to solve in the class, he took it home and got his father to solve it even without being told to do so. This shows that he is interested in his class work.

C

Child 'C' is not particularly clever and a bit backward. He is actually too old to be in the class. He has been repeating. He hardly carries out the teacher's instructions and not very interested in the class work.

When given the assignment of class management, it was carefully handled. He would have been allowed to act as class monitor, but he bullies other children and actually inflicts physical injury on some of them.

He hardly answer questions in the class. On a particular occassion, when asked a question in the class, he gave no answer. Being a slow learner, I realised that he did not understand the lesson. I had to go over and repeat some part of the lesson. After this, I asked him the same original question and he was able to make an attempt to answer. He was highly commended for this, just to encourage him.

He likes to read comics and make unrelated drawings in the class. I usually seize his comic magazines because he has no excuse for doing this since they usually have library periods.

He does not do his assignments and one day in particular, I made him sit on the class corridor to do it.

I later discovered that he has some background problems. I tried to help him and he improved greatly towards the end.

D

She is smart and clever. She is above average in academic performance. She is also responsible and always likes to lead; but she is a bit noisy.

One of her characteristics is, whenever she is asked to look after the class would write the names of the "noise maker" But I discovered that a good number of them would protest. I later on discovered that she often includes the names of those that have quarrelled with her. I had to teach her to be fair with all her classmates, and should not take the opportunity of being the class-monitress to revenge. She cleans the room and arranges teacher's table. She often find the class a bit difficult to control and this I think is sometimes due to her small stature. But on a particular day she was able to manage the class so well and I praised her for that.

She takes her lessons and worked serious because she knows her father would not take a lazy attitude from her, although she is sometimes engaged in other activities. She was caught making noise during my lesson, one day, I asked her a question pertaining to the lesson, she gave a right answer but others in her group gave wrong answers. I knew she has been disturbing them and I therefore changed her from her seat and I gave the rest group a written assignment to be completed in the classroom.

She does her assignments and submits them punctually. But on one occassion, she did not do it just because there was a "party" in their house. I just pardoned her

and told her to bring it the following day. I did this because she does not do such thing very often.

E

She is an introvert, very quiet and peaceful. Academically she is above average.

Whenever put in charge of class management, she does it in a reliable way. Cleans the table and assigned different duties to each member of the class. She does not yield to the boy's threats.

She hardly answer questions in the class except when called upon to do so. Anytime she gives a correct answer in the class, she is usually recommended and others are advised to work hard like her. She does her assignments regularly and does her class work too.

She was once found not doing her assignment, she was made to do it outside the class and submit immediately.

Conclusion

From the above observation, we could see that there was no demarcation in the behaviours of these children, the behaviours overlap and one typed of attitude in one child may be exibited in a different way in another child.

APPENDIX IV

CATEGORIES OF STUDENTS BEHAVIOURS IN SCIENCE CLASSROOMS: TEACHER DESCRIPTIONS

SERIAL NO. OF RESPON-DENTS	INTELLECT							ATTITUDES							
	PERSONALITY[1]		SELF-CONCEPT[2]		INTELLIGENCE[3]		CREATIVITY[4]	ATTITUDE TO-WARDS SCIENCE[5]		ATTITUDE IN SCIENCE WORK[6]		ATTITUDE TO PEER GROUP AND TEACHERS[7]		ATTITUDE TO RU AND REGULATIONS	
	Intro-vert	Extro vert	-ve	+ve	Low I.Q.	High I.Q.	Handi-capped	Crea-tive	-ve	+ve	-ve	+ve	-ve	+ve	--ve	+ve
001	✓	✓	✓						✓			✓	✓		✓	✓
002	✓					✓		✓	✓					✓	✓	✓
003	✓	✓				✓	✓		✓		✓		✓		✓	✓
004									✓		✓		✓		✓	✓
005		✓				✓			✓	✓				✓	✓	✓
006		✓	✓		✓				✓				✓	✓	✓	✓
007	✓	✓			✓	✓			✓		✓		✓		✓	✓
008	✓	✓									✓		✓		✓	✓
009		✓	✓						✓		✓				✓	✓
010	✓				✓	✓			✓			✓			✓	✓
011	✓	✓				✓			✓				✓	✓	✓	✓
012	✓					✓	✓		✓			✓	✓		✓	✓
013	✓					✓			✓					✓	✓	✓
014						✓	✓		✓		✓		✓	✓	✓	
015						✓			✓				✓	✓		

Appendix IV (cont'd)

SERIAL NO. OF RESPON-DENTS	INTELLECT								ATTITUDES							
	PERSONALITY[1]		SELF-CONCEPT[2]		INTELLIGENCE[3]		CREATIVITY[4]		ATTITUDE TO-WARDS SCIENCE[5]		ATTITUDE IN SCIENCE WORK[6]		ATTITUDE TO PEER GROUP AND TEACHERS[7]		ATTITUDE TO RULES AND REGULATIONS	
	Intro-vert	Extro vert	-ve	+ve	Low I.Q.	High I.Q.	Handi-capped	Crea-tive	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve
016											✓		✓			✓
017	✓				✓	✓			✓	✓						✓
018		✓				✓			✓		✓		✓		✓	
019											✓	✓	✓		✓	
020	✓	✓			✓		✓		✓				✓			✓
021					✓	✓	✓		✓		✓	✓				✓
022		✓			✓	✓	✓				✓		✓		✓	✓
023	✓	✓	✓			✓			✓		✓	✓	✓		✓	✓
024	✓				✓	✓			✓		✓	✓	✓		✓	✓
025	✓	✓			✓	✓			✓		✓		✓		✓	
026	✓	✓	✓						✓				✓			
027	✓								✓		✓		✓		✓	✓
028	✓					✓			✓							✓
029	✓	✓			✓	✓										
030	✓				✓	✓			✓				✓		✓	✓
031					✓	✓							✓			✓
032		✓							✓			✓		✓	✓	✓

Appendix IV (cont'd)

SERIAL NO. OF RESPON-DENTS	INTELLECT							ATTITUDES							
	PERSONALITY[1]		SELF-CONCEPT[2]		INTELLIGENCE[3]		CREATIVITY[4]	ATTITUDE TO-WARDS SCIENCE[5]		ATTITUDE IN SCIENCE WORK[6]		ATTITUDE TO PEER GROUP AND TEACHERS[7]		ATTITUDE TO RULES AND REGULATIONS[8]	
	Intro-vert	Extro-vert	-ve	+ve	Low I.Q	High I.Q	Handi-capped	Crea-tive	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve
033	✓					✓			✓		✓		✓	✓	✓	✓
034	✓	✓			✓	✓			✓		✓		✓		✓	✓
035						✓										✓
036	✓					✓			✓		✓		✓		✓	✓
037	✓	✓							✓			✓			✓	✓
038	✓	✓			✓	✓				✓		✓			✓	
039	✓	✓			✓	✓					✓	✓			✓	
040					✓	✓						✓	✓	✓	✓	✓
041	✓				✓	✓			✓					✓	✓	✓
042					✓	✓							✓		✓	
043						✓			✓		✓		✓		✓	
044	✓					✓			✓		✓		✓		✓	✓
045	✓		✓			✓			✓				✓		✓	✓
046	✓	✓				✓			✓		✓	✓	✓			
047	✓					✓							✓			✓
048						✓			✓			✓		✓		✓

Appendix IV (cont'd)

SERIAL NO. OF RESPON-DENTS	INTELLECT								ATTITUDES							
	PERSONALITY[1]		SELF-CONCEPT[2]		INTELLIGENCE[3]		CREATIVITY[4]		ATTITUDE TOWARDS SCIENCE[5]		ATTITUDE IN SCIENCE WORK[6]		ATTITUDE TO PEER GROUP AND TEACHERS[7]		ATTITUDE TO RU AND REGULATION	
	Intro-vert	Extro-vert	-ve	+ve	Low I.Q	High I.Q	Handi-capped	Crea-tive	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+v
049						✓							✓		✓	✓
050	✓	✓				✓				✓		✓				✓
051										✓					✓	✓
052	✓								✓		✓	✓		✓		✓
053	✓	✓				✓			✓				✓			✓
054	✓					✓		✓	✓			✓	✓	✓	✓	✓
055	✓	✓			✓					✓			✓	✓		✓
056	✓					✓			✓		✓	✓				✓
057										✓			✓		✓	✓
058	✓					✓				✓	✓			✓	✓	✓
059	✓	✓							✓	✓			✓	✓	✓	✓
060		✓				✓			✓						✓	✓
061	✓				✓					✓						
062			✓		✓	✓		✓			✓	✓	✓	✓		✓
063						✓			✓				✓		✓	✓
064	✓				✓	✓			✓		✓	✓	✓	✓	✓	✓
065	✓					✓				✓		✓				

APPENDIX IV (cont'd)

SERIAL NO. OF RESPON-DENTS	INTELLECT							ATTITUDES							
	PERSONALITY[1]		SELF-CONCEPT[2]		INTELLIGENCE[3]		CREATIVITY[4]	ATTITUDE TOWARDS SCIENCE[5]		ATTITUDE IN SCIENCE WORK[6]		ATTITUDE TO PEER GROUP AND TEACHERS[7]		ATTITUDE TO RULES AND REGULATIONS[8]	
	Intro-vert	Extro vert	-ve	+ve	Low I.Q	High I.Q	Handi-capped	Crea-tive	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve
66	✓	✓				✓							✓		✓	
67	✓								✓	✓						✓
68	✓	✓			✓	✓							✓	✓		✓
69						✓			✓				✓			
70	✓				✓											✓
71	✓								✓			✓	✓		✓	✓
72	✓															
73						✓		✓	✓				✓		✓	
74	✓	✓			✓				✓						✓	
75	✓					✓										✓
76	✓	✓				✓										
77											✓					
78	✓					✓			✓		✓		✓			
79	✓					✓			✓							✓
80	✓								✓				✓	✓	✓	✓
81						✓			✓						✓	
82	✓					✓								✓		

APPENDIX IV (cont'd)

SERIAL NO. OF RESPONDENTS	INTELLECT						ATTITUDES					
	PERSONALITY[1]		SELF-CONCEPT[2]	INTELLIGENCE[3]		CREATIVITY[4]	ATTITUDE TO-WARDS SCIENCE[5]	ATTITUDE IN SCIENCE WORK[6]	ATTITUDE TO PEER GROUP AND TEACHERS[7]		ATTITUDE TO RULES AND REGULATIONS[8]	
	Intro-vert	Extro-vert	-ve	+ve	Low I.Q	High I.Q.	Handi-capped	Crea-tive	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve
93	✓				✓	✓			✓		✓					✓
34					✓	✓			✓	✓						
85	✓	✓			✓	✓					✓			✓		
36	✓	✓							✓						✓	✓
87	✓	✓				✓	✓		✓	✓					✓	✓
88	✓										✓				✓	✓
89									✓		✓				✓	✓
90	✓					✓			✓		✓				✓	
91	✓				✓	✓			✓	✓	✓				✓	
92	✓					✓	✓					✓				
93					✓	✓					✓					
94						✓					✓					
	62	33	7	0	29	65	9	2	61	15	29	23	58	23	55	64
	95		7		94		11		76		52		81		119	