AN ANALYSIS OF CLASSROOM INTERACTION PATTERNS OF KENYAN SECONDARY SCHOOL CHEMISTRY TEACHERS AND THEIR UNDESIRABLE BEHAVIOURS.

BY

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A B S T R A C T

One major concern in education is the study of events which take place in the classroom. In particular, studies of classroom interaction patterns of different teachers have been conducted in an attempt to explain and interpret behaviour patterns of different teachers in the classroom.

The present study is aimed at establishing a relationship between classroom interaction and undesirable behaviours of teachers. The study was conducted in two stages - a training stage followed by the main or final study.

The main purpose of the training was to train the observer on how to observer and code reliably classroom interaction. During this stage a sample of four (4) chemistry teachers teaching in government secondary schools in both urban and rural Kenya were used for this training. The observer sat in classes of these four teachers with other two trained observers and coded their chemistry lessons classroom interaction. This was done till a high reliability coefficient was arrived at (10.86) between the observers.

After training, the sample for the main study was selected. Stratified random sampling was used for this selection. All the selected teachers were observed teaching chemistry twice and a questionnaire of their undesirable behaviours was given to their students to respond to. This was done to every teacher.

Using the overall responses to the questionnaires the teachers were divided into two groups, upper and lower. The median was used to divide these teachers. The upper group of chemistry teachers comprised those teachers seen by their students to have few undesirable behaviours and the lower group were those seen by their students to have many undesirable behaviours.

For analysis of the relationship between teachers' classroom interaction and their undesirable behaviours, the classroom interaction patterns for these two groups were compared. The classroom interaction patterns were measured using the Flanders interaction analysis system. Both descriptive statistics and inferential statitics

were used to analyze these classroom patterns. t-test was used for test of significant differences in the groups.

The data obtained and analyzed revealed that teachers seen as having many undesirable behaviours (Lower group) used less praises, rewards, and encouragements during their classroom interaction unlike teachers seen by their students as having few undesirable behaviours (Upper group) who used relatively more praises, rewards and encouragements. Also the lower group used more criticism and commands than the upper group. Thus there was therefore a relationship between the teachers classroom interaction and his undesirable behaviours as seen by students.

The study therefore recommends that more research on this line could be done, covering all teachers (trained and untrained) and all various types of secondary schools in Kenya. in an effort to obtain a more comprehensive picture about the relationship between teachers' classroom interaction and their undesirable behaviours as seen by the students.

Teachers and teacher trainers should also use the results obtained in this study to restructure their ways of teaching and training.

Chapter 1

1.0 INTRODUCTION

One major aim of teaching is to make students being taught learn. To determine whether the students have learned anything during the teaching, several measures can be used. One of the most important measures is the student's performance in a test or an examination. In Kenya for example, each year thousands of Kenyan Secondary School students sit for the Kenya Certificate of Education (KCE). This examination is taken at the end of four-year course which covers a variety of subjects, which include English, Mathematics, Chemistry, Physics, Biology, Geography, History, Swahili and Religious Education.

It has been observed that students do differ in their performances in examinations like KCE. Some students do better than others despite the fact that all schools in Kenya for example, follow a common syllabus for the various examination papers offered. What then could be the main factors which contribute to the differences in this academic performance? One of the major factors which affect performance, is the nature of teacher-student interaction during classroom teaching.

It has been noticed that in many of the Kenyan classrooms some students have a great many interactions with their teachers everyday while others have less interactions; some are usually praised, while others are criticised or disciplined and others are mainly ignored. This kind of classroom interaction is considered to be biased.

This kind of biased classroom interaction has been shown to affect performance. In their study Meichanbaum, et al (1969)[1], teacher biased classroom interaction was shown, "to affect students' performance." Not only is the performance affected, but also the students' attitude towards the subject, the teacher and the school may be affected.

It is however possible that many teachers may not be aware of their biased classroom interactions and therefore need to be told. One way of investigating whether the teacher is biased in the way he interacts with his students is by observing him. The students are however observing the teacher everyday and can also indicate whether the

[1] Meichanbaum, D; Bower, K; and Ross, R., "A behavioural analysis of teacher expectancy effects" Journal of personality and social psychology, 1969, 13, pp. 306 - 316.

particular teacher has biased interaction. A student who is usually criticised for example will say so. This information can be used to inform the teachers who may change. The information from student can also be used to investigate whether the way a student sees his teacher in terms of interaction, has any relationship with the way the teacher teaches.

This study is an investigation of whether teachers seen by most of their students as having undesirable behaviours like scolding students, abusing them regularly, ignoring them, etc., compare with the way they teach. The way the teacher teaches which can be referred to as classroom interaction patterns in this study is measured using the Flanders (1970)[2] "ten category system of classroom observation." The teachers' undesirable behaviours are measured by responses of the students to a "teacher undesirable behaviour questionnaire," developed by Leeds (1954)[3]. This study investigated for example whether teachers seen by their students as having a high proportion of undesirable behaviours (high percentage

[2]Flanders N.A., Analyzing teaching behaviour. Addison Wesley Publishing Company, Reading, California, London Don Mills, Ontario, 1970, p.

[3]Leeds C.H. "Teacher behaviour, liked and disliked by students" Education 1954, 75, pp. 29 - 36

frequency of undesirable behaviours) had also poor classroom interaction like giving no encouragements to students, criticising them alot, commanding them alot, etc --- as given by the Flanders observation schedule of classroom interaction. The results from this study then would guide in making recommendation for further research in this area and to teachers and teacher training institutions for considerations during the training of the teachers to be.

This kind of research is not very new. Some researchers have already explored areas related to this study. Flanders (1965a)[4] showed that, "elementary school teachers who scored high in motivation of students, fondness of the teacher by the students, fair punishments to the students used more encouragements, praises, and unbiased interaction with their students than did the teachers that scored low on the same aspects, who comparatively used more criticisms, commands and lectures and less encouragements and praise for their students.

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[4] Flanders N.A. "Teachers influence, pupil attitudes and achievement." Co-operative Research Monography, No. 12 Washington D.C.: U.S. Government Printing Office 1965a, pp. 99 - 65.

Amidon and Giammatteo (1965)[5] also reported the kinds of verbal behaviours that distinguished superior - rated teachers from average teachers. Their results indicated that "the verbal behaviour patterns of superior teachers can be identified and that they differ markedly from those of other teachers." Since therefore a considerable effort has been deployed in the search for solutions to various classroom interactions related problems, the present study is but one such an undertaking.

1.1 STATEMENT OF THE PROBLEM

The primary concern of the present study was to compare classroom interaction patterns of Kenyan Chemistry teachers and their undesirable behaviours as seen by their students.

To undertake such a study the investigator was motivated by some evident problems with students in Kenyan secondary school system.

As indicated earlier, students in Kenya do differ in their performances in examinations like the KCE.

[5] Amidon E.J.; and Giammatteo M.M. "The verbal behaviour of superior teacher," Elementary School Journal, 1965 pp. 283 - 285.

Many of these students do fail their examination while others pass poorly and others pass well. Hamachek (1972)[6] provides an excellent analysis of school failure when he reminds us that, "roughly one-third of the youngsters who enter first grade do not complete eleventh grade, even today." The question therefore is, "What can be done to change this? In the opinion of the investigator part of the answer to this question may lie in improving teacher classroom interaction. Another part may be to update and improve curricula. In this study the former has been investigated. Books such as Death of Early Age by Jonathan Kozol (1967), as well as personal observations by the investigator, have convinced the investigator that, apart from poor curricula, teachers themselves are frequently responsible for discouraging some students by behaving in a way that may cause students' failure and frustration.

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[6]Hammachek, D; "Effects of early school failure on self-image development and implications for school counsellors." Paper presented at the annual meeting of American Educational Research Association, 1972.

In observing and talking to the teachers the investigator was however convinced that in most instances of poor teaching, including most instances of grossly inappropriate behaviour, that might seem to stem from malice or callousness, are not done deliberately or even consciously by the teachers involved. Some result from mainly lack of adequate mechanisms for giving teachers feedback and helping them to change their behaviours.

If then this is a possible reason as to why some teachers frequently discourage some students, it follows that such teachers may improve if made aware that they do discourage some of their students. This has more easily been said than done.

The present study is an undertaking which has been geared towards trying to solve part of this problem. This has been done by investigating the relationship between verbal classroom interaction and undesirable behaviours of chemistry teachers. The results from this study will help as a feedback for those teachers found to have many undesirable behaviours and poor teaching habits like unnecessary criticisms, calling on only a few students from the whole class, failing to use students' ideas

and not rewarding most of their students when necessary, so as to improve.

1.2 PURPOSE OF THE STUDY

The present study has several purposes, namely:

(i) To investigate if there are any differences in verbal behaviour patterns present in classrooms of two groups of secondary school chemistry teachers in Kenya - One group ranked high and the other low on a factor considered important to teaching success in this study: that is, the students' perceptions of teachers' undesirable behaviours.

(ii) To make recommendations based on the findings of this study for future research in this area and also for teachers and educators in general to avoid biased classroom interactions if found to be related to poor classroom teaching.

To fulfil these purposes it was deemed necessary to gear the study towards answering some questions based on the problem being investigated.

1.3 RESEARCH QUESTIONS AND HYPOTHESES DERIVED FROM THE QUESTIONS.

Because of the Flanders ten category system of interaction analysis was used to investigate the classroom interaction patterns of the Chemistry teachers, the questions are derived from Flanders descriptions of classroom interaction patterns.

1.3.1. Research Question

Is there any relationship between teacher responses, teacher initiations, pupil initiations and undesirable behaviours of secondary school chemistry teachers in Kenya?

To answer this question the teachers were divided into two groups: Upper and Lower. The Upper group comprised of those teachers seen by their students to have few undesirable behaviours while the Lower group comprised of those teachers

seen by their students to have many undesirable behaviours. By stating null hypotheses these two groups were then compared as a measure of the relationship between the teachers' classroom interaction and their undesirable behaviours. This was done also for questions 2, 3 and 4. The null hypotheses of this question (1) are stated below:

Hypothesis 1.3.1.1 There is no significant difference between the Upper and the Lower groups of Chemistry teachers with respect to teacher response ratio (TRR)

Hypothesis 1.3.1.2 There is no significant difference between the Upper and the Lower groups of Chemistry teachers with respect to pupil initiation ration (PIR).

Research Question 1.3.2. Is there any relationship between the teacher's response and reaction after students stop talking and the undesirable behaviours of the secondary school chemistry teachers in Kenya?

Hypothesis 1.3.2.1. There is no significant difference between the Upper and the Lower groups of chemistry teachers with respect to instantaneous teacher response ratio (TRR_{89}).

Hypothesis 1.3.2.2. There is no significant difference between the Upper and the Lower groups of chemistry teachers with respect to instantaneous teacher question ratio (TQR_{89}).

Research Question 1.3.3. Is there any relationship between the teacher classroom influence and undesirable behaviours of Chemistry teachers in Kenyan Secondary Schools?

Hypothesis 1.3.3.1. There is no significant difference between the Upper and the Lower groups of Chemistry teachers with respect to indirect-direct ratio (i/D).

Hypothesis 1.3.3.2. There is no significant difference between the Upper and Lower groups of Chemistry teachers with respect to pure indirect - direct ratio (i/d).

Research Question 1.3.4. Is there any relationship between the percentage of classroom time spent in each of the Flanders 10 categories of classroom interaction by the teachers and the undesirable behaviours of secondary school Chemistry teachers in Kenya?

Hypothesis 1.3.4. There is no significant difference between the Upper and the Lower groups of Chemistry teachers with respect to the percentage of time spent in each of the 10 categories of Flanders classroom interaction categories.

1.4. NEED FOR THE STUDY

The teacher and the learner are normally constituent elements in educational systems and it is important for effective learning that, opportunities for their interaction be available. This as has already been indicated is not the case for all the students. As it has been noted this is because of the uneven classroom interactions between the students and their teachers which exist in many classrooms especially in the Kenyan situation.

Most of the researches done have however not investigated how the students who receive few and discouraging interactions from their teachers view the teachers' behaviours and how their views relate to the way the teachers teach. Amidon and Giammatteo (1965) for example just showed that superior rated teachers differed with inferior rated teachers. This study has already been cited. It has also been mentioned that Flanders (1965) in his study indicated different teaching patterns of differently rated teachers. These two studies and several others did not specify whether only students were used to rate their teachers. The investigator therefore, in view of these studies, felt there was need to use students' perceptions of their teachers' behaviour and compare with the way teachers teach. It was not only this which motivated the researcher to undertake this study. The researcher also felt that none of the related studies has been done in Kenya and therefore there was need for such a study in Kenya.

It was felt that if the Chemistry teacher in Kenya was to produce optimum learning for the students, the study of the relationship between the teachers' verbal classroom interaction and their undesirable behaviours was needed. This would help the teachers

understand some of their teaching habits and how they relate to their students.

1.5 DEFINITION OF TERMS USED IN THE STUDY

At various sections of this thesis a number of terms are used frequently enough to warrant definition. It was the intention of the investigator that by defining these terms those reading the thesis will follow it through with better clarity. These terms are:

1.5.1 Secondary School Chemistry Teachers: The teachers used as subjects in this study were male and female teachers teaching in Kenyan secondary schools.

1.5.2. Verbal Interaction Patterns: These are defined in this study as, short chains of verbal interaction events that can be identified and occur frequently enough to be of interest. These include such verbal behaviours like praising, criticizing, questioning, answering and lecturing.

1.5.3. Interaction Analysis: This refers to efforts of codifying types of verbal behaviours occurring in classrooms and charting of the flow of communicative behaviour so that the kind of interaction going on can be clearly seen.

1.5.4. Undesirable Behaviours: The teachers' undesirable behaviours in this study are those behaviours that are seen to discourage students like abusing them, scolding them, fussing at them, giving them unnecessary punishments regularly, and being generally anti-social to them.

1.5.5. Urban/Rural Schools: The Chemistry teachers in this study were drawn from two types of schools "Urban and Rural". Urban schools here are those schools situated in the urban centres while the rural schools are those situated in rural areas.

1.5.6. Government Secondary Schools: In Kenya there are four types of secondary schools. The government schools which are maintained by the government, the private schools maintained by individuals or organizations, the high cost schools and the secondary schools aided by the local community of where the school is situated usually referred to as "Harambee" schools. In this study teachers teaching in the government schools were used.

1.5.7. Class Influence: This is divided into two:

(a) Indirect Influence: This is when the teacher maximised the students' opportunity to talk and respond freely in the classroom.

(b) Direct Influence: This is when the teacher minimised the students' opportunity to talk and respond freely in the classroom.

The indirect influence was calculated by finding the indirect-direct ratios (I/D) and i/d). The I/D ratio which includes content is calculated by dividing the sum of tallies in categories 1, 2, 3 and 4 by sum of tallies in categories 5, 6 and 7. i/d ratio which does not include content (usually referred to as pure indirect-direct ratio) is calculated by dividing the sum of tallies in categories 1, 2 and 3 by tallies in categories 6 and 7.

The other terms not defined here are defined in the context of the study.

1.6. RESEARCH DESIGN

Among the most popular areas of classroom research is that which is concerned with classroom interaction especially teacher-student relationships during classroom interaction. The present study focused mainly on the relationship between teachers' classroom interaction and their undesirable behaviours as seen by their students among a sample of Chemistry teachers teaching in a number of government secondary schools in Kenya.

The subjects were trained Chemistry teachers from 16 government schools in Machakos District, Kenya. Four of the teachers from four of the schools were used during the training of the observer (researcher). Teacher's classroom interaction was measured by use of an interaction analysis technique. In this case the Flanders ten category system of classroom observation was used. The investigator first trained on how to use this technique, then coded teachers verbal classroom interaction for two lessons. After observing each of the individual teachers then using an undesirable opinion questionnaire the students were requested to evaluate their teachers according to their undesirable behaviours.

Calculation of Flanders ratios and percentages and their relationship with the teachers standing as per evaluation given by the students was necessary, if a measure of verbal classroom interaction - undesirable behaviours relationship was to be obtained. The relationship was found by dividing the teachers into two groups "Upper" and "Lower" using their undesirable behaviours as given by their students. The classroom interaction patterns of these two groups were compared as a measure of the relationship between the Chemistry

teachers' classroom interaction and their undesirable behaviours as given by their students.

From the analysis of the results it was possible to make some recommendations for future research on classroom interaction and its bearing on the students' perception of the teachers' behaviours and also the students' performances.

Though this study was designed to undertake all what has been mentioned it worked under some basic assumptions and limitations.

1.7 BASIC ASSUMPTIONS

Listed below are several operational assumptions underlying the execution of the present study.

(a) Interaction behaviour of any teacher in the classroom can be studied with objectivity by use of an interaction analysis schedule.

(b) The Flanders ten category system of interaction analysis represents all classroom verbal interaction behaviours.

(c) The students were honest in conveying their opinions (Perceptions) of undesirable behaviours of their teachers. It is also assumed that the students are aware of teacher behaviours.

(d) Observing a teacher in class twice gives a reliable information about his verbal classroom pattern. (Rosenshine, 1973).

(e) Verbal language (behaviour) represents the greatest proportion of all the teachers' classroom interaction patterns (Withall, et al, 1961).

(f) Uneven classroom affects students' performance and the way they evaluate their teachers.

(g) The number of teachers studied will represent the behaviour of Chemistry teachers in Kenya.

Lack of enough money to finance the study and lack of enough time for the execution of the study was a major limitation and therefore a stratified sample was used to avoid investigation of the effects of other variables like sex.

1.9 ORGANIZATION OF THE THESIS

This thesis is organized into FIVE Chapters:

CHAPTER I: Is devoted to a consideration of nine sections namely, introduction, statement of the problem, purpose of the study, research questions and hypotheses, need for the study, definition of terms, research design, basic assumptions and limitations of the study.

CHAPTER II: A review of literature is done. This literature goes back to work done from late 1930s to early 1981. All this work has been done outside Kenya. The review of related literature establishes the rationale for the study.

CHAPTER III: Methodology of the research is treated. Here first a description of training undertaken by the researcher is made, selection of sample, and instruments used are described. The data collection procedure and statistics employed are also explained in this chapter.

Once the relevant data have been collected it needs to be presented, analysed and interpreted in an effort to test the formulated hypotheses. This is done in Chapter IV.

The last Chapter (V) focusses on possible conclusions, implications and recommendations for further research in this area of study.

In short this chapter has indicated the cause for this study and the problems faced by the study.

Chapter II

2.0 INTRODUCTION

To anyone outside education it may seem paradoxical that the classroom has been such a marginal preoccupation for educational research. Yet it remains the case that the classroom has remained a 'black box' for researches, providing merely a vehicle for input-output experimental designs. Literature on 'teacher-effectiveness' contains few studies which involve a direct examination of teaching process.

Nineteen years ago Medley and Mitzel (1969),[1] characterized the typical work in this field as "someone who limits himself to manipulation of studying antecedents and consequences, but never once looks into the classroom to see how the teacher actually behaves."

More recently however, a shift of research has taken place. Studies of classroom interaction have become more and more frequent.

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[1] Medley D.M.; and Mitzel, H.E., (1969) "Measuring behaviour by systematic observation", in cage No. 1 (ed) Handbook on research on teaching. Chicago: Rand McNally, p. 247.

Basically classroom research aims at studying through direct observation or recording the process of teaching and learning which takes place inside the classroom. Hitherto such research in Kenya has only been persued by few individuals. Eight years ago Sifuna (1973),[2] was one of the first Kenyans to study "classroom interaction in New Primary Approach (N.P.A.) classrooms".

It may therefore be emphasized that more energy, money and time, be spent studying processes of teaching and learning which take place inside the classroom than hitherto, the case especially in the Kenyan situation.

This chapter is therefore devoted to reviewing literature in many areas relevant to the studies of classroom teaching and learning. Specifically this study is concerned with the relationship between classroom interaction and teacher behaviours as perceived by students. The literature reviewed will therefore be mainly devoted to this area.

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[2] Sifuna D.N., "The impact of New Primary Approach on quality of teaching in primary schools in Kenya". Unpublished Masters Dissertation, University of Nairobi, 1973.

The review of literature has been therefore divided into five sub-sections; which are reviewed below.

2.1 THE NATURE OF TEACHER - STUDENT CLASSROOM INTERACTION.

Classroom behaviour by its nature, exists in a context of social interaction in the classroom. The act of interaction leads to reciprocal contacts between the teacher and the students and this inter-change itself may be called teaching.

The inter-change may not however, be in fair distribution among all the students and the teachers. In a normal Kenyan classroom for example, it will not take one much time to notice that some students have greater interactions with their teachers than others. These interactions also differ in their nature. Some students are frequently praised, others are criticized and disciplined and others are usually ignored by their teachers. This in itself is a bias, thus for teachers interacting encouragingly with some of their students and discouragingly with others may make it hard for some students to like their encounter with such a teacher.

This has been shown to be happening in many classroom by several researchers. In his study Evans (1980)[3] showed that, "teachers interacted more times and more favourably with their most creative nominees, these were praised and encouraged frequently while the least creative nominees received few and usually discouraging interactions." This study was conducted using primary and pre-school pupils and their teachers. In the present study however the investigator was interested in finding out whether this could be the case with secondary school teachers and their students. In the present study the investigator also wanted to find out whether any relationship existed between the way a secondary school teacher teaches and his undesirable behaviour as seen by the students. Evans in his study mentioned above does not seems to have covered what effect this biased nature of classroom interaction could be having on the way the pupils perceive their teachers, an aspect considered in the present study.

Before considering the literature on the relationship between the way a teacher teaches and the way he is perceived to behave by his students,

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[3]Evans, T.P., "Pre-school and primary teacher's interactions with their most and least creative pupils." Research in Education 1980, No. 24, pp. 30 - 40.

it is worth considering some aspects which make a teacher interact differently with different students.

In his book Brophy (1974),[4] it has been indicated that, "several student attributes do influence teacher-student interaction patterns. One of these attributes is the socio-economic status (SES) of the students.

In his study Becker (1952)[5], interviewed some teachers and found that, "they took into consideration the social status of the students when teaching them". Becker, however did not investigate how, then, the teachers interacted with their students, which Davis and Dollard (1940)[6], had done in a similar study and discovered that "high status children get most of their teachers' praises and rewards while lower class children get mainly criticisims and punishments." These two studies do indicate that social status does actually bias teacher-student interaction. Both studies have however not mentioned whether

[4] Brophy, J.E.; Teacher Student Relationship, Holt Rinehart and Winston Inc. New York, Sydney, 1974 p. 6

[5] Becker, H.; "Social Class Variation in Teacher-Pupil Relationship", Journal of Educational Sociology 1952, 25, pp. 451 - 465.

[6] Davis, A.; and Dollard, J., "Children of Bondage" American Council on Education, Washington D.C. 1940, pp. 16 - 25.

social status is not the only one which affects teacher student interaction. The other similar studies have also overlooked other factors which may affect teacher-student interaction. Rist (1970)[7], in his study for example, indicated that "the teacher interacted more positively with the other children who were from higher status families."

Spaulding (1962)[8], however found that sex also affected teacher-student interactions, he found that "teachers were more harsh with boys than with girls." Similar results had been also obtained by Waetjen (1962). The two studies are cases indicating that not only social status affects teacher-student interaction but also there are other factors which affect this interaction like sex and also achievement.

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[7]Rist, R., "Student social class and teacher expectations: The self-fulfilling prophecy in ghetto education" Harvard Education Review, 1970, 40 pp. 411-451.

[8]Spaulding, R. "Achievement, Creativity and self-concept correlates of teacher - pupil transactions project No. 1352. United States Department of Health Education and Welfare, Office of Education, 1963.

Achievement has been shown to affect the way teachers interact with their students. Hoehn (1954)[9], in a study of social status differentiation in teachers, discovered that, "high achieving students enjoyed more promotive and supportive contacts from their teachers, while low achievers had a greater proportion of teachers' contacts involving conflict with their teachers or domination and direction by the teachers." Similar results had also been observed earlier by DeGroat and Thomson (1949)[10] who discovered that "high achievers received more praise, while low achievers received mostly disapproval." The scope of these studies however does not seem to have covered the effect of this bias on attitude of students towards the teachers, the subjects and performance. May be it would have been more profitable if these researchers investigated whether any relationship existed between this nature of classroom interaction and the way the students perceived the teachers' behaviours.

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[9]Hoehn, A., "A study of Social Status Differentiation in Classroom Behaviour of Ninteenth Grade Teacher." Journal of Social Psychology 1954, 39. pp. 269-293

[10]DeGroat, A., and Thomson G., "A Study of the Distribution of Teacher Approval and Disapproval among Sixth Grade Pupils", Journal of Experimental Education 1949, 18, pp. 57-75.

Goods (1970)[11], in his study also discovered that, "first grade students whom teachers perceived as high achievers received more responsive opportunities and more positive feedback, than classmates perceived as low achievers". Similar results were also obtained by Kranz and Fishell (1970) who discovered that, "teachers consistently had more substantive interactions with top third of their class and the interactions were more favourable for the high achievers."[12]

All the studies reviewed above indicate that the nature of classroom interaction is affected by the students' social status, sex and achievement. All this may induce feelings of failure and frustrations to students who receive discouraging interaction from their teachers. Many capable students in such cases may therefore not get the chance to reveal their talents or fulfil their potential, simply because they receive several years of less adequate education than their more well-heeled classmates.

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[11] Good, T., "Which pupils do teachers call on?" Elementary School Journal 1970, 70, pp. 190-198

[12] Kranz, P. W., and Fishell, K. "The relationship between teacher perception of pupils and teacher behaviour toward those pupils." Paper presented at annual meeting of American Educational Research Association.

Logically it would be argued that students, for example who are deemed by their teachers to be low achievers need more attention so as to improve.

In the present study it had been suspected that this kind of biased classroom interaction would affect both the attitude of the students towards their teachers and subjects; this may in turn affect the students' performance. In terms of the attitude towards their teachers, it was suspected that the students who mainly received criticisms or were not called upon at all by their teachers may not like their teachers and hence the subjects they teach. If asked to say something about their teachers such students are likely to give the opinions that the teachers criticize them, do not call on them or they may say such teachers are poor in teaching. The already reviewed literature does not say anything about how the encouraged and discouraged students may evaluate their teachers' behaviours or even how their performances compare. This is the main loophole in all the studies reviewed above.

In the present study it was therefore suspected that if students are asked to evaluate the way their teachers behave, the nature of the teachers' classroom interaction would be projected in such an evaluation. If therefore this evaluation is compared with the way the teachers teach and it is discovered that poorly evaluated teachers are poor in teaching, such teachers need this feedback so as to improve their behaviours as well as their teaching. This is because effective teaching does not only involve mechanical teaching of a subject but also the relationship between the teacher and his students, which is an important aspect of effective teaching.

To study the relationship between these teachers' classroom interactions and the students' perceptions of their teachers' behaviours it is important to consider how the biases mentioned influence performance. Some researchers have therefore investigated the teacher influence on performance, so as to establish the worthiness of the study.

2.2 TEACHER INFLUENCE

One assumption in the present study was, that uneven classroom does affect students' performance

and the way they evaluate their teachers.

It is actually uncommon to expect a student who receives criticisms most of his days in school, to like his teacher. Infact such a student is likely to be frustrated and may hate anything to do with that particular teacher or even the school. This may affect the student's performance and he may end up failing examinations or even dropping out of school.

When Rosenthal and Jacobson (1968)[13], indicated that "teacher's expectations regarding a student's ability influence the child's classroom learning and test performance in their publication, the pigmalion in classroom," a number of educators like Yunker (1970)[14] interpreted it to imply that "children's school performance could be improved by making the teacher think better of the child's ability." Barker (1970)[15], reviewing researches in this area showed that "teachers might intentionally or unintentionally suppress the learning of some students simply because they subjectively feel those students are not capable of

[13] Rosenthal, R., and Jacobson, L., Pigamalion in the Classroom. New York: Holt, 1968

[14] Yunker, B., "The Powers of Positive Teaching." Family Circle. May 1970, pp. 95-96.

[15] Barker, Lunn, J., Streaming in Primary Schools London: N.F.E.R., 1980, pp. 12-18.

grasping some materials as quickly or as well as other students."

One of the first studies to examine teacher-expectancy effects was in tutoring situation. Beez (1968)[16] studied 60 graduate students who taught a symbol learning task. This was an experimental study where half of the teachers were told their students were culturally deprived and were difficult to teach, the other half was told the reverse; "the teachers who taught the supposed to be culturally deprived students taught significantly few symbols (5.7 Vs 10.4) and the students who were supposedly not culturally deprived learned more symbols (5.9 Vs 3.1) moreover, 77% of the students alleged to have better intellectual prospects learned five or more symbols, but only 13% of the children alleged to have poor prospects learned five or more symbols." This study is a clear indication that teacher-bias, in this case induced by experimenters may be translated into bad teaching habits thus affecting both student learning and performance. To understand how the teachers behaved towards their students, the study

[16] Beez, W. "Influence of biased psychological reports on teacher behaviour and pupil performance", Proceedings of the 70th Annual Convention of the American Psychological Association, 1968, 3, pp. 605 - 606

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should have however sought the opinions of the students towards their teachers' behaviour. This would have shown whether teachers of the alleged poor students in intellectual prospects behaved in a similar manner like the teachers of the students alleged to have better intellectual propects or not. This study seems to have overlooked this immportant aspect.

This study clearly demonstrates that teacher-bias affects both the students' learning and performance. The present study presents the opinion that these biases should be avoided as much as possible, which none of the reviewed studies has mentioned. One way to avoid such biases should be making the teachers understand that they do have biased classroom interaction and that this bias affects both students' learning and performance. For the teachers to be aware of their biases and effects of these biases, it is important to compare the students' opinions about the teachers' behaviours and the way the teachers teach - the results from such a comparison would then be conveyed to the teachers. This may in turn make the teachers regularly diagnose individual students problems.

This view was also expressed by Sharma[17] from Njoro, Kenya when he observed that:

> "With love and affection many students improve their learning and undesirable behaviours; every teacher should therefore be trained in such a way that he can understand and diagnose the problem of particular child before resulting to ruthless caning."

Teachers who resort to ruthless punishments will therefore not encourage students but instil fear which may result in the teacher being disliked by the student(s). Mcfarland (1971)[18] in his book expresses the view that "students will tend to like teachers who try to talk to them and understand their problems; he goes on to say that, in classes where the students are motivated and reinforced equally (evenly) most of them will feel free and learning will be enhanced, unlike classes where the teachers are harsh." As Mcfarland indicated, at least everybody appreciates fairness and therefore for a teacher to enhance learning one thing to consider is fairness.

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[17] Sharma, M. L. In the Daily Nation of 31st July, 1979. p. 10 Col. 15, published at Nation House, Nairobi, Kenya.

[18] Mcfarland, H.S.N., Psychological Theory and Educational Practice. Routledge and Kegan Paul, London, p.

As it has been mentioned however, teachers do not distribute their classroom interaction equally (evenly) to their students and this has also been shown not only to affect students' learning and performance but also "the students who fall victims of teacher scolds and criticisms will dislike their teachers," Brophy (1981)[19]. In a case like this if a student who is usually scolded and criticised is asked to evaluate his teacher he is likely to indicate that such a teacher criticizes students, he is harsh with students, etc. This particular teacher may not actually be aware of all these and needs this information. It is however considered more reasonable in the present study to investigate whether a poorly rated teacher has poor classroom teaching as measured by Flanders technique so as to inform the teacher both his nature of classroom interaction and his behaviours as seen by his students and how these two are related.

It is important therefore at this juncture, to consider whether students' evaluations are useful and how valid they are.

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[19] Brophy, J. "On Praising Effectively", The Elementary School Journal, 1981, No. 5, pp. 270 - 278.

2.3 STUDENTS' PERCEPTIONS OF THEIR TEACHERS

The past several years have witnessed a considerable increase in the use of students' evaluations for instructors (teachers) and instruction in schools, colleges and universities. These evaluations involve perception of students towards their teachers and instructions given by these teachers. This has come up mainly because researchers have discovered that students are always in classroom watching what their teachers are doing and therefore can give a considerable information about their teachers' behaviours, especially in a classroom situation.

Earlier in this chapter, it was indicated that the way teachers treat their students affects not only their learning and performance but also the way the students perceive their teachers' behaviours. This perception has been shown to have a relationship with teaching effectiveness.

In their study of students' perceptions of engineering instructors Deshpande and others, (1970)[20]

[20] Deshpande A., Webb S.C. and Marks, E. "Students' Perceptions of Engineering Instructors' Behaviours and their Relationship to Instructors and Courses". American Education Research Journal, 1970, No. 7, pp. 289 - 305.

discovered that "effective instructors were rated high in motivation and reinforcement." Looking at the results of this study however it is noticed that Webb and Marks only investigated the relationship beteen teaching effectiveness, reinforcement and motivation. It seems the scope of this research has not included aspects of teacher behaviours like social interaction with their students and its relation with the teaching effectiveness. Tuckman and Oliver (1968)[21] in their study indicated that "instructors who received feedback concerning their course ratings showed greater gain than did teachers who received no feedback." On validity and reliability of students' ratings, Veldman and Pect (1963),[22] in their study found that "students ratings of their teachers were reliable and valid enough and when used as feedbacks to teachers, the teachers did change their undesirable behaviours."

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[21] Tuckan B. W., and Oliver, W. "Effectiveness of Feedback as a Function of Source, Journal of Educational Psychology, 1968, No. 59 pp. 297-301

[22] Veldman D.J. and Peck, R.F. "Student teachers' characteristics from the pupils view point," Journal of Educational Psychology, 1963, No. 54 pp. 340-353.

It is therefore important to note as indicated from these studies, that although students are not trained observers they do have a fast cumulative classroom experience and this if used may serve to reduce any possible biases of other judges in the situation.

In view of the related literature on the validity and usefulness of students' perceptions of their teachers, the studies reviewed have however not mentioned how these ratings or perceptions can compare with actual verbal classroom teaching (interaction) of the teacher. This study was designed to investigate this relationship. To investigate this relationship measuring instruments to measure teachers' classroom interaction and students' perception of teachers' behaviours were used. The investigator in this study adapted these two instruments because they could provide the data needed for the present study. Below is a brief review of the measuring instruments used.

2.4 MEASURING THE CLASSROOM INTERACTION

The present study involves observing Chemistry teachers teaching. It is however not possible to sit in a class and describe accurately what is happening in a classroom because of the complexity of the spontaneous classroom behaviour.

This view was also expressed by Flander (1965)[23], as early as nineteen sixties when he observed that:

> Even trained observers struggle with the same biases that distort the testimony of a witness at the scene of an accident. Too often the observer's preconceptions of what he thinks should happen to allow him to perceive certain behaviours but prevent him from perceiving others.

Interaction analysis is however an observation schedule designed to minimise these difficulties by permiting systematic record of spontaneous acts and scrutinizing the process of instruction by taking into account small bits of interaction that take place in classroom instruction.

Classroom interaction is particularly concerned with the influence patterns of the teacher. This might be considered a bias, but it is a bias in terms of pre-determined concepts. The concepts in this case refer to teachers' control of the students' freedom of action. The interest in the present study is to distinguish those acts of the teacher that increase students' participation from those that

[23] Flanders, N.A., (1965) "Early research on classroom climate: Teacher influence, pupil attitude and achievement." Cooperative Monograph , No. 12, U.S. Department of Health Education and Welfare, Office of the President, Washington D.C. 1965.

decrease it and keep a record of both. Primarily interaction analysis, is concerned with verbal behaviour because it can be observed with high reliability than most non-verbal behaviours. The assumption is that the verbal behaviour of the teacher is an adequate sample of his total behaviour. Interaction analysis is just a label, that refers to any technique used for studying the chain of classroom events in such a fashion that each event is taken into consideration. In this study the technique used was the Flanders (1970)[24] "category system of interaction analysis".

The development of these systematic recording techniques is not new; it has been going on for at least 33 years. The first efforts were isolated projects but since interest in technology has increased many researchers are now developing these systems.

Anderson (1939)[25], made one of the earliest attempts to analyse and describe in a systematic way

[24] Flanders N.A. Analyzing Teaching Behaviour. Addison-Wesley Publishing Company, Reading, Massachusetts, Menlopark, Carlifornia, London, Don Mills, Ontario, 1970, p. 34.

[25] Anderson H.H. "The Measurement of Domination and Socially Integrative Behaviour in Teachers' Contacts with Children," Child Development. 1939, No. 10 pp. 73-79.

the spontaneous interaction between a teacher and students in a class, when he "observed for a number of years the sort 'contacts' between children and teachers in elementary school classes." Anderson found it difficult to analyse the classroom behaviour without an observation schedule and ventured in developing a general observation technique.

Withall (1949)[26] was however amongst the first to develop a specific category system. He "classified the teachers' verbal statements into seven categories."

From all these early studies it was becoming clear that it was not possible to record every detail of what happened, hence more research was devoted to teacher talk and pupil talk. The advantage of taking more interest only in verbal behaviour was because of its relative easiness to record.

To be sure the major reason for lack of concern with non-verbal behaviours can be traced

26 Withall, J. "The development of a technique for measurement of social emotional climate in classrooms, Journal of Experimental Education, 1949, 17, pp. 347 - 61.

from the difficulties in categorization, the elusiveness of meaning on non-verbal messages and seemingly the surbordinate function the non-verbal behaviour plays on the verbal behaviour in classroom settings because as Golloway (1966),[27] puts it:

> Verbal language assumes a tremendous burden for coherency of communication between human beings and verbal language serves us well for it is obvious to state that teachers rely overwhelmingly upon words to state and clarify ideas and meanings to students.

The system used at present could therefore measure verbal behaviour patterns only. This system was developed by Flanders in 1965. It is a ten category system for categorizing both teacher teacher talk and student talk.

Using this system did not mean there were no other systems available. Amidon and Hough (1967)[28] for example mention, "20 different category systems in use in United States by 1965. Today there were well over 100 category systems many of which are expansions of the Flanders system".

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[27] Golloway, C.M. "Non-verbal communication in teaching" Educational Leadership, 1966 p. 71

[28] Amidon E.J., and Hough J.B., Interaction Analysis: Theory Research and Application. Addison Wesley Publishing Company, Massachusetts, Ontario, 1967.

The Flanders system however was the most suitable observation system for the present study.

The reliability and validity of systems like the Flanders used in this study has been questionable. Several studies have however indicated means and ways of assuring reliability and validity. Fishman and Anderson (1971)[29] do suggest that "Judges should be trained to use the system, then interjudge agreement are obtained.". In the present study three judges (observers) were used. The specific methods for obtaining the interjudge agreements as used in the present study have varied. Tab and others (1964)[30] for example used "recorded audio-tapes" to determine interjudge agreement." Live lessons were used in the present study. The number of judges used to calculate the interjudge agreement has also varied from "Two", as indicated by Taba and others (1964)[31] in their research to "thirty" as indicated by Waimon

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[29] Fishman, S.E., and Anderson, W.G., "Developing a System for Describing Teaching," Quest January 1971, pp. 9 - 16.

[30] Taba, H. et al, "Thinking in elementary school children," U.S. Office of Education Cooperative Research Project No. 1574, San Francisco, San Francisco State College, 1964, pp. 1 - 36.

[31] Op. Cit., p. 30

and Hermanowiscz (1965)[32]. In this study the interjudge reliability was calculated using only two trained judges and the Scotts (1955)[33] formula to calculate reliability. This formula shows that "Reliability $\frac{Po - Pe}{100 - Pe}$ where Po is the actual proportion of agreement between the judges and Pe is the proportion of agreement expected by chance," this formula was used because of its sensitivity in determining the inter-observer reliability.

In use of any specified category system there is always a major drawback of the observer personal bias. Researchers have however had little concern on the possible intrusive effects that an observer might have on the behaviour of the observed and the observation. Medley and Mitzel (1963)[34], discussing systematic observation of class settings indicated that "teachers do actually behave differently when

[32] Waimon, M.D., and Hermanowiscz, H.J. "A Conceptual System for prospective teachers to study teaching behaviour", Paper read at the American Educational Research Association Convention, Chicago Feb. 1965.

[33] Scott W.A., "Reliability of content analysis: The case of nominal scale coding, "Public Opinion Quarterly 1955, No. 19, pp. 321-325.

[34] Medley D.M., and Mitzel H.D., "Measuring classroom behaviour by systematic observation" in N.L. Gage (ed), Handbook of Research on Teaching. Chicago: Rand McNally and Company, 1963, pp. 247-328.

being observed than when not being observed". They however, further argue that "this should not be taken very seriously,, but whatever can be done to minimise the disturbing effect of the observer should be done." Heyns and Zander (1953)[35] had earlier suggested that "the most realistic approach to this problem was to keep an observer in an observational setting long enough for students and teachers to be familiar with him." These two researchers have however not indicated for how long the visits or for how long the observer should be within the observational setting. Borg and Gall (1976) however do suggest that about "three visits to the observational setting would do." In the present study the classes were visited thrice before any datum was collected.

Finally since the main aim of this study was to investigate the relationship between teacher's classroom interaction and their undesirable behaviours using interaction analysis to measure classroom interaction and an opinionnaire for students to evaluate their teachers, it is worthwhile to review

[35] Heyns, R. and Zander A.F., "The relation of the observer to the group being observed" in L. Festinger and D. Katz (eds). Research Methodology in Behavioural Sciences. Dryden, New York, 1953.

any work relevant to this relationship.

2.5 RELATIONSHIP BETWEEN TEACHER'S CLASSROOM INTERACTION AND THE WAY THE STUDENTS EVALUATE THEM.

It has already been reviewed and indicated that teachers do bias students during teacher-student classroom interaction. This bias has been shown to affect student learning, performance and the way he perceives his teacher. Use of students' perceptions of their teacher's behaviours has been shown to give reliable information. The present study investigated the relationship between the teachers' classroom interaction and their undesirable behaviours as given by their students.

Few individuals have also investigated the relationship between a teacher's classroom interaction and the way the teacher is evaluated by his students in a number of aspects. Several of these researchers have discovered that different verbal behaviour patterns are present in classrooms of different types of teachers.

Two studies by Flanders (1965a)[36] for example indicated that "classes of elementary teachers that scored high on fondness of the teacher, motivation, fair rewards and punishments, lack of anxiety and independence used more praises, students' ideas, encouragements, and allowed more freedom for students in their classrooms than teachers who scored low and who comparatively used less praises, ecouragements and more commands and criticisms". Flanders (1965a)[37], did a third study to investigate how students' evaluation of their teachers related to achievement stimulation by the teachers. He discovered that, "teachers of seventh-grade mathematics who encouraged and praised their students more stimulated high achievement than teachers who used more criticisms and commands."

Flanders' studies have shown that, first there is a relationship between the way the teacher teaches and the way he behaves as seen by the pupils and second that the way a teacher behaves during teaching has some relationship with the achievement of the students.

[36] Flanders, N. A., Teacher infleucne, pupil attitude and achievement, Co-operative Research Monograph, No. 12, Washington D.C.; U.S. Government Printing Office, 1965a, pp. 49 - 65.

[37] Op. Cit., pp. 66 - 110.

The two studies were as mentioned above done at elementary school level. The question in the present study is therefore, What happens in secondary situation? How would for example a secondary school student who is usually criticised, commanded, abused scolded, etc-- perceive the behaviour of the teacher who does all these to him? The present study is therefore addressing itself to the relationship between the way the secondary school teachers teach and their undesirable behaviours as seen by their students. This is so in order to find out whether for example, a teacher who is poor in teaching (does not teach effectively) has also undesirable behaviours like abusing students, scolding them, punishing them, etc.. or not.

2.6 CONCLUSION

In conclusion, the present study is working with constraints mentioned in Chapter I and elsewhere in this thesis, set out to study the relationship between secondary school Chemistry teachers' classroom interaction and their undesirable behaviours as seen by their students.

Literature survey available showed that there was a case for establishing the relationship between teacher's classroom interaction and his undesirable behaviours as given by his students among chemistry secondary school teachers in Kenya and hence the choice of the topic for this thesis. Further, the literature reviewed revealed that some studies showed a relationship between teachers' classroom interaction and students' learning, performance and the way the students evaluated their teachers. The investigator therefore decided to find out how the Kenyan secondary school chemistry teachers stood with respect to their classroom interaction as compared to their undesirable behaviours as given by the students.

To do this study a sample of chemistry teachers, instruments used, and actual data collection is needed. The next chapter (III) guided by the brief literature review done in this chapter, presents the design of the study, sample used, instruments used and actual collection of data.

Chapter III

METHODOLOGY

3.0 INTRODUCTION

The preceding two chapters laid down the groundwork for this study. In chapter I the problem of the study along with the purpose, and related question, the need for the study, the basic assumptions and limitations for the study were discussed; definition of terms was also done. Chapter II reviewed literature related to this study. Chapter III will focus on research methodology. Precisely this chapter establishes training done for the preparation of the main study, the population and sample selection, instruments and how they were used, data collection and statistical procedures employed.

This study was carried out in two stages namely; the initial training of the researcher and the final study or the main study. The purpose of this training was to prepare for the main study. Part of the main study involved observing the teachers teaching chemistry. These observations were made using an observation schedule (the Flanders ten category system), because as Flanders

(1965)[1] argues, "the spontaneous behaviour of a teacher is so complex and variable that an accurate description of it is most difficult " Interaction analysis is an observation schedule designed to minimise the difficulties and permits systematic record of spontaneous acts so as to scrutinise the process of instruction by taking into account each small bit of interaction. To use such a schedule the observer therefore needed to train first and this is why it was decided that first part of this study be training on how to code classroom interaction using the Flander's classroom interaction observation schedule.

This training involved, training from taped and vediotaped chemistry lessons and the final part of the training involved observing actual chemistry lessons usually referred to as live training (McNamara and Bennet 1979, p. 101). For live training four chemistry teachers were used. These four teachers were selected and observed by both the researcher and two trained observers. The observations were made using the Flanders classroom interaction observation system.

[1] Flanders N.A." Teacher influence, pupil attitude and achievement" Research Monograph No. 12, U.S. Department of Health, Education and Welfare, Office of Education, Washington D.C. 1965.

In the case of the main study the classroom interaction of the chemistry teachers was compared with their undesirable behaviours. The classroom interaction was obtained by coding while the undesirable behaviours were given by the students. This comparison was done by dividing the chemistry teachers into two groups Upper and Lower, using the responses made by their students to their teachers' undesirable behaviours, then comparing the verbal classroom interaction patterns of these two groups. The upper group comprised of those chemistry teachers with the lowest percentage frequency of undesirable behaviours while the lower group comprised of those chemistry teachers who had the highest percentage frequency of undesirable behaviours.

College graduate trained chemistry teachers were chosen and used for this study as subjects. These chemistry teachers were teaching forms II, III and IV students. These students were used to respond to a questionnaire of undesirable behaviours of their teachers. The deicison to use college trained chemistry teachers was based on consideration about their training.

It was decided that only trained teachers would be used. This was done on the assumption that trained and untrained teachers were different in their classroom interaction, and so to avoid this probable difference being projected in the study, the use of untrained teachers was discarded. Form I (secondary year I) having just left primary schools were considered not well placed to evaluate their teachers objectively because they probably had not stayed long enough with them. Forms V and VI (Secondary year 5 and 6) classes were left out due to the fact that not many schools had forms V and VI.

After this brief general introduction of the methodology chapter, it is worthwhile to deal with the particular aspects of this chapter. These aspects are training, the population, the subjects, the instruments used, the data collection and a description of the statistics used for the analysis of the data.

3.1. TRAINING

As it has been indicated, this kind of study involves observing a teacher's behaviour and categorizing it. To do this the observer needs to train on how to categorize these classroom interactions. Initially the researcher who is also the observer in the main study used taped and vediotaped chemistry lessons and actual chemistry classroom teaching. This training was done by coding Flanders categories as explained in the data collection section in this chapter. A trained observer(s) helped to train the researcher.

This training was done as follows: The researcher and other two trained observers listened and coded taped and vediotaped chemistry lessons. Each lesson was listened to and coded for only twenty minutes. In the first five minutes of the lesson and last five minutes of the lesson nothing was coded. This was done because usually the first five minutes of a lesson is settling down while the last five minutes is summary thus the actual body of the lesson lies in between.

After listening and coding each lesson the tape or videotape was stopped and discussed by the researcher and the other two trained observers. The lesson was then replayed if there was much disagreement, which was then sorted out, to clear the differences. After using several taped and videotaped lessons and establishing some consistencies, the three observers, that is, the researcher and the two trained observers then started observing actual chemistry lessons taught by some four selected chemistry teachers. The same procedure for coding the taped and videotaped chemistry lesson was used. In addition the three observers sat in convenient places where they could see all the interchanges in the classroom. This sample of chemistry teachers was selected the same way as the sample used in the main study. The procedure used for this selection is explained in the main study. All the four teachers used for this training were requested by the researcher to allow him and other observers to visit their classes for several lessons. Three visits were made for familiarization only, thus no data (coding) was done. After these three familiarization visits, six lessons were observed and discussed. The inter-observer reliability for the sixth observation was found to be high enough (0.86) for the training to be stopped.

The last observations for the researcher and one trained observer are shown in Table III.I.

Table III.I Showing Calculations of Inter-observer Reliability by Scotts Method.

CATEGORY	TALLIES BY OBSERVER A*	TALLIES BY OBSERVER B*	% A	% B	DIFFERENCES % (DISA-GREEMENT)	(AVERAGE %)^2
1	0	0	0	0	0	0
2	4	4	1.26	1.22	0.04	0.0153
3	5	6	1.57	1.83	0.26	0.029
4	31	30	9.75	9.15	0.6	0.89
5	213	215	66.98	66.55	1.43	43.89
6	8	8	2.52	2.44	0.08	0.078
7	1	2	0.314	0.61	0.296	0.002
8	22	17	6.9	5.2	1.7	0.364
9	9	16	2.8	4.9	2.1	0.149
10	25	30	7.9	9.15	1.25	0.725
TOTAL	318	328	100.03	100.05	7.756	46.14
	646		200.08			

A* Researcher

B* Trained observer.

Columns 2 and 3 show tallies made by the observers A and B in each category. The formula used for the calculation was suggested by Scott (1955). It is shown below.

$$\pi = \frac{P_o - P_e}{100 - P_e}$$

Where π is the inter-observer reliability

P_e is the proportion of agreement expected by chance and is calculated by squaring the proportion of tallies in each category and taking the sum as shown in table ((III.I)

P_o - is the proportion of agreement and it is determined by subtracting the total percentage of disagreement (table III.I) from 100. The inter-observer reliability ( ) is calculated below.

$$\pi = \frac{P_o - P_e}{100 - P_e} = \left\{\frac{(100 - 7.756) - 46.14)}{100 - 46.14}\right\}$$

$$\pi = \frac{46.3}{53.86}$$

$$\therefore \quad \pi = 0.86$$

During the live training all the four Chemistry teachers were requested to teach normally and were assured that the observers were interested in just seeing what goes on in the classroom for research purposes and so they need not be afraid because it was not a fault-finding undertaking. The sample used for training is shown below.

TABLE (III.2) SHOWING SAMPLE USED FOR TRAINING

SCHOOL NAME AND CODE	SCHOOL CATE-GORY	TYPE OF SCHOOL	TEACHER SEX	TEACHER AGE	TEACHER EXP-ERIENCE	CLASS TAUGHT	NUMBER OF STUDENT
Ngara Girls (J)	Urban	Girls	M	28	5	3	40
Mangu Boys (K)	Rural	Boys	M	26	2	3	38
St. Francis Girls (L)	Rural	Girls	F	27	4	3	39
Thika High (M)	Urban	Boys	F	25	1	2	41
TOTAL							158
	%U= 50 %R= 50	%G=50 %B=50	%M=50 %F=50	Mean 26.5 Years	Mean 3	%3=75 %2=25	Mean 39

During this training session the sample was selected by going through the teachers' personal files at the Teachers Service Commission (TSC) H. Q.) which was allowed by the Senior Staffing Officer.

3.2 POPULATION OF MAIN STUDY

The population of this study was Kenyan Secondary Chemistry Teachers, teaching forms II, II and IV students in government secondary schools. The students in these forms were used to respond to a questionnaire of undesirable behaviours of their teachers. The government secondary schools were chosen due to their similarities with respect to facilities like textbooks, laboratories, science equipment, library, etc. As it has been noted this study involved observations being made for every teacher. Before any observations were made, the particular teachers and their classes were visited three times because as Borg and Gall (1971)[2] argue, "it is advisable to meet the teachers and the students before any observations are made to minimise observer effect."

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[2]Borg, W. R., and Gall, D.M. (1971) Educational Research: An Introduction, 2nd editon: Longman, New York and London, 1977 pp 236.

Due to this fact, the nature of the study was both expensive and time consuming. Because of limited time and money however, it was therefore decided that only one Kenyan district would be used for this study. This was Machakos District. So all the chemistry teachers were from the government secondary schools in Machakos District.

3.3 SUBJECTS

There were 40 trained graduate chemistry teachers in all the government secondary schools in Machakos district. Since this study aimed at investigating the relationship between the teachers and verbal classroom interaction and their undesirable behaviours, to avoid extraneous variables such as sex, age, experience, etc affecting the study it was decided that a stratified sample be used. Stratified random sampling technique was therefore the only technique appropriate for selection of the subjects used for this study. The stratified random sampling permits the inclusion of parameters of special interest and controls internal validity in terms of selected factors through the use of moderator variables (Tuckman 1972, p. 202).

This technique ensures representativeness and avoids bais. In this case for example male and female teachers are represented by inclusion of both sexes. In addition, stratification represents a good operational strategy for screening members of the of the population into and out of the study by reducing variability.

This type of sampling left a sample of 28 teachers out of the original 40 teachers. The procedure followed for the selection is shown below.

(a) All the chemistry teachers were trained graduates.

(b) All the Chemistry teachers had taught in the school where they were observed teaching for at least one year. This was essential because the students had to be familiar with their behaviours to be able to evaluate them and they could only be familiar with them by staying with them longer.

(c) Both male and female teachers were included in the study hence both sexes were represented.

(d) Both urban and rural government secondary schools were included in the study, thus teachers teaching in both rural and urban schools were represented in the study.

(e) Both girls and boys schools were included in the study. This meant that male teachers teaching girls, male teachers teaching boys, female teachers teaching girls and female teachers teaching boys were included in the study.

(f) The experience of the Chemistry teachers was chosen to lie between 1 and 6 years and almost homogeneous group in terms of experience.

(g) The ages of the chemistry teachers were chosen to lie between 24 and 35 years for the same reason in (f).

As indicated earlier in this chapter all this information was gathered from the teachers' personal files at the Teachers Service Commission (TSC) Nairobi.

The files were made available to the researcher by the Staffing Officer of Eastern Province, Mr. Kamau. As said above after this ampling only 28 teachers were left, out of the original 40, and this is the sample which was used for this study. The analysis of the sample appears in table (III.3).

After sampling and selecting the subjects of the study what remained was actual collection of data; to do this, tools to collect data on observational and undesirable behaviours were needed. As it has been indicated, it is difficult for any researcher to get into class and observe reliably what is happening between the pupils and the teacher without using a category system, for observational data, the researcher had therefore, to look for an appropriate category system to use in collecting the classroom interaction data. Similarly the researcher had to find an appropriate instrument to measure the chemistry teachers' undesirable behaviours. The instruments selected and used by the researcher are analysed and shown below.

TABLE III.3 SHOWING SAMPLE FOR MAIN STUDY

SCHOOL NAME CODE	SCHOOL CATE-GORY	SCHOOL TYPE	TEACHER SEX	TEACHER EXPE-RIENCE	TEACHER AGE	CLASS TAUGHT	NUMBER OF STUDENTS
Machakos Boys(N)	Urban	Boys	M	4	29	3	36
	"		F	2	27	3	40
	"		M	1	26	4	22
Machakos Girls (P)	Urban	Girls	M	4	31	2	40
Machakos Tech. (Q)	Urban	Boys	F	3	26	3	39
	"		M	5	31	4	34
Mumbuni Boys (R)	Urban	Boys	F	2	25	2	42
			M	5	28	3	37
			M	6	35	4	36
Tala Boys (S)	Urban	Boys	M	5	31	4	19
			M	5	31	3	38
Kangundo Boys (T)	Urban	Boys	M	6	32	2	35
			M	3	29	2	33
			M	2	28	2	28
			M	2	27	3	36
Misyani Girls (U)	Rural	Girls	M	1	27	2	39
			M	1	25	3	39
Boys (V)	Rural	Boys	M	4	30	3	32
			M	4	28	3	30
Precious Blood Girls (w)	Rural	Girls	M	5	30	2	48
			F	2	24	3	48
Masinga Boys (X)	Rural	Boys	M	5	31	2	37
			M	5	30	3	34
			M	1	26	3	36

SCHOOL NAME CODE	SCHOOL CATE-GORY	SCHOOL TYPE	TEACHER SEX	TEACHER EXPE-RIENCE	TEACHER AGE	CLASS TAUGHT	NUMBER OF STU-DENTS
Makueni Girls (Y)	Rural	Girls	F	6	32	3	36
			M	2	26	2	40
			M	6	35	2	41
Makueni Boys (Z)	Rural	Boys	M	2	27	2	30
	%U=50	%B=67	%M=82	Mean	Mean	%3=43	Mean
	%R=50	%G=33	%F=18	3.5 years	28.8 years	%4=14	36
						%2=43	

3.4 INSTRUMENTS USED

Since the intention of this study was to investigate the relationship between classroom interaction of chemistry teachers and their undesirable behaviours as seen by their students, appropriate instruments which could be used to observe classroom interaction and measure undesirable behaviours were used.

The earliest attempt to analyse and describe in a systematic way the spontaneous interaction between a teacher and children in his class was probably the work of Anderson (1939),[3] who as early as 1939 "observed for a number of years the sort of 'contacts' between children in nursery and elementary school classes and related these to the behaviour of the teacher towards children." Anderson (1946)[4] was among the first to find out that "it was very difficult to analyse classroom interaction without categorizing it"[4]. Withall (1949)[5] was however

[3] Anderson, H.H., "The measurement of domination and socially integrative behaviour in teachers' contacts with children" Child Development, 1939, 10, pp. 73-89

[4] Anderson, H.H.; et al, Studies of teacher's classroom personalities Stanford University Press.

[5] Withall, J., "The development of a technique for the measurement of social-emotional climate in classrooms", Journal of Experimental Education, 1949, 17, pp. 347-61.

amongst the first to develop a category system. "His classification of the teacher's verbal statements into seven categories showed a pattern of teacher verbal behaviour similar to Anderson's categorization of general behaviour.

From these early studies it was becoming clear that since it was not possible to record every detail of what happened in class, it was best to concentrate on some aspects. More and more research was then devoted to teacher talk and pupil talk.

While there have been many schemes devised to analyse teacher-student talk in classroom "the most potent of such methods for science teaching is Flanders (1965) system"; observes Cunnigham (1967)[6]. Amidon and Hough (1967) mention 20 different systems being used in the United States by 1965. Today there are well over hundred systems, many of which are however adaptations and modifications of the Flanders system. The Flanders system was found to be easy to train in its use and it was applicable in this study. Most of the other systems available

[6] Cunnigham, J.D., "Interaction analysis: A useful technique for research and science supervision. Science Education. Feb. 1967, No. 1, Vol. 51. Boyd Printing Co., Inc. Albany, New York.

were difficult to train in their use for example "the 23 - category science observation schedule" McNamara (1979)[7], which need a lot of time to train which the researcher lacked. The Flanders system on the other hand needed only 10 to 12 hours to train and could be used effectively.

Due to the above stated reasons, the researcher therefore decided that the Flanders category system would be used to collect the classroom interaction data for the chemistry teachers. The Flanders category system is described below and a description of how it was used is given in the data collection section in this chapter. The main advantage of this category system was its easiness to train in its use, its suitability in collecting classroom interaction data and the fact that Flanders (1970) himself had written a book on its usage and explained fully how to use it and what to do with the data collected with it and also how to interpret such data. Many of the other category systems lack all these. The drawback with this category system is that it only has categorized verbal behaviours while sometimes in a classroom interchange one cannot miss the non-verbal behaviour.

[7] McNamara J. A., and Bennett, G., Focus on Teaching, Longman Inc. New York, 1979, p. 88

The Flanders category system also does not say what an observer should do when a teacher for example tells the student to do some work on their own or when the teacher is demonstrating.

3.4.1. THE FLANDERS INTERACTION ANALYSIS CATEGORY (FIAC) SYSTEM.

This system was developed by Flanders (1965). He developed it to categorize both talk by the teacher and the pupil. Flanders had three objectives when he developed this category. These are:

(i) To help individual teachers develop and control their teaching behaviour.

(ii) To study teaching behaviour by keeping track of selected events that occur during classroom interaction, and

(iii) To focus on teaching behaviour and its relationship to classroom interaction and educational outcomes.

Having these objectives in mind, Flanders spent many hours of live classroom observation, he came up

with a ten category system for categorizing teacher talk and pupil talk. This category system is shown in table III.4. This table lists ten categories. Seven are used when the teacher is talking, two are used when any pupil is talking and the last category indicates silence or confusion. So far as communication is concerned these three conditions: (a) Teacher talk (b) Pupil talk (c) Silence or confusion, are said to exhaust all the possibilities of verbal classroom interaction. Category systems which exhaust all the possibilities like the FIAC system are totally inclusive of all possible events, and since any event can be classified, a totally inclusive system permits coding at a constant rate throughout the observation. This was essential because the intention of this study was to reach a conclusion about the proportion of time spent in one or more categories. Procedures on using this instrument are included in the data collection section of this chapter. All the rules and procedures recommended for the use of the FIAC system were followed by the researcher.

TABLE III.4 FLANDERS SCALE FOR INTERACTION ANALYSIS

INDIRECT INFLUENCE	1*	Accepts Feeling: Accepts and clarifies the feeling tone of the students in a non-threatening manner. Feelings may be positive or negative. Predicting or recalling feelings are included.
	2*	Praises or Encourages: Praises or encourages students action or behaviour; jokes that release tension, but not at the expense of another individual: nodding head or saying "um hm"? or "go on" are included.
	3*	Accepts or Uses ideas of students: Clarifying, building or developing ideas suggested by a student. As teacher brings more of his own ideas into play, shift to category five.
	4.*	Asks Questions: Asking a question about content or procedure with the intent that a student answers.
DIRECT INFLUENCE	5*	Lecturing: Giving facts or opinions about content of procedure; expressing his own ideas; asking rhetorical questions.
	6*	Giving directions: Directions, commands or orders to which a student is expected to comply.
	7*	Criticizing or Justifying Authourity: Statement intended to change student behaviour from non-acceptable power; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
	8*	Student Talk - Response: Talk by student in response to teacher. Teacher initiates or solicits student statement.
	9*	Student Talk-Initiation: Talk by students which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk: If he did, use this category.
	10*	Silence or Confusion: Pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

* There is NO scale implied by these numbers. Each number is classificatory; it designates a particular kind of communication event. To write these numbers down during observation is to enumerate not to judge a position on a scale.

3.4.2 THE TEACHER UNDESIRABLE BEHAVIOUR

The FIAC system was used to collect verbal classroom interaction data (observations of teacher pupil interchanges) for the chemistry teachers; but it was also the intention of this study to collect the chemistry teachers' undersirable behaviours so as to investigate their relationship with classroom interaction. The study was particularly intended to find out whether the magnitude of undesirable behaviours was related to verbal classroom interaction, if so, how? As an example it was the intention of the study to find out whether a teacher or a group of teachers who used lots of criticisms during their classroom interaction were perceived by many of their students to have undesirable behaviours or not.

To get the responses from the students an undesirable behaviour questionnaire had to be used as a tool. The only tool or instrument which was available and was a measure of undesirable behaviours of the teacher as seen by the students was a questionnaire developed by Leeds (1954)[8], shown in table III.5.

TABLE III.5 TEACHER UNDESIRABLE BEHAVIOURS FORM

Name of the school ----------

Name of the Teacher ----------

1.	Scolds students alot	----------
2.	Usually cross	----------
3.	Often "bossy"	----------
4.	Scolds a student infront of others	----------
5.	Always "fussing at" students	----------
6.	Talks too much	----------
7.	Difficult to approach with problems	----------
8.	Difficult to please	----------
9.	Easily annoyed or bothered	----------
10	Does not see things as students do	----------
11	Does not participate in students games	----------
12	Uninterested in students activities	----------
13.	Assigns "lots" of home work	----------
14.	Punishes the whole class for one or two offenders	----------

15. Uses detention during recess or after school. _____

The behaviours included in this instrument are: (a) Verbal behaviours implying interpersonal relations (1 - 6), (b) Non-verbal behaviour implying interpersonal relations (7-10) and (c) Behaviours involving work and structure (11 - 5) which were considered inclusive of most of teacher undesirable behaviours. This instrument has not been widely used and therefore not much has been written about it. Leeds (1954)[9], however, compared "ten most liked and ten most disliked teachers using this questionnaire." He did two studies one in 1946 and another in 1951 and in these two studies "the disliked teachers received much more diapproval in both years, although the most-liked teachers were also criticised by their students but, relatively, to a very small extent as compared to the disliked teachers. Furthermore, the 1946 and 1951 studies were done in different states." This supports the use of the instrument because it shows that the instrument could measure undesirable behaviours reliably in different years and states. The language used in this instrument

[9]Leeds, Op. Cit., pp. 29 - 36.

as it can be seen in Table III.5 is easily understandable which is an advantage. This instrument was used to collect the chemistry teachers' undesirable behaviours by requesting the students to respond to the behaviours given in the questionnaire in the present study. The major drawback with this questionnaire was that it gave no choice or choices whereby the student could choose. It would probably have been a better questionnaire if it was in Linkert scale form where the students could for example strongly agree, agree, disagree or strongly disagree that the particular teacher had the undesirable behaviour stated. This instrument left the students with no choice, but to decide whether the particular teacher had the behaviour stated or not. However, since it was the only suitable instrument available for this study, it had to be used. Procedures on how it was used are included in the data collection section which appears below.

3.5. DATA COLLECTION

After deciding and selecting the appropriate tools (instruments) to collect data for this study the tools were then used as explained below.

Prior to visiting the already chosen 28 teachers in 12 government secondary schools in Machakos District, letters were sent to these teachers and their Headmasters/Headmistresses requesting a number of things, among these requests was kindly asking the teachers to send their chemistry time tables and informing them that the researcher would visit them after he received their timetables; this, it was made clear to them was for research purposes not for inspecting them; another request was for the Headmaster/Headmistress to allow the researcher to be in their schools and conduct research for a certain period. All these requests were solicited by a research permit from the Office of the President, the Heads and their teachers were however found willing and cooperative even without showing or producing the research permit.

The researcher received all the chemistry timetables from the 28 teachers after a week. After receiving these timetables every individual teacher out of the 28 teachers was visited and requested to allow the researcher to sit in their classrooms several times. Furtunately all the chemistry teachers allowed the researcher to sit in their classes. All the teachers were then visited for data collection.

3.5.1. PROCEDURES FOLLOWED FOR COLLECTING CLASSROOM INTERACTION DATA.

The researcher went into the class and requested the particular chemistry teacher to teach as he/she normally does. This was done to reduce the observer effect, because the teacher could change his style of teaching due to the researcher's presence. To minimise the observer effect no data were collected for three classroom visits (lessons). This,it was assumed would allow the teacher to teach as he normally does because the researcher would have become familiar with him (teacher) and also with the students. During each time of visit the researcher also talked freely with both the teacher and the students in and outside the classrooms when time allowed. Doing this the researcher was still trying to make himself more familiar hence minimise more observer effect. Borg and Gall (1971)[10], qualify this when they argue that:

> "Unless he is concealed, the observer is likely to have an impact on the observed. For example, an observer entering the class-

[10] Borg W. R., and Gall D.M., Educational Research: An Introduction, Longmans New York and London 1971, p. 236.

> room for the first time probably will arouse the curiosity of the students and possibly the teacher. The resulting inattentiveness of the students to the teacher may not reflect his usual behaviour and thus may provide nonrepresentative data. To prevent this situation the observer should not record any observation for the first time he is in the classroom.

After the researcher was reasonably familiar with the teacher and the students he started coding the classroom interchange using the FIAC system. To do this the researcher (observer) sat in the classroom in the best position to hear and see the participants. Almost as often as possible (about every three seconds) the researcher decided which category best represented the communication event just completed. He then wrote down the number in column on coding sheet (one is provided in the Appendix A) while he simultaneously assessed the continuing communication. He did this trying to keep his tempo as steady as possible. The researcher increased the rate of coding during rapid exchanges especially if the rare events were occurring like 1, 2, 7 and 9 on the other hand, during long periods of lecture, the observer relaxed and inadvertently slowed his tempo as compared to periods of rapid exchanges.

The coding: Whenever the teacher was talking the numbers 1 to 7 were used, for students 8 or 9 was used and for silence or confusion 10 was coded.

When the researcher was assessing the balance of initiation and response, when the teacher was talking the response categories coded by the researcher were 1, 2 and 3 and when the teacher was initiating, 5, 6 or 7 were coded. Below is an explanation of the nature of the communication or interchange coded in each category.

(a) Category I: The teacher statements which were judged as accepting and clarifying an attitude or the feeling tone of a student in a nonthreatening manner were coded as category I. A statement like " "My! But this class seems excited! Tell me what happened at the dining hall during lunch break", was coded in this category.

(b) Category 2: When the teacher praised and encouraged the students, the researcher coded it in this category. This included

a teacher nodding his head while saying "Um hm" -- with proper reflection. A distinction between categories 2 and I is that in the latter there is an element of objective diagnosis which is missing in category 2. Both categories were used for statements which had overtones of warmth and friendliness, but category 3 adds teacher approval as well.

(c) Category 3: When the teacher responded to the ideas students expressed by (i) acknowledging the students' ideas by repeating the nouns and logical connectiveness just expressed; (ii) modifying the idea, rephrasing it or conceptualizing it in the teacher's own words; (iii) applying the idea, using it to reach inference or taking the next step in a logical analysis of a problem; (iv) comparing the ideas, drawing a relationship between the students' ideas and one expressed earlier by either another student or teacher; and (v) summarizing what was said by the student or a group of them was coded in this category.

(d) Category 4: All questions which were asked by the teacher which served to move the conversation to a next step, to introduce a new problem element, and involve ideas which the teacher thought were important were coded as 4.

(e) Category 5: When the teacher was lecturing, expressing opinions, giving facts, interjecting thoughts and made off-hand comments, all these were classified in this category.

(f) Categories 6 and 7: Both these categories were used for teacher statements which were intended to produce compliance. A statement like "please take out your chemistry text books and turn to page 14", was coded as 6 while a statement like "one problem with you is that you don't follow direction," was coded 7.

(g) Categories 8 and 9: All pupil talk was coded with these categories. The researcher separated responses from initiations and coded 8 for the student responses and 9 for student initiation. The researcher had to decide which were responses and which were initiations. This may be explained by looking at the following example and the way it was coded. T-stands for teacher while S- stands for student

(i) T: "What is calcium?".

S: "It is a metal."

(ii) T: "What did you learn unique about calcium?"

S: "I thought the way it reacts with water was unique".

In a case like the example given above the researcher coded (i) S: as a response hence category 8 and (ii) S: as an initiation hence category 9.

(h) Category 10: This category was coded when there was a pause in classroom communication or when there was noise or confusion. The researcher avoided recording a series of 10's for longer than half a minute. When the researcher for example expected no more interchange he stopped coding, noted the time and drew two parallel lines to indicate stopping (=). When the verbal interchange again opened the researcher again noted the time and started coding. 10 was also used before beginning of any coding-an advice given by Flanders (1970) which takes care of the last bit of settling down of the class. As an example a sample of a coded classroom interaction of one of the teachers is provided in the appendix D.

Using all the above categories the researcher then collected the classroom interaction data of the chemistry teachers for two lessons, a theory and a practical lesson.

For the practical lessons which involved demonstrations, when the teacher started demonstrating, the researcher put the two parallel lines (=) for stopping indicating time of stop and wrote demonstration (D) below after the teacher stopped demonstrating. The researcher also checked the time and indicated it. These spans of times were used to indicate the time the teachers spent on demonstration. During classroom observation and coding a decision had to be made, like when two or more categories seemed equally appropriate. However, as Amidon and Hough 1967, pp. 127) suggested, the category numerically furthest from 5 was used. No second-guessing was done on intent of the teacher, categories were coded as their effect on the students was perceived.

After observing the chemistry teachers for two lessons (twice) if there was no other teachers to be observed in the particular school then the undesirable behaviour questionnaire was administered to the students. If however, there were other teachers or there was another teacher, the classroom interaction data were collected first. It should also be noted that all the observational data for each teacher were transferred to a 10x10 matrix for interpretation-one such matrix is provided in Appendix B.

3.5.2 Procedures followed for administering the undesirable behaviour opinion questionnaire

After every individual teacher was observed the last time, he was requested to allow the researcher administer the questionnaire in the teacher's absence. The teachers were assured that the questionnaire was not harmful but wanted to find out the students' opinions about some of their teachers' classroom behaviours. After the teacher agreed which all of them did, then the questionnaires was administered. One of these questionnaires is included in the Appendix C.

During the administration every sentence was explained carefully to the students and the students were requested to be sincere and honest in giving their opinions and if their teacher whose name appeared on top of the questionnaire had the undesirable behaviour stated " cross (X)" the space provided and if they thought he did not have such a behaviour they were advised to leave the space provided "blank". An example of responses made by one student to one of his teachers is shown in Appendix E.

After collecting the classroom interaction data of chemistry teachers and their undesirable behaviours as seen by their students what remained was to present and analyse the collected data. This is done in Chapter IV but before embarking on presenting and analysing the collected data it is worthwhile discussing the statistical procedures used for analysis of these data.

3.6 STATISTICAL PROCEDURES USED FOR THE STUDY

The first type of statistics used in this study was used to divide teachers into two groups using their students' responses to their undesirable behaviours. The intention of the researcher was to divide the observed teachers into two groups using their undesirable behaviours as given by the students. These two groups were "upper" and "lower" as mentioned earlier. To divide these teachers the median was used because it gives the mid point of the two groups unlike the mean and it was the intention of the study to have two equal groups.

3.6.1 Median

The median is a score in the middle or that

point on a scale of measurement above which there are exactly half the scores or responses and below which there are the other half of the scores. In the distribution 1, 3, 5, 7, 9, 11, 13, the middle score for example is 7. Thus the score seven indicates the median at which there are three scores above and three scores below. The median is obtained by arranging the scores in ascending order form, the smallest to the greatest score and selecting that point above and below which there are an equal number of scores. This is the case when the total of the scores is odd. When the total is even the median is between the two middle measures. In the distribution 7, 8, 9, 10, 11, 12, for example, the middle measures are 9 and 10 therefore the median would be 9.5, thus the scores 7, 8, 9 lie below and 10, 11, 12 lie above.

In dividing the teachers using the median, the upper group comprised of the group with scores above the median and the lower group with scores below the median.

After dividing the teachers into two groups: Upper and Lower, it was the intention of this study to investigate whether the two groups were significantly different and also whether their classroom interaction patterns were also significantly different. To do this the appropriate statistics was the "t" test.

3.6.2. The "t" Test.

The "t" test determines whether or not the means of two groups differ so much that the samples are unlikely to have been drawn from the same population. There are various formulae for "t" depending upon the particular circumstances. These are: (a) differences between the means of small samples and large independent samples, (b) differences between means of small samples and (c) differences between the means when the two measures are taken from the same sample. In the case of this study the sample was small and therefore the circumstance (b) was used.

3.6.2.1. "t" test for small independent groups (30)

When one wishes to compare the mean scores of samples or groups containing less than 30 cases the formula outlined below is appropriate because it makes allowances for sampling errors which are of greater importance in small samples.

The formula is:

$$t = \frac{x_1 - x_2}{\sqrt{\frac{\sum ed^2 1 + ed^2 2}{n_1 + n_2 - 2}\left(\frac{(n_1 + n_2)}{n_1 n_2}\right)}}$$

This is the formula used for "t" test in this study. In this case,

X_1 = the mean score of group 1

X_2 = the mean score of group 2

d_1 = the deviation score obtained by subtracting each score (X_1) in group 1 from the mean score (X_1)

d_2 = The deviation score obtained by subtracting each score (X_2) in group 2 from the mean score (X_2)

n_1 = the number of scores in group 1

n_2 = the number of scores in group 2.

These are the main statistical procedures used for the analysis of the data collected. It should however be noted that other statistics like frequency distribution were also used.

3.7 Conclusion

This chapter was devoted to discussion of methods and procedures to (1) select the teachers who participated in the study (2) describe the research instruments and (3) gather data. Chapter 4 will present, analyse and interpret data collected in the course of the study. Similarly chapter 5 will summarize the findings of the study and make the appropriate recommendations.

Chapter IV

ANALYSIS AND OBSERVATIONS

4.0 INTRODUCTION:

In the previous chapter (Methodology), instruments used, sample of the study, data collection and statistical procedures have all been explained. In the same chapter it was also mentioned that the original sample of this study was forty (N = 40) chemistry teachers in twelve government secondary schools in Machakos District. Of these only 28 (N = 28) were involved in the study.

All these 28 chemistry teachers were observed teaching chemistry and after the last observation was made for every teacher an opinion questionnaire was administered to their students to evaluate their teachers as explained earlier. All the data collected were presented and analysed in this chapter. This chapter is divided into three sections namely:

(a) Presentation and analysis of teacher's undesirable behaviours data

(b) Presentation and analysis of teacher's verbal classroom interaction and tests of the hypotheses. and

TABLE IV.I STUDENTS' RESPONSES TO THE UNDESIRABLE BEHAVIOURS OF THEIR CHEMISTRY TEACHERS.

TEACHER	NUMBER OF STUDENTS	NUMBER OF "YES" RESPONSES	SPACE LEFT "BLANK"	% OF YES RESPONSES
01	36	178	362	33
02	40	104	496	17
03	22	26	304	8
04	40	54	546	9
05	39	123	462	21
06	34	184	326	36
07	42	177	453	28
08	37	45	510	8
09	36	113	427	21
10	19	29	256	10
11	38	46	524	8
12	35	74	451	14
13	33	40	455	8
14	28	126	294	30
15	36	86	454	16
16	39	182	403	31
17	39	228	357	39
18	32	72	408	15

(c) Additional data analysis and observations

4.1 ANALYSIS OF TEACHERS' UNDESIRABLE BEHAVIOURS

Each of the 28 chemistry teachers was observed, and students gave their opinions about the teacher's undesirable behaviours. The responses by the students to all the 28 teachers were presented in Table IV.I. The results were given in percentage frequencies of undesirable behaviours (% of yes) and they were overall students' opinions (from all students of the class the teacher taught) per teacher.

TEACHER	NUMBER OF STUDENTS	NUMBER OF "YES" RESPONSES	SPACE LEFT "BLANK"	% OF YES RESPONSES
19	30	59	391	13
20	48	165	555	23
21	48	72	648	10
22	37	84	471	15
23	34	112	398	22
24	43	116	529	18
25	36	76	464	14
26	40	192	408	32
27	41	104	511	17
28	30	45	405	10

The first analysis conducted was on teacher undesirable behaviours and is shown also in table IV.I in percentage frequencies of undesirable behaviours as given by the students. This analysis was done so as to divide the teachers into two groups "Upper" and "Lower" for the purposes of this study. To divide the teachers, they were first arranged in ascending order in accordance with their percentage frequency of undesirable behaviours (% of "yes") The teacher with the smallest percentage frequency of undesirable behaviours was placed first and the one with the largest percentage frequency was placed last. This arrangement is shown in table IV.2. After arranging the teachers in ascending order, they were divided into two equal groups using the median. Since all the teachers were 28 (an even number) the middle measures were 16 and 17, divided by 2 and therefore the median was $\frac{16 + 17}{2} = 16.5$

hence all teachers with percentage frequencies of undesirable behaviours below 16.5 comprised the "upper" group (N = 14) while the ones with percentage frequencies of undesirable behaviours above 16.5 comprised the "lower" group (N = 14). These two groups are shown in table IV.3.

After dividing the teachers into two groups "upper" and "lower" as shown in table IV.3 an analysis to determine whether these two groups were significantly different was conducted. Before this, the significance level was deicided to be 0.01 level. The result of this analysis is shown in table IV.4. From this table it is seen that the two groups are significantly different at 0.01. level.

TABLE IV.2 TEACHERS ARRANGED IN ASCENDING ORDER WITH RESPECT TO THE PERCENTAGE FREQUENCY OF THEIR UNDESIRABLE BEHAVIOURS

TEACHER CODE	PERCENTAGE FREQUENCY OF UNDESIRABLE BEHAVIOURS		TEACHER CODE	PERCENTAGE FREQUENCY OF UNDESIRABLE BEHAVIOURS
03	8		02	17
08	8		27	17
11	8		24	18
13	8		05	21
04	9		09	21
10	10		23	22
21	10		20	23
28	10		07	28
20	13		13	30
12	14		16	31
25	14		26	32
18	15		01	33
22	15		06	36
15	16		17	39

TABLE IV.3 TEACHERS DIVIDED INTO "UPPER" AND "LOWER" GROUPS

UPPER GROUP	% FREQUENCY OF UNDESIRABLE BEHAVIOURS		LOWER GROUP TEACHERS	% FREQUENCY OF UNDESIRABLE BEHAVIOURS (% YES)
03	8		02	17
08	8		27	17
11	8		24	18
13	8		05	21
04	9		09	21
10	10		23	22
21	10		20	23
28	10		07	28
20	13		13	30
12	14		16	31
25	14		26	32
18	15		01	33
22	15		06	36
15	16		17	39
N = 14				N = 14

TABLE IV.4 A COMPARISON OF UNDESIRABLE BEHAVIOUR PERCENTAGE FREQUENCIES OF UPPER AND LOWER GROUPS OF TEACHERS.

GROUP	NUMBER OF CASES	RANGE	MEAN	T.VALUE	DEGREES OF FREEDOM	2 - TAIL PROB(P)
Upper	14	8-16	11.286	7.08	26	*0.001
Lower	14	17-39	26.286			

* Significant at 0.01 level.

After dividing the teachers into two groups Upper and Lower, it was the intention of this study to compare the classroom verbal interaction patterns of these two groups as a measure of the relationship between the classroom interaction and the undesirable behaviours of the teachers. The presentation and analysis of classroom verbal interaction of both groups is done below.

4.2 PRESENTATION AND ANALYSIS OF VERBAL CLASSROOM INTERACTION PATTERNS OF THE TEACHERS AND TESTING OF THE HYPOTHESES:

As it was shown in chapter III, coded classroom interaction data are usually transferred to a 10 x 10 matrix from which they are decoded and interpreted.

After the teachers were divided into two groups, Upper and Lower, the data of their classroom interaction were given in two composite matrices. The data were not given in number of tallies per matrix cells from the overall number of tallies per group, but in percentages.

A composite matrix for the Upper group of teachers is presented in Table IV.5, in like manner Table IV.6 shows the master matrix for the lower sample. The total of each column indicates the average percentage of tallies recorded for the category. Tallies 1 - 1, 2 - 2, 3 - 3, 4 - 4, etc, indicate the number of times a category of behaviour is sustained for a period longer than three seconds. All the other cells indicate transitional behaviour, that is the number of times the verbal discourse changes from one category to another. The tallies in cell 5 - 10, for example indicate the number of times a category 5 was followed by 10.

TABLE IV.5 A COMPOSITE MATRIX OF THE 14 TEACHERS IN THE UPPER GROUP*

CATEGORY	1	2	3	4	5	6
1	0.016	0	0	0.016	0.13	0
2	0	0	0.1	0.2	0.62	0.032
3	0.016	0.016	0.016	0.18	0.42	0
4	0.032	0	0	0.8	1.3	0.51
5	0.2	0.064	0.032	5	61	0.3
6	0	0	0	0.064	0.34	0.13
7	0	0	0	0.16	0.45	0.112
8	0	0.7	0.432	0.4	1.4	0.016
9	0.32	0.3	0.13	0.432	0.8	0
10	0.32	0.05	0	1.53	4.16	0.304
TOTAL	0.616	1.13	0.71	8.732	70.62	1.404

cont.

CATEGORY	7	8	9	10		TOTAL
1	0	0.016	0.4	0.05		0.628
2	0.032	0	0.064	0.064		1.112
3.	0.016	0.032	0.016	0		0.712
4	0.08	1.8	0.53	3.64		8.692
5.	0.2	0.543	0.66	2.4		70.399
6.	0.032	0.56	0.112	0.26		1.498
7	0.18	0.144	0.05	0.13		1.226
8.	0.304	0	0.08	0.13		3.462
9	0.16	0	1.023	0.112		3.277
10	0.2	0.32	0.34	3.8		10.736
TOTAL	1.172	3.415	3.275	10.456		101.742 101.58

*N = 5,876 tallies. All numbers in the matrix represent percentage of N.

TABLE IV.6 A COMPOSITE MATRIX OF THE 14 TEACHERS IN THE LOWER GROUP*.

CATEGORY	1	2	3	4	5	6
1	0.1	0.016	0	0.016	0.05	0
2	0	0	0.06	0.08	0.3	0.016
3	0	0	0	0.11	0.27	0.016
4	0.016	0.016	0.03	1.13	1.44	0.6
5	0.06	0.05	0.016	4.8	54	0.85
6	0.03	0	0	0.36	0.5	0.22
7	0.06	0	0	0.25	0.424	0.27
8.	0.016	0.36	0.28	0.44	1.6	0.11
9	0.11	0.06	0.08	0.41	0.74	0.03
10	0.02	0.016	0.016	2.17	4.74	0.644
TOTAL	0.698	0.412	0.482	9.766	64.064	2.756

cont.

CATEGORY	7	8	9	10	TOTAL
1	0.06	0.016	0.06	0.16	0.478
2	0	0	0.03	0.016	0.502
3	0	0	0.016	0.06	0.472
4	0.16	1.37	0.46	4.3	9.522
5	0.33	0.6	0.6	2.8	64.106
6	0.2	0.83	0.11	0.016	2.226
7	0.22	0.24	0.08	0.424	1.968
8	0.424	0.527	0.3	0.25	4.35
9	0.1	0	1.24	0.08	2.85
10	0.424	0.4	0.22	5	13.83
TOTAL	1.918	3.983	3.116	13.108	100.34 / 100.3

*N = 5,420 tallies. All numbers in the matrix represent percentage of N.

Before actual calculation of patterns of influence or nature of classroom interaction of the two groups of teachers, it was worthwhile considering a picture representing a general outlook of the classroom interaction nature of the two groups of teachers. Fig. I illustrates graphically a general picture represented by histograms of the nature of classroom interaction for the groups. These histograms indicate a general comparison for the teachers in the upper and lower groups, with the ten categories. On plotting the histograms, in cases where the percentage of tallies of similar behaviour was relatively small several categories were combined like 1, 2 and 3.

Looking at the histograms in Fig. I, the following patterns of interactions for the two groups were detected.

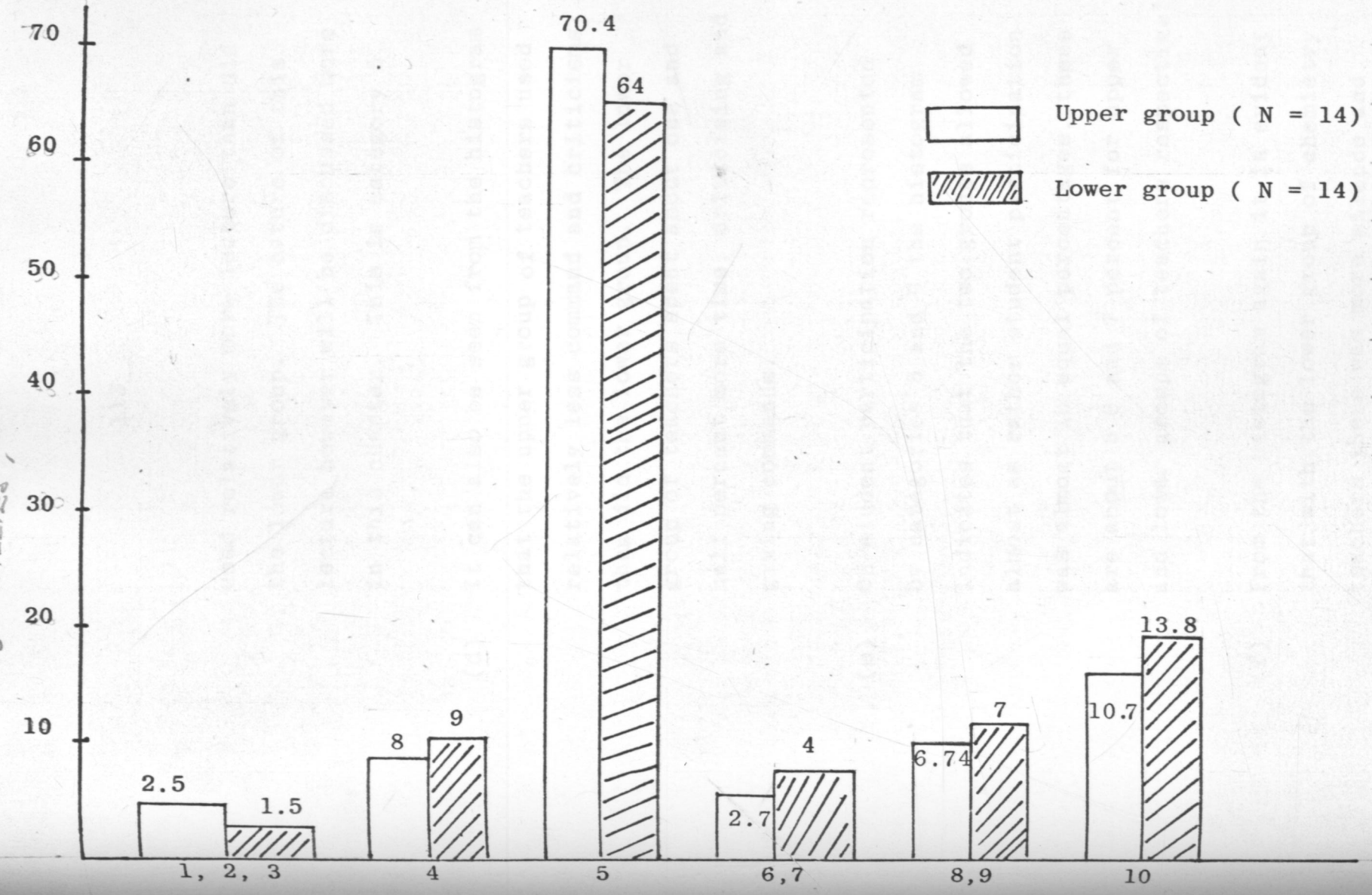
(a) The upper group relatively used categories 1, 2 and 3 more than the lower group;

they spent one percent more time than did the lower group. This means these teachers in the upper group praised their students more, considered students' personal feelings more (like seeing a student unsettled and kindly asking him what the problem is, encouraged students more, and used students' ideas more either by modifying them, clarifying them or rephrasing them.

(b) The upper group relatively used fewer questions than did the lower group. It was however noted that the type of questions used by the lower group were mainly routine questions which included question-answer pattern without any efforts to incooperate the inquiry kind of questions. The upper group asked questions which were usually probing and continued the question with a particular student for a longer time which meant that the students were helped to think more. This is category 4.

(c) The upper group as seen from the histogram

FIG. 1 INFLUENCE PATTERNS OF THE UPPER GROUP AND LOWER GROUP OF CHEMISTRY TEACHERS WITH RESPECT TO THE PERCENTAGE OF TALLIES IN TEN CATEGORIES



used relatively more lecture than did the lower group. The nature of this lecture however will be discussed more in this chapter. This is category 5.

(d) It can also be seen from the histogram that the upper group of teachers used relatively less command and criticisms than did the lower group. The lower group of teachers spent about one and half percent more time, criticising and giving commands.

(e) On student participation represented by categories 8 and 9 the histogram indicates that the two groups allowed almost as rather student participation was almost in equal percentages, these are about 6.9 and 7 percent for upper and lower groups of teachers respectively.

(f) From the histogram again it is evident that with the lower group of chemistry teachers there was more silence and confusion in their classrooms than with the upper group of chemistry teachers,

> thus in the classrooms of the lower group of teachers for example many students were found to talk at the same time which was coded as category 10.

During classroom observations also, there were usually quite a number of activity periods. These included activities like settling down to work, cleaning the blackboard, passing out and collecting materials, etc.., there were also periods of evaluation in which new materials were being introduced, periods in which students and teachers planned activities together and periods in which students worked at their own desks or in groups. By tabulating these different activity periods on matrices, it was possible to see how teacher classroom patterns of interactions varied from one activity to another. In analyzing such matrices it is worthwhile to consider the total tallies in certain areas of the matrix (Hough, 1966 pp. 7 - 8). The tabulated matrix is divided into special areas for interpretation. These areas are shown in Fig. 2. The areas are described as follows:

Areas A, B, C, D were used to find the percentage time the teacher talked, the student talked and the time which was spent in pauses, silence and confusion. In comparision, areas A and B only indicated the percentage of teacher statements called indirect and direct. Indirect influence tends to expand the students' freedom of participation, direct influence tends to restrict this freedom.

Area E is a block of nine cells that indicated the continued use of acceptance and praise and transition among these categories while the teacher talked. The cell 3-3 in this block for example indicated extended acceptance and clarification of students' ideas.

Area F is a block of 4 cells that indicated the continued use of directions, criticism and transition between these two categories. The two transition cells are particularly reliable indicators of discipline problem. Shifting from directions to criticism was tallied in the 6 - 7 cell and indicated that expected compliance was judged unsatisfactorily by the teacher. Shifting from criticism back to directions the cell 7 - 6 indicated a return to more direction after criticism.

Areas G_1 and G_2 were particularly interesting because they isolated the immediate response of the teacher at the moment students stopped talking. One aspect of teacher flexibility can be discovered by comparing the balance of indirect and direct statements shown in G_1 and G_2 with those found in areas A and B. The differences between superficial, short, perfunctory praise or clarification, and praise or clarification that is more carefully developed was easily seen by comparing the tallies in G_1 with those in E, particularly the 2- 2 and 3-3 cells.

Area H indicated the type of teacher statements that triggered student participation. As one might expect there is usually a heavy loading of tallies in the 4 - 8 cell. High frequencies in the cell and the 8 - 4 cell, but not in the cell 8 - 8 which often indicated rapid drill.

Area I indicated sustained student participation. This included lengthy statements by the students or student - to - student communication..

The 'steady state' cells fall on the diagonal from cells (1-1) to(10-10). Tallies here indicated that the speaker (teacher) persisted in a particular communication category for longer than three seconds. All the other cells were transition cells, moving from one category to another.

These areas also gave a picture of the nature of classroom interaction patterns of the two groups of chemistry teachers. To gain this picture a comparison of the percentage of tallies was done for areas A to I and the results are shown in Table IV.7.

In this table it is seen that unlike the picture already indicated from the histograms in Fig. I, the lower group of the chemistry teachers used more indirect talk than did the upper group; 11.19% of indirect talk for upper group and 11.34% of indirect talk for lower group. It should however be noted that this difference is small and as seen from the histogram it might have arisen because of the lower group's use of more routine questions classified as category 4. Due to the use of more time lecturing (thus category 5) the upper group therefore is seen to have relatively used more direct talk (Area B) than did the teachers in the lower group. Student

FIG. 2: AREAS OF MATRIX ALLOWANCES

CATEGORY	CLASSIFICATION		CATEGORY	1	2	3	4	5	6	7	8	9	10	TOTAL
ACCEPTS FEELINGS	INDIRECT INFLUENCE	TEACHER TALK	1	AREA E							AREA			
PRAISE			2											
STUDENT IDEA			3											
ASK QUESTIONS			4	"CONTENT CROSS AREA"										
LECTURES	DIRECT INFLUENCE		5						AREA F					
GIVES DIRECTIONS			6											
CRITICISM			7											
STUDENT RESPONSE	STUDENT TALK		8	AREA G_1					AREA G_2		AREA 1			
STUDENT INITIATION			9											
SILENCE			10	AREA A										
				AREA A				AREA B			AREA C		AREA D	
				INDIRECT TEACHER TALK				DIRECT TEACHER TALK			STUDENT TALK		SIL.	

TABLE IV. 7

PERCENTAGE OF TALLIES IN AREAS (A-1) FOR UPPER AND LOWER GROUPS OF TEACHERS.

AREA		UPPER GROUP	LOWER GROUP
A	Indirect teacher talk	11.188	11.358
B	Direct teacher talk	73.196	68.738
C	Student talk	6.69	7.099
D	Silence	10.456	13.108
E	Continued use of praise and acceptance	0.164	0.176
F	Continued use of directions and criticism	0.454	0.91
G_1	Student talk following	2.714	1.756
G_2	Teacher talk	2.68	3.004
H	Teacher talk following student talk (i.e. teacher statements that trigger students' participation)	4.927	4.412
I	Sustained students' participation.	1.103	2.067

participation is however seen to have been almost the same in the classrooms of the two groups as also indicated by the histogram in Fig. I, thus approximately both groups allowed seven percent of total classroom time for student participation.

The histogram did not give a picture of such classroom behaviours as student talk following teacher talk. In table IV.7, however this is indicated and it can be seen that there was more student talk following teacher talk in the classrooms of the upper group of chemistry teachers than in the classrooms of lower group of chemistry teachers. This may be interpreted to mean that teachers in the upper group allowed students to talk more frequently after they talked. With statements that triggered student participation the teachers in the upper group were found to use such statements relately more than did teachers in the lower group (4.93% Vs 4.4%). Thus as explained earlier teachers in the upper group tended to use statements that called for student participation more often than the teachers in the lower group.

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The kind of comparison made from areas A to I as shown in table IV.7 tends to give the picture of the classroom interaction in a very broad sense than otherwise looking at single categories or some classroom interaction ratios.

To investigate the detailed classroom interaction patterns of the two groups of chemistry teachers, it was therefore considered whorthwhile doing some specific classroom interaction analysis as suggested by Flanders (1970). Tables IV.8 and IV.9 therefore provide all the classroom interaction ratios for the Upper and Lower groups of the teachers respectively.. These ratios and percentages were calculated using the matrices for all the individual teachers in each group. The way these calculations were done is explained later in this chapter. As shown in these two tables the first three columns are percentages while the rest are ratios, all of classroom interaction patterns as decoded from each individual teacher's classroom interaction matrix. A sample of one teacher's classroom interaction matrix is provided in the Appendix F.

TABLE IV.8

CLASSROOM INTERACTION PATTERNS OF THE UPPER GROUP IN RATIOS AND PERCENTAGES

TEACHER CODE	% OF T. T.	% P. T.	% OF S. C.	T. R R.	T. Q. R
03	89	5	6	50	11
08	83	6	11	64	4
11	77	12	11	94	24
13	85	13	12	75	8
04	76	50	19	87	14
10	83	11	6	12	17
21	83	6	11	89	37
28	88	8	4	42	40
20	89	5	6	61	61
12	77	5	18	11	62
25	82	7	11	88	67
18	68	12	20	29	18
22	91	2	7	45	8
15	86	6	8	37	14
N=14	A	B	C	D	E
MEAN	82.6	7	10.7	56	27.7

Cont.

TEACHER CODE	P I T	TRR_{89}*	TQR_{89}*	I/D	i/d
03	16	74	20	0.2	1
08	54	88	21	0.06	1.8
11	25	99	12	0.3	16
13	100	90	50	0.1	3
04	54	95	0	0.2	6.5
10	42	63	14	0.2	0.15
21	7	69	38	0.1	0.6
28	11	42	98	0.2	9
20	73	80	43	0.1	1.6
10	10	76	40	0.2	1.7
25	8	99	31	0.1	2
18	26	59	33	0.3	0.4
22	54	66	100	0.1	0.8
15	73	76	29	0.2	0.6
N =14	F	G	H	I	J
MEAN	39.5	76.9	37.8	0.169	3.225

$^{*}_{89}$ is a number to differentiate (D) TRR, (E) and TQR with G and H.

TABLE IV.9

CLASSROOM INTERACTION PATTERNS OF THE LOWER GROUP IN RATIOS AND PERCENTAGES

TEACHER CODE	% OF T. T.	% OF P. T.	% OF S. C.	T R R	T Q R
02	77	9	14	7	11
27	71	4	26	32	21
24	90	3	7	29	7
05	83	2	20	20	26
09	84	4	12	5	8
23	63	5	32	28	28
20	79	4	17	71	10
07	90	4	6	0	3
13	84	6	10	48	14
16	74	22	4	21	22
26	81	10	9	13	16
01	73	18	9	58	11
06	81	2	17	19	10
07	86	5	9	24	10
N = 14	A	B	C	D	E
MEAN	79.7	7.0	13.7	26.9	14

cont.

TEACHER CODE	P I R	T R R_{89}	T Q R_{89}	I/ D	i/d
02	71	54	21	0.12	0.08
27	40	45	13	0.3	0.5
24	43	61	0	0.08	0.4
05	36	48	0	0.3	0.25
09	21	51	31	0.08	0.05
23	59	51	30	0.4	0.4
20	45	93	50	0.12	2.5
07	95	100	33	0.02	0
13	29	73	43	0.2	0.9
16	30	70	48	0.3	0.3
26	15	61	3	0.2	0.15
01	72	88	20	0.2	1.4
06	38	55	50	0.1	0.15
07	5	67	33	0.12	0.3
N = 14	F	G	H	I	J
MEAN	42.8	65.5	26.8	0.18	0.53

The results shown in tables IV.8 and IV.9 will therefore be used for all the remaining analyses. Below is an explanation of how the ratios and percentages were calculated.

(a) Percentage of teacher talk (% T.T): This is the percentage of classroom time in which the teacher was coded as talking. It was calculated by taking the sum of tallies in categories 1 to 7 dividing by the total number of tallies in the whole matrix and multiplying by 100.

(b) Percentage of pupil talk (% P.T): This is the percentage of classroom time in which the students were coded as talking (responding or initiating). It is the sum of tallies in categories 8 and 9 divided by total number of tallies in categories 1 to 10 multiplied by 100.

(c) Percentage of silence or confusion (% S.C.): This is the percentage of classroom time which was coded as pauses, confusion (like when two students were talking at the same time) and when

the teacher asked questions with no replies. It was calculated by dividing all tallies in category 10 by total number of tallies in categories 1 to 10 and multiplying by 100.

The results from calculations of these three classroom percentages are shown in table IV.10. There was no use of finding whether there was any significant difference between these two groups with respect to these percentages because teacher talk, pupil talk and silence or confusion do not tell us much about classroom interaction hence these are used to gain a general picture of classroom interaction patterns and table IV.10 indicates that the upper group of teachers talked more than the lower group (82.6% of T.T. Vs 79.7% of T.T.), pupil talk was the same in the classroom of the two groups (7% P.T. Vs 7% P.T.) but in the classrooms of the lower group of chemistry teachers, there was more silence and confusion (13.7%) as compared to the silence and confusion in the classrooms of the upper group of chemistry teachers (10.7%). This information does not however tell us much about the nature of classroom interaction patterns of the two groups of chemistry teachers.

The knowledge of how much the teacher talked or pupil talked however becomes more useful when combined with some index of quality. Simple ratios can be calculated which provide this quality in terms of teacher initiation, teacher response and student initiation. These ratios have the advantage of being able to give a detailed information of the nature of any classroom interaction and are stable enough to be used with very small numbers of tallies, (e.g. 300 tallies) and yet provide the nature of the classroom interaction. (Flander 1970 p. 102). These are the ratios used to test some of the formulated hypotheses. The ratios are:

(i) The teacher response ration (TRR): which is defined as an index which corresponds to the teachers' tendency to react to the ideas and feelings of the students. The TRR is calculated by adding category frequencies 1 + 2 + 3 and dividing by sum of frequency categories 1 + 2 + 3 + 6 + 7 then multiplying by 100.

TABLE IV.10: A COMPARISON OF UPPER AND LOWER GROUPS OF CHEMISTRY TEACHERS WITH RESPECT TO THE PERCENTAGE OF TEACHER TALK, PUPIL TALK AND SLENCE OR CONFUSION

	UPPER GROUP	LOWER GROUP
% of T.T.	82.6	79.7
% of P. T.	7	7
% of S. C.	10.7	13.7

(ii) Teacher question ratio (TQR): defined as an index representing the tendency of a teacher to use questions when guiding the more content oriented part of the class discussion. The TQR is the percentage of all categories 4 and 5 which are classified in category 4. It is calculated by multiplying the category 4 frequency by 100 and dividing by the sum of the categories 4 and 5 (4/4+5 100).

*Note: When the divisions are given as 4/4+5 it does not mean dividing four and four plus five but it means dividing tallies in category 4 with sum of tallies in categories 4 and 5.

(iii) A pupil initiation ratio (PIR): is the proportion of pupil talk judged by the observer to be an act of initiation. PIR is calculated by multiplying the frequency in category 9 by 100 and dividing by the sum of all pupil talk (9/8+9)100).

4.2.1 Reasearch Questions and Null Hypotheses

Are there any differences between the "upper and "lower" groups of chemistry teachers with respect to their responses, initiations and their students' initiation during their classroom interactions?

Hypothesis A - 1: There were no significant differences between the upper and lower groups of chemistry teachers with respect to teacher response ratio (TRR).

Table IV.11 presents the results of analysis of t tests. The t was significant ($t = 3.18$ $P < 0.01$). There were therefore significant differences between the upper and lower groups of the chemistry teachers with respect to the teacher response ratio (TRR). The hypothesis A - 1 was rejected at the 0.05 level of significance.

Hypothesis A - 2: There were no significant differences between the upper and lower groups of chemistry teachers with respect to teacher question ratio (TQR).

Table IV.11 displays the results of analysis using t test. The t was significant (t = 2.32 $P < 0.01$) indicating significant differences between upper and lower groups of chemistry teachers with respect to teacher question ratio (TQR). In view of these data, the hypothesis was rejected at the 0.05 level.

Hypothesis A - 3: There were no significant differences between the upper and lower groups of chemistry teachers with respect to pupil initiation ratio (PIR).

Table IV.II: displays the results of the analysis using t - test. The t was not significant (t = 0.326) indicating no significant differences between upper and lower groups of chemistry teachers with respect to pupil initiation ratio (PIR). In view of these data the hypothesis was not rejected at the 0.05 level.

It was also the intention of this study to investigate how a teacher reacts when pupils stop talking. The following ratios are used to investigate this.

TABLE IV . 11

A COMPARISON OF CLASSROOM INTERACTION PATTERNS OF UPPER AND LOWER GROUPS OF TEACHERS WITH RESPECT TO TEACHER'S RESPONSE, INITIATION AND STUDENTS' INITIATION.

VARIABLE	GROUP AND SUBJECTS	RANGE	MEAN
T.R.R.	Upper 14 Lower 14	11 - 94 0 - 71	56 26.786
T. Q.R.	Upper 14 Lower 14	4 - 90 7 - 28	31 14
P. I. R.	Upper 14 Lower 14	7 - 100 5 - 95	39.5 42.8

cont.

VARIABLE	T - VALUE	DEGREES OF FREEDOM	TWO-TAIL TEST OF SIGNIFICANCE
T.R.R.	3.18	26	0.01
T. Q. R.	2.32	26	0.05
P. I. R.	0.326	26	-

Instantaneous teacher response ratio (TRR_{89}): Which is the tendency of the teacher to praise or integrate students' ideas and feelings into the class discussion, at the moment the pupils stop talking. The TRR_{89} can be calculated by adding the cell frequencies in rows 8 and 9, columns 1, 2 and 3 and multiplying this sum by 100, and dividing the product by the total tallies in the cells of rows 8 and 9, columns 1, 2, 3, 6 and 7.

Instantaneous teacher question ratio (TQR_{89}): is the tendency of the teacher to respond to pupil talk with a question based on his own ideas, compared to his tendency to lecture. The TQR_{89} is calculated by adding the frequencies in cells (8 - 4) + (9 - 4), multiplying by 100, and dividing by total tallies in the four cells (8 - 4) + (8 - 5) + (9-4) + (9+5).

RQB: Are there any differences between the upper and lower groups of chemistry teachers with respect to the way they react when students stop talking?

Hypothesis B - 1: There were no significant differences between the upper and lower groups of chemistry teachers with respect to instantaneous teacher response ratio (TRR_{89}). In view of these data, the hypothesis was not rejected at 0.05 level of significance. (shown in table IV.12 $t = 1.8$)

Hypothesis B - 2: There were no significant differences between upper and lower groups of chemistry teachers with respect to instantaneous teacher question ratio (TQR_{89}).

Table IV.12 gives the results of analysis using t - test. The t was not significant (t = 1.03) indicating no significant differences between upper and lower groups of chemistry teachers with respect to instantaneous teacher question ratio (TQR_{89}). In view of these data, the hypothesis was not rejected at the 0.05 level of significance.

RQ_c: Are there any differences between the upper and lower groups of chemistry teachers with respect to the way they influenced the classroom interaction?

TABLE IV.12

A COMPARISON OF CLASSROOM INTERACTION PATTERNS OF UPPER AND LOWER GROUPS OF TEACHERS WITH RESPECT TO THEIR REACTION WHEN STUDENTS STOPPED TALKING AND GENERAL INFLUENCE PATTERNS

VARIABLE	GROUP AND SUBJECTS	RANGE	MEAN
TRR_{89}	Upper = 14	42 - 99	76.9
	Lower = 14	45 - 100	65.5
TQR_{89}	Upper = 14	0 - 100	37.8
	Lower = 14	0 - 50	28.2
I/D	Upper = 14	0.06-0.3	0.17
	Lower = 14	0.02-0.4	0.18
i/d	Upper = 14	0.15-16	3.225
	Lower = 14	0 - 2.5	0.527

cont.

VARIABLE	T - VALUE	DEGREES OF FREEDOM	TWO-TAIL TEST OF SIGNIFICANCE
TRR_{89}	1.8	26	0.1
TOR_{89}	1.03	26	-
I/D	0.292	26	-
i/d	2.25	26	0.05

Hypothesis C - 1: There were no significant differences between the upper and the lower groups of chemistry teachers with respect to indirect-direct ratio (I/D ratio).

Table IV.12 displays the results of analysis of t-test. The t was not significant (t = 0.292) indicating no significant differences between upper and lower groups of chemistry teachers with respect to indirect-direct ratio (I/D). In view of these data, therefore the hypothesis was not rejected at 0.05 level of significance.

Hypothesis C - 2: There were no significant differences between the upper and the lower groups of chemistry teachers with respect to revised indirect-direct ratio (i/d).

Table IV.12 again displays the results of analysis of t-test. The t was significant ($t = 2.25$ $P < 0.05$) indicating that there were significant differences between upper and lower groups of chemistry teachers with respect to revised indirect-direct ratio (i/d). So the hypothesis was rejected at the 0.05 level of significance.

and Hypothesis (C - 3). There were no significant differences between the upper and lower groups of chemistry teachers with respect to percentage of classroom time spent in each of the 10 categories of the classroom interaction.

Table IV.13 displays the results of analysis of t-test for each category. t was not significant for all the categories (Category 1t = 0.475, category 2t = 0.944, category 3t = 0.49, category 4t = 0.151, category 5t = 0.08, category 6t = 0.707, category 7t = -1.085, category 8t = 0.456, category 9t = 0.259 and category 10t = 0.298), indicating that there were no significant differences between the upper and lower groups of chemistry teachers with respect to the percentage of classroom time in each of the 10 categories of the classroom interaction.

4.3 ADDITIONAL DATA ANALYSIS AND OBSERVATIONS

A more detailed analysis of the results is made by considering the percentage of tallies in individual cells and groups of cells.

TABLE IV.13

A COMPARISON OF THE UPPER AND LOWER GROUPS ON THE PERCENTAGE OF TALLIES IN EACH OF THE 10 CATEGORIES.

CATEGORY	SAMPLE	NUMBER OF SUBJECTS	RANGE	MEAN
1	Upper	14	0 - 0.4	0.0628
	Lower	14	0 - 0.16	0.0478
2	Upper	14	0 - 0.62	0.1112
	Lower	14	0 - 0.3	0.0502
3	Upper	14	0 - 0.42	0.0712
	Lower	14	0 - 0.27	0.0472
4.	Upper	14	0 - 3.64	0.8692
	Lower	14	0.016-4.3	0.9522
5.	Upper	14	0.032-61	7.04
	Lower	14	0.016-54	6.4
6	Upper	14	0 - 0.56	0.1498
	Lower	14	0 - 0.83	0.2226
7	Upper	14	0 - 0.45	0.1266
	Lower	14	0 - 0.424	0.1968
8	Upper	14	0 - 1.4	0.3462
	Lower	14	0.016 - 1.6	0.435
9	Upper	14	0 - 1.023	0.328
	Lower	14	0 - 1.24	0.285
10	Upper	14	0 - 4.16	1.074
	Lower	14	0.016 - 5	1.3108

cont.

CATEGORY	T - VALUE	df	TWO-TAIL (P)
1	0.45	18	-
2	0.944	18	-
3	0.49	18	-
4	-0.51	18	-
5	0.08	18	-
6	-0.707	18	-
7	-1.085	18	-
8	-0.456	18	-
9	0.259	18	-
10	0.298	18	-

In this case it is essential to refer to the composite matrices in tables IV.5 and IV.6 for these observations.

Category I: (acceptance, clarification and recognition of students' emotional state) is shown in the first column and row of both matrices. Of all the 10 categories used, this category was among the ones least used, the others are categories 2 and 3. The teachers in the upper group used this category (1) equally as did the lower group (Tables IV.5 and IV.6).

Category 2: (teacher praise and reward) is shown in the second column and row of both matrices. This category was used more than twice by the upper group of chemistry teachers than by lower group of chemistry teachers (Tables IV.5 and IV.6).

Category 3: (clarifying and making use of students' ideas) is shown in third column and row of both matrices. This category was used about one and half times more by the upper group than the lower group of chemistry teachers.

The percentage frequency for the upper group of chemistry teachers for example in cell (3-3) was 0.016 (Table IV.5) while for the lower group it was 0 (table IV.6), this is an indication of a more lengthy development of students' ideas by the former. Cells 5-3 and 3-5 (from answering students' question to using students' ideas and vice versa) also shows high percentage frequencies (0.032 - 0.016, and 0.42-0.27) in favour of the upper group of chemistry teachers. This suggests that this group used students' ideas to answer their questions more often than did the chemistry teachers in the lower group.

Category 4: (teachers' questions) was used almost as frequently by one group as by the other (8.8 to 9.7) table IV.5 and IV.6.

Category 5: (lecturing) appeared in nearly equal percentages for both upper and lower groups of chemistry teachers (70.6 and 64.) ratio 1:0.9. A more detailed look at the distribution of tallies in row 5 and column 5 however showed a marked difference in cell (5-6) from lecture to requests and commands. The lower group of chemistry teachers spent about four times, time from lecture to requests and

commands as much as the upper group of chemistry teachers did (0.85 Vs 0.3). This suggests that more frequent directions and commands were used by the lower group of chemistry teachers.

Category 6 and 7: (directions, commands and criticism); were used about twice (4.8 Vs 2.6) as often by the lower group as by the upper group of chemistry teachers.

Category 8 and 9: (students' responses and initiatitions) were present in both the classes of the upper and the lower groups of chemistry teachers in nearly equal proportions (6.7 Vs 7) and

Category 10 (silence or confusion) was found to be more in classes of the lower group of chemistry teachers as compared to the classes of the upper group (13 Vs 11).

4.4 CONCLUSION

The intention of this chapter was to analyse the data collected so as to investigate the relationship between the classroom interaction of Kenya secondary school chemistry teachers and their undesirable behaviours.

The hypotheses set which have guided the study throughout have been tested and the results have been shown and observations made. Conclusions, implications and recommendations which can be made from this study are however included in the next chapter of this thesis.

Chapter V

CONCLUSIONS , IMPLICATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this chapter, the hypotheses cited for the research have been examined one by one with respect to the data obtained so as to see if the latter supports the defined hypotheses or not. Subsequently, conclusions have been drawn.

Further, an overview of the entire research project is made following which, implications and suggestions are made.

5.2 HYPOTHESES:

For each of the hypotheses a statement has been made describing what a particular hypothesis holds. Subsequently in view of the results obtained, the action taken against each hypothesis has been stated.

5.2.1. Hypothesis A - I: This hypothesis maintains that there is no significant difference in teacher response ratio (TRR) between the chemistry teachers

from upper group, (i.e. those teachers who are seen by their students to have less undesirable behaviours) and those from lower group, (i.e. those teachers who are seen by their students to have more undesirable behaviours).

This hypothesis was rejected on the basis of the results obtained (see table IV.II) at $P < 0.01$. This means that teachers from upper group and those from lower group differed significantly in the way they responded and initiated their classroom interaction, also it means that in the classrooms of the upper and lower groups, student initiation also differed significantly. This was a positive difference.

5.2.2. Hypothesis A - 2: This hypothesis maintains that there is no significant difference in teacher question ratio (TQR) between the chemistry teachers from upper group, (i.e. those teachers who are seen by their students to have less undesirable behaviours) and those from lower group, (i.e. those teachers who are seen by their students to have more undesirable behaviours).

This hypothesis was rejected on the basis of the results obtained (see table IV.11) at $P<0.05$. This means that teachers from upper and lower groups differed significantly with their tendency to use questions when guiding the more content oriented part of classroom discussion.

5.2.3. Hypothesis A - 3: According to this hypothesis, there was no significant difference between the upper and lower groups of chemistry teachers with respect to pupil initiation ratio (PIR) in their classrooms.

This hypothesis was not rejected on the basis of results obtained (see table IV.11) at $P<0.05$.

This means that in the classrooms of both upper and lower groups of chemistry teachers pupil initation was not significantly different.

5.2.4. Hypothesis B - 1: According to this hypothesis there was no significant difference between the upper and lower groups of chemistry teachers with respect to instantaneous teacher response ratio (TRR_{89}).

This hypothesis was not rejected on the basis of the results obtained (see table IV.12) at ($P<0.05$). Thus the way teachers reacted when the students stopped talking in both the classes of upper and lower groups of chemistry teachers was not significantly different.

5.2.5. Hypothesis B - 2: According to this hypothesis there was no significant difference between the upper and lower groups of chemistry teachers with respect to instantaneous teacher question ratio (TQR89).

This hypothesis was also not rejected at ($P<0.05$). Thus the way the teacher responded to pupil talk with a question or questions based on the students' ideas as compared to their tendency to lecture was not significantly different from the classrooms of the two groups of chemistry teachers.

5.2.6. Hypothesis C - 1: This hypothesis maintained that there was no significant difference between the upper and the lower groups of chemistry teachers with respect to indirect-direct ratio (I/D ratio).

This hypothesis was not rejected at ($P<0.05$) which means that indirect to direct influence ratios in classes of both upper and lower groups of chemistry teachers were not significantly different; a finding which was also found by Pankratz (1967)[1] in his study of "verbal interaction patterns in classrooms of selected physics teachers."

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[1]Pankratz, R. "Verbal interaction patterns in the classrooms of selected chemistry teachers." A paper prepared for the book 'interaction analysis; theory, research and application' by Amidon and Hough Addison-Wesley, Reading, London, Ontario, 1967, pp. 189 - 209.

5.2.7 Hypothesis C - 2: According to this hypothesis there was no significant difference between the upper and lower groups of chemistry teachers with respect to pure indirect - direct ratio (i/d).

This hypothesis was rejected at (0.05 level); which means that pure indirect-direct ratio influences ratios in the classes of both upper and lower groups of chemistry teachers were significantly different which was again a finding in Pankratz (1967)[2] study.

5.2.8. Hypothesis D (7): Stated that there were no significant differences between the upper and the lower groups of chemistry teachers with respect to percentage of classroom time spent in each of the ten categories of the classroom interaction.

This hypothesis was not rejected at 0.05 significant level for all the categories and therefore the classroom time spent for each of the ten categories was not significantly different for both upper and lower groups of chemistry teachers.

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[2]Pankratz, Op. Cit., pp. 189 - 209.

5.3 CONCLUSIONS FROM THE HYPOTHESES

The verbal classroom interaction of two groups of chemistry teachers were investigated. One group had many undesirable behaviours as indicated by their students (Lower group). The other group had few undesirable behaviours as indicated by their students (Upper group). The Flanders system of interaction analysis was used to measure the verbal classroom interaction of the two groups of teachers through direct observation.

The following conclusions are drawn from the analyzed data in this investigation:

(i) The teacher's use of certain categories of verbal behaviour during classroom interaction was significantly different for the two groups of chemistry teachers at 0.05 level. Teachers in the upper group tended to react to students' feelings and ideas more positively than did the teachers in the lower group. The teachers in the Upper group used more praise, reward, students' ideas and acceptance than the teachers in lower group.

The teachers in the upper group also significantly used fewer commands and directives than teachers in the lower group; they also used less criticisms and rejection. Their classes experienced less confusion and irrelevant behaviour.

(ii) The teachers in the upper group used questions significantly (0.05 level) more when guiding the content oriented part of the classroom discussion.

(iii) Indirect influence (constructive reaction to students' feelings, praise and reward and use of students' ideas) as compared to direct influence (directions, commands and criticisms) was employed by the upper group of chemistry teachers more often (0.05 level) and in a more sustained manner than by the lower group of chemistry teachers. This comparison known as the i/d ratio, was more than six (6) times higher for upper group than for lower group of chemistry teachers.

(iv) Although questions occurred about frequently in classrooms of both groups there was evidence that the two groups of teachers asked different kinds of questions and stated them in different forms.

(v) Each of the two groups of chemistry teachers in the present study used approximately more than half (70.4% and 64%) of their time giving instruction via lecture.

From the above results or conclusions it is therefore clear that the two groups of chemistry teachers do differ in several aspects as indicated above. From the differences it was however noted that the lower group of chemistry teachers had poorer ways of classroom instruction than the upper group of chemistry (as measured by Flanders system of interaction analysis). This therefore implies that according to this study there is a direct relationship between the way the Kenyan chemistry teachers give their instructions and their undesirable behaviours as seen by their students. The poorer teachers in instruction (measured by Flanders system of interaction analysis) were also found to be having many undesirable behaviours as given by their students.

One inference which therefore can be made from the present study is that students should not be let in class as pieces of furniture but human beings who though biased can make observations of wrong things the teachers do; such wrong things like undesirable behaviours may be directed towards some students and may as reviewed earlier affect performance of the students. It is therefore felt in the present study that students' perception of their teachers' behaviours should be taken as one way of correcting teachers' behaviours.

From the above stated conclusions and observations some recommendations and implications have been made.

5.4 IMPLICATIONS OF THE STUDY

Within the limitations of this study, and on the basis of the conclusions that have been made from the results, several implications are suggested.

(a) The education systems of developing countries like Kenya are characterized by rapid changes in structure and content. The results of the present study can serve as a guideline in planning for future changes

in structure, content, and ways of teaching chemistry and science in secondary schools. The present study has discovered that the individual student is important to the teacher than a group of students. The educators in Kenya should therefore think of ways and means of having the teachers teach their students without any biases.

(b) In the present study the poorly evaluated teachers by their students differed significantly from those evaluated relatively better by their students. The poorly evaluated teachers used relatively less praises, rewards and students' ideas than did the better evaluated teachers. The poorly evaluated teachers also used more commands and criticisms than did the better evaluated teachers. It therefore appears necessary and helpful to consider students' perceptions of their teachers' behaviours as one of the measures of effective teaching.

(c) The data from the present study, especially the opinions from the students can help teachers and teacher trainers to mutually define and discuss specific classroom interaction patterns displayed. Such student perceptions of teacher behaviours can help in suggesting the necessary successive approximations needed to achieve the desired classroom interactions.

(d) The results from this study suggest that teachers must first try to perceive their classroom behaviours and interactions accurately and comprehensively before they can achieve their ideal or desired classroom behaviours.

5.5 RECOMMENDATIONS

Based on an objective evaluation and subjective undestanding of this study, the following recommendations are made for future research:

(a) Students' responses to inventories, scales and questionnaires such as the teachers'

undesirable behaviours have been used as a measure of their perception of the teacher effectiveness. Some investigators have advocated their usefulness in research; while others are questionable to some extent. Research studies in Kenya should examine the student responses to such measures and determine whether they are realistic manifestations of feelings with a strong bias or not.

(b) A replication of this study should be done using a larger random sample of chemistry teachers. This sample should also cover all secondary school chemistry teachers including those teaching in private and 'Harambee' schools. The teachers should include trained and untrained teachers, male and female teachers, etc.. Inclusion of such a variable would investigate which variable strongly influences the nature of teacher's classroom interaction.

(c) Research studies on teaching of chemistry in Kenya should provide for analysis of the aptitude of the learner, classroom interaction of the teacher, classroom climate, classroom environment and their interaction with instruction. This can be accomplished if instruments such as chemistry or science aptitude scales and instructional strategy indicators are developed. Such research would have several advantages. It would allow for determination of the relative effects of the factors like teacher behaviour, classroom environment, teacher qualification, etc.. on teaching (instruction)

5.6 SUMMARY OF THESIS

The study was set out to investigate and analyse the classroom interaction of Kenyan secondary school teachers and their undesirable behaviours. The major issue which was thought by the investigator was that teachers do bias their classroom interaction by the way they interact in the classroom. This bias affects students' perception of the teachers and students' learning.

It should however be noted that no other research had investigated the relationship between this bias and students' perception of teacher behaviours especially undesirable behaviours. This was clearly demonstrated in the literature review. This is why it was felt that there was need for such a study.

The subjects for this study were stratified secondary school chemistry teachers. This in itself excluded some extraneous variables which would have otherwise influenced the study. Since this was an observational study of the right instrument for the observing classroom teaching was chosen and data collected. The teachers were grouped into two groups upper and lower according to the number of undesirable behaviours they had according to their students.

After the collected data were analysed it was discovered that there was a relationship between the way a teacher gives instructions (teaches) and his undesirable behaviour as given by the students. Using the Flanders technique for observing the classroom teaching, teachers found to have poor classroom

teaching were also found to have many undesirable behaviours.

In conclusion it is therefore observed that those teachers who establish a good working relationship with most of their individual students and consider their students as human beings are usually effective teachers. Effective teachers here refers to the fact that students learn more in their classrooms. All the teachers should therefore strive to achieve such a goal (establishing a good working relationship with their students).

APPENDIX A

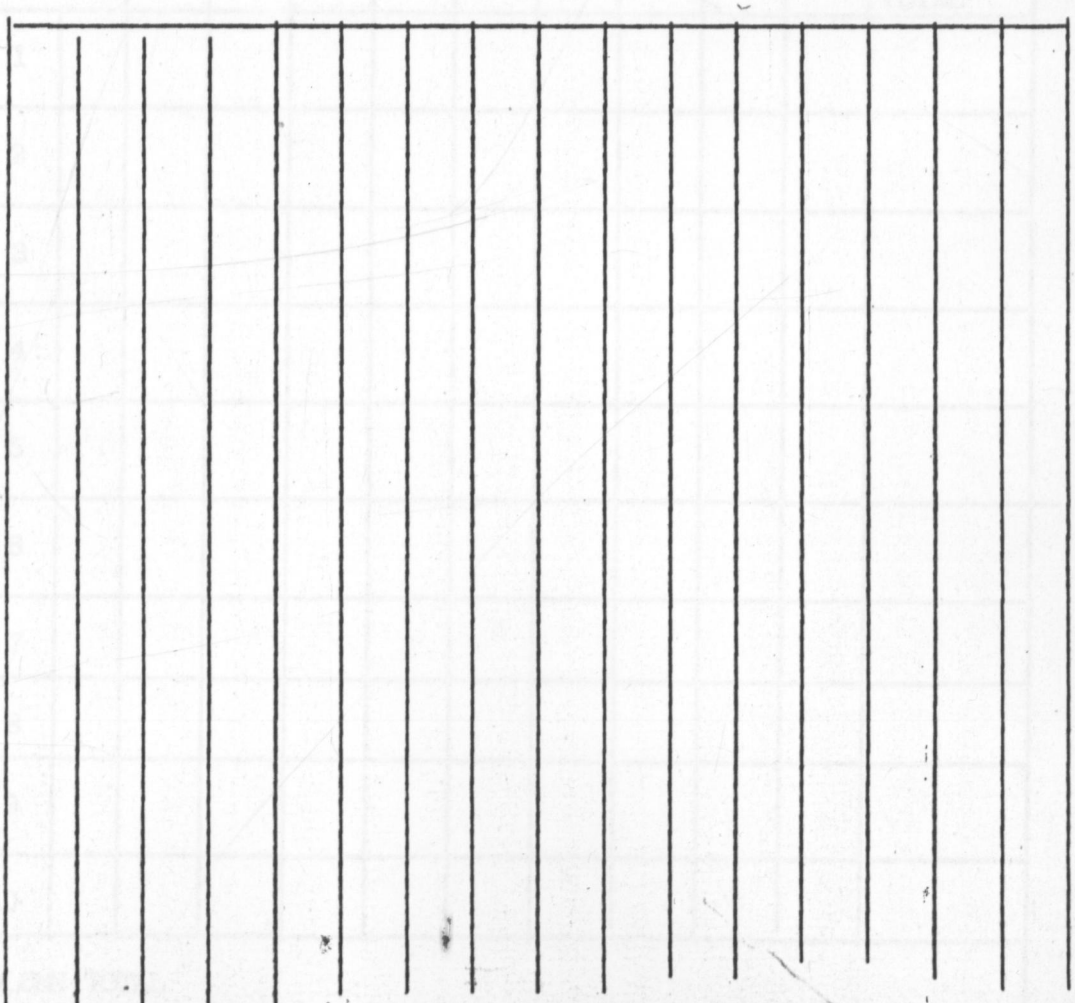
Classroom interaction coding sheet No ------ Date -------

(i) Name of the school _____

(ii) Name of the teacher _____

(iii) Name of the class _____

(iv) Time coding was started _____ Time ended _____



APPENDIX B

Name of the School _____

Name of the teacher _____

Name of class _____

Time taken in class _____

Time of the day _____

	1	2	3	4	5	6	7	8	9	10	ROW TOTAL
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
COLUMN TOTAL											

APPENDIX C

(The teacher undesirable behaviour opinion questionnaire)

Name of the school _____

The objective of this questionnaire is to point out to the individual teachers, those behaviours that need improvement in the opinion of the students. In order for the questionnaire to fulfil the objective, your opinion must be sincere and honest. Please cross (X) the space provided if your teacher possesses the behaviour stated in your opinion. If not leave the space blank ( )

Name of the teacher . _____

1. Scolds students alot _____
2. Usually cross _____
3. Often bossy _____
4. Scolds a student in front of others _____
5. Always "fussing at" students _____
6. Talks too much _____
7. Difficult to approach with problems _____
8. Difficult to please _____
9. Easily annoyed or bothered _____

10 Does not see things as students do _____

11 Does not participate in students games _____

12 Uninterested in students activities _____

13 Assigns "lots" of home work _____

14 Punishes the whole class for one or two offenders _____

15 Uses detention during recess or after school _____

APPENDIX D.1

(A sample of coded classroom interaction of a teacher's (Code No. 24) classroom interaction.

(i) Name of the School Masinga Boys

(ii) Name of the Teacher Mr. Itute George

(iii) Name of the class Form 2B.

(iv) Time coding was started 9.30 a.m. time ended 10.

LESSON I

10	7	5	5	5	3	10	5
5	4	5	5	5	5	10	5
5	6	5	5	5	5	6	5
5	8	5	5	5	5	5	5
5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5
10	5	5	5	10	5	5	5
5	5	5	5	10	5	5	5
5	5	10	4	5	5	10	5
5	5	10	8	5	5	10	5
5	5	10	3	5	5	5	5
		D* 6 MIN.					
5	5		4	5	5	5	5
5	5	5	6	5	5	5	5
5	10	5	8	5	10	6	5
5	5	5	5	5	10	5	5
5	5	5	5	5	10	5	5
					D 4 MIN		
10	5	5	5	5	10	5	5
4	4	10	5	5	10	5	5
8	6	5	5	5	5	5	5
5	8	5	5	5	5	5	5
5	5	5	5	5	5	5	5
5	4	4	5	5	5	5	5
5	9	10	5	5	5	5	5
5	3	5	5	5	5	5	5

5 5 5 5 4 10 5 5

4 5 5 5 6 10 5 5

DIAGRAM 2 MIN.

8 5 5 5 8 10 5 5

*D DEMONSTRATION: - MIN→MINUTES.

APPENDIX D.2

(A sample of a coded classroom interaction of a teacher's (Code No. 24) classroom interaction.

(i) Name of the school — Masinga Boys

(ii) Name of the teacher — Mr. Itute George

(iii) Name of the class — Form 2B

(iv) Time coding started 2.00 p.m.

Time ended 2.30 p.m

LESSON 2:

10	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	4	5	5
5	10	5	5	5	5	6	10	5	5
5	10	5	5	5	5	4	3	5	5
5	10	5	5	5	7	4	5	5	5
5	D 5 MIN	5	5	5	7	5	5	5	5
5	10	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	10	5	5
5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5
5	5	4	5	5	5	5	5	5	5
5	10	4	5	5	5	5	5	5	5
5	4	5	5	5	5	5	5	4	5
5	5	5	5	5	5	5	5	4	5
5	5	10	5	5	5	5	5	8	5
5	5	5	5	5	5	5	5	4	5
5	5	5	5	5	5	5	5	9	5
5	5	5	5	5	5	5	5	6	10
5	5	5	5	5	5	5	5	10 D 4 MIN	D 4 MIN
5	5	5	5	5	4	5	5	9	5
5	5	5	5	5	4	5	5	9	5
5	5	5	5	5	4	5	5	9	5
4	5	5	5	5	5	5	5	9	5

4	5	5	5	5	6	5	4	2	5
5	5	5	5	5	4	5	5	4	5
5	5	5	5	5	5	5	5	5	5

APPENDIX E

(A sample of responses made by one student to a teachers undesirable behaviours)

Name of the School Masinga

The objective of this questionnaire is to point out to individual teachers, those behaviours that need improvement in the opinion of the students. In order for the questionnaire to fulfil the objective, your opinion must be sincere and honest. Please cross (X) the space provided if your teacher possesses the behaviour stated in your opinion. If not leave the space blank ( ).

Name of the teacher Mr. Itute

1.	Scolds students alot	
2.	Usually cross	X
3.	Often "bossy"	
4.	Scolds a student in front of others	
5.	Always "fussing at" students	X
6.	Talks to much	X
7.	Difficult to approach with problems	

8. Difficult to please _____

9. Easily annoyed or bothered _____

10. Does not see things as students do _____

11. Does not participate in students games _____

12. Uninterested in students activities _____

13. Assigns "lots" of home work _____

14. Punishes the whole class for one or two offenders _____

15. Uses detention during recess or after school _____

APPENDIX F

(A sample of a teachers classroom interaction data transferred to a 10 x 10 matrix

Name of the teacher Mr. Itute G.

Name of the observer Mr. Wasanga

CATEGORY	1	2	3	4	5	6	7	8	9	10	TOTAL	%
1											0	0
2				1							1	0.2
3				1	3						4	0.8
4				6	9	4		3	2	5	29	6.0
5				17	350	3	2			12	384	81.0
6				2	2			4		1	9	2
7				1	1		1				3	0.6
8			3		5						8	1.7
9		1	1			1			3		6	1
10			1	1	13	1		1	1	14	32	6.7
TOTAL	0	1	5	29	384	9	3	8	6	32	476	100

APPENDIX G

(Calculation from the matrix in Appendix F)

1. % of T.T. $= \frac{1+4+29+384+9+3}{476} \times 100 = \frac{430}{476} \times 100 = 90$

2. % of P.T. $= \frac{8+6}{476} \times 100 = \frac{14}{476} \times 100 = 3$

3. % of S.C. $= \frac{32}{476} \times 100 = 7$

4. P.I.R. $= \frac{6 \times 100}{8+6} = \frac{6}{14} \times 100 = 43$

5. T.R.R. $= \frac{0+1+4}{0+1+4+9+3} = \frac{5}{17} \times 100 = 29$

6. TQR $= \frac{29}{29+384} = \frac{29}{413} = 7$

7. $TRR_{89} = \frac{(8+6) + (0+1+4)}{(8+6) + (0+1+4+9+3)} = \frac{17}{31} \times 100 = 61$

8. $TQR_{89} = \frac{0+0}{0+0+0+5} \times 100 = 0$

9. $I/D = \frac{0+1+4+29}{384+9+3} = \frac{34}{390} = 0.08$

10. $i/d = \frac{0+1+4}{9+3} = \frac{5}{12} = 0.4$

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