

CHAPTER THREE

PROBLEM AND PROCEDURE

On the basis of some theoretical framework discussed in chapter two sufficient trial has been given in United States of America and other countries to different procedures of teacher training for modifying teacher behaviour to improve the effectiveness in the classroom. A review of the literature related to the area of teacher effectiveness and teacher behaviour in the context of the student-teacher practice teaching programme in vogue in secondary teacher education colleges with its limitations, and paucity of empirical knowledge regarding the efficacies of different procedures impelled the investigator to apply them to Indian conditions. The present study, therefore, is an attempt to assess the usability of Flanders Classroom Interaction Analysis System and micro-teaching in our teacher training programme as well as their relative effectiveness in improving teaching on the basis of the class performance as the criterion variable in Indian conditions.

3.1 Statement of Problem

The investigator thus selected the problem related

to Flanders Interaction Analysis Category System, micro-teaching and traditional teacher training methods. The problem is being specifically stated as follows: "INTERACTION ANALYSIS, MICRO-TEACHING AND MODIFICATION OF TEACHER CLASSROOM BEHAVIOUR".

Delimitation of the Study

The study was delimited to forty pre-service student-teachers studying for their B.Ed. degree of Gorakhpur University in T.D. College, Jaunpur, U.P. in the sessions 1970-71 and 1971-72. Ninety students of class VIII of T.D. Singh Inter College, Jaunpur, U.P. worked in experimental classes. The investigator matched the control and experimental groups on the variables of age, sex, marital status, area (rural and urban), marks at graduate level, teaching subjects and teaching experience only. The comparison of the effectiveness of the techniques on the basis of classroom behaviour of student-teachers was done on the variables of teacher talk, student talk, silence or confusion, I/D and i/d ratios, teacher-student talk ratio, categories in steady state cells, extended indirect, extended direct, categories in 3-3 cell and 9-9 cells, the measures of Flanders Interaction Analysis System. Flanders Interaction Analysis Category System was planned to be used to measure the student-teacher verbal behaviour in the classroom. The study was delimited to the use of three treatments,

viz. micro-teaching procedure, Flanders Interaction Analysis Category System with the traditional methods of training to student-teachers to help in modifying their teaching behaviour. The experiment was conducted without the use of any technological hardware for classroom observation.

The major objectives of the study were:

1. to collect classroom behavioural data to show whether or not there is significant difference between student-teachers given the treatment of micro-teaching and the control group teachers using traditional training method only,
2. to know whether the treatment of Flanders Interaction Analysis produces significant difference in classroom behaviour of student-teachers compared to control group student-teachers,
3. to know whether two treatments, namely, micro-teaching and Flanders Interaction Analysis Category System could be synchronised in teacher training programme, and
4. to consider the usability of micro-teaching and Flanders Interaction Analysis Category System in teacher training programme to modify the student-teacher classroom verbal behaviour.

The present study seeks to evaluate the efficacies of Flanders Interaction Analysis Category System, micro-teaching and traditional teacher training method in the modification of teacher behaviour in the classroom. Teaching behaviour in the classroom is defined as teacher verbal behaviour in the classroom on the variables of

teacher talk (TT), student talk (ST), silence or confusion (S/C), teacher and student talk ratio (T/S ratio), Indirect-direct (I/D) and revised indirect-direct (i/d) ratios, steady state ratio (SSR), extended indirect (Ext.ind.), extended direct (ext.dir.) categories in 3- 3 cell (3-3) and category in 9 - 9 cell (9-9) based on Flanders Interaction Analysis Category System discussed in chapter One. Flanders Interaction Analysis Category System has been used in this study as a teacher training tool as well as observation tool. The three treatments used for modifying the student-teacher behaviours are: micro-teaching, Flanders Interaction Analysis System and traditional teacher training methods. The criterion variable is the measure of verbal teacher behaviour in the classroom.

In order to fulfil the objectives, the following null hypotheses were framed:

1. Student-teachers trained through micro-teaching do not change their verbal classroom behaviour in the classroom significantly compared to the student-teachers trained in traditional way only.
2. Student-teachers trained in Flanders Interaction Analysis Category System do not change their verbal classroom behaviour significantly compared to the student-teachers trained in

traditional way only.

3. Student-teachers trained in micro-teaching do not change their verbal classroom behaviour in the classroom significantly compared to the student-teachers trained in Flanders Interaction Analysis Category System.

3.2 Design of the Study

In order to fulfil the objectives and to test the hypotheses the study was designed in two stages: (i) the pilot study and (ii) the final experiment.

Stage I - Pilot Study

The pilot experiment aimed at seeing the efficacy of the FIACS treatment compared to traditional method of training as well as visualizing the administrative difficulties in the process of treatment being given to student-teachers and their assessment. A simple design having one experimental (N = 10) and one control group (N = 10) was executed. The experimental and control groups were matched on variables of age, sex, marital status, area (rural and urban), marks at graduate level, subjects at graduate level, teaching subjects and teaching experience. The experimental group was given the treatment of acquainting them with Flanders Interaction Analysis in theory only. No practical training

in coding, preparing matrix and interpretation of classroom behaviour was given. In the post-treatment test, Flanders Interaction Analysis Category System was employed to observe classroom behaviour twice for 30 minutes each for each student-teacher. The final data of the experimental and control groups were compared. The design of the study may be diagrammatically described as below:

TABLE 3.1
Pilot Study - Design

	Control N = 10	Experimental N = 10
	Two months Traditional Training	Two months Traditional Training
Treatment	Traditional Training	Flanders Classroom Interaction Analysis (theoretical knowledge)
	15 days	15 days
Post-test	Classroom observation through Flanders Classroom Interaction Analysis Category System Two lessons of 30 minutes each per teacher	Classroom observation through Flanders Classroom Interaction Analysis Category System Two lessons of 30 minutes each per teacher

All experimentation was done in class VIII of the same school, through the medium of Hindi in the teaching of

social studies. Both the groups were to use the lesson plans prepared by each on the lines suggested in their method of teaching classes to be attended by both the groups. The experimental treatment was to be in addition to the traditional teacher training programme to be given to student-teachers.

Stage II - Final Experiment

As the data of Stage I of the experimental and control groups compared showed significant difference in some of the components of the classroom behaviour like I/D, i/d, extended indirect etc. indicating that the theoretical introduction of Flanders Interaction Analysis has produced significant effect, nevertheless to be more sure, the final experiment was planned to be conducted by introducing one more variable of micro-teaching. (For detailed calculation refer next chapter IV).

For the final experiment a simple experimental pre-test-post test design with two experimental groups and one control group was executed. The study included 10 student-teachers in control group and the other 10 in two experimental groups. Each experimental group consisted of five student-teachers. The groups were matched keeping in view of the variables of age, sex, marital status, area (rural and urban), socio-economic status, marks at graduate level, subjects at graduate level, teaching subjects and teaching experience.

Unlike the design of Stage I pre-treatment observation was taken of all groups. The two treatments given to the experimental groups were the micro-teaching in simulation condition as well as in real situation to group I and theoretical explanation and practical training of Flanders Interaction Analysis to Group II. After treating the experimental Group I by micro-teaching in simulation condition as well as in real class situation and Group II the treatment of FIACS in addition to traditional training given to both the groups and control group in traditional training only, all the 20 student-teachers were observed by Flanders Interaction Analysis Category System. The design of the study may be described diagrammatically as below:

TABLE 3.2

The experiment was conducted in class VIII of the same school, in social studies teaching class through the medium of Hindi.

3.3 Sample

Two sets of sample were used, one for the pilot study and the other for the final experiment. A sample of 20 student-teachers was drawn out of 160 student-teachers admitted for B.Ed. training in the year 1970-71 in Tilakdhari College, Jaunpur, affiliated to University of

TABLE 3.2

Final Experiment - Design

	Control Group	Experimental Groups	
		Micro-teaching Group I	Flanders Interaction Analysis Group II
	N = 10	N = 5	N = 5
Pre-test	Classroom observation of 20 minutes through FIACS	Class-room observation of 20 minutes through FIACS	Classroom observation of 20 minutes through FIACS
Treat- ment	Traditional training two months	Traditional training two months	Traditional training two months
	Traditional training	Micro- teaching (simulated & classroom) one month	Flanders Interaction Analysis (Theoretical & Practical) one month
Post- test	Classroom observation of 40 minutes in two periods of each 20 minutes through FIACS	Classroom observation of 20 minutes in one period through FIACS	Classroom observation of 40 minutes in two periods of each 20 minutes through FIACS

Gorakhpur, Uttar Pradesh. An information sheet was filled in by each student-teacher. In order to control the variables a few criteria were fixed for the selection of student-teachers for the purpose of the study. The criteria were:-

1. Only male student-teachers to be selected.

2. Student-teachers who passed their B.A. in the year 1970.
3. Student-teachers having no previous teaching experience.
4. Those who secured 40 to 50 per cent of marks at their graduate examination.
5. Student-teacher who offered at least one language and one subject out of social sciences at the graduate level.
6. Student-teacher who offered social studies as one of the teaching subjects.
7. Those who ~~fell~~ in the age group of 20 to 24 years.
8. Student-teachers who came from rural areas.
9. Those who were married.

Twenty student-teachers thus selected were divided in two groups randomly to form experimental group and control group of ten each.

The sample of ^{twenty} ~~2~~ student-teachers for the final experiment was selected out of 157 student-teachers admitted in Tilakdhari College in the session 1971-72 for B.Ed.

training. Again, for the purpose of controlling the variables the student-teachers were selected against the criteria of sex, age, residence, income of the family, marital status, education, teaching experience, etc.

Only male student-teachers who fell in the age group of 20 to 24 years and who came from rural areas were selected. Again, the selected student-teachers showed income range of their family earning between 4000 and 5000 rupees per annum. They were married. They had passed their B.A. in the year 1971, secured 40 to 50 per cent of marks and offered at least one language and one subject out of social sciences at the graduate level examination. They had no previous teaching experience and had offered Hindi and Social Studies as their teaching subjects in B.Ed.

An information sheet (see Appendix) was made available to each student-teacher admitted. Twenty student-teachers thus selected were divided into two groups: control 10 and experimental 10 to be further divided into micro-teaching group I 5 and Flanders Classroom Interaction Analysis Group II 5 at random.

Student Sample

The experimental class in both experiments was class VIII. Students numbering 90 and 105 in the years 1970-71 and 1971-72 respectively at Tilakdhari Singh Inter

College, Jaunpur were used. In the year 1970-71 the whole class was divided into two sections of 45 each; and in 1971-72 the whole class divided into three sections of 35 each. The students were in the age group of 11 - 14 years. Social Studies was taught to them as a compulsory subject. Students were put in different sections randomly.

Thus five sections of class VIII of Tilakdhari Singh Inter College, Jaunpur in the years 1970-71 and 1971-72 were used. A micro-class comprised of 10 students drawn from a class at random and replaced from other ten students in reteach situation.

TABLE 3.3

3.4 Tools and Treatment

For gathering information relating to the matching variables on 'Information proforma' was prepared and administered to the student-teachers under training (see Appendix). ----). For training the student-teachers, the traditional method as practised to-day, micro-teaching procedure and Flanders Classroom Interaction Analysis were used. Teacher Behaviour was measured by observing and analyzing the classroom interaction of concerned student-teachers using Flanders' Interaction Analysis Category System. Details of each tool and treatment are described below:

TABLE 3.3

Table Showing the Comparison of Controlled Variables

Variables for matching	Pilot Study (1970-71)		Final Study (1971-72)	
	Control group	Experimental group	Control group	Experimental FIACS Group II
1. Age Range	20 to 24 years	20 to 24 years	20 to 24 years	20 to 24 years
Mean	21.95 years	22.45 years	22.85 years	23.15 years
2. Sex	Male	Male	Male	Male
3. Marital status	Married	Married	Married	Married
4. Area	Rural	Rural	Rural	Rural
5. Annual income Range	---	---	Rs.4000-5000	Rs.4000-5000
Mean	---	---	Rs.4451	Rs.4476
6. Graduated in the year	1970	1970	1971	1971
7. Subjects at Graduate level	One language & one social science	One language & one social science	One language & one social science	One language & one social science

Variables for matching	Pilot Study (1970-71)		Final Study (1971-72)	
	Control group	Experimental group	Control group	Experimental Micro-Teach- ing Group I FIACS Group II
8. Marks at graduate level				
Range	40 to 50%	40 to 50%	40 to 50%	40 to 50%
Mean	46.2%	46.8%	48%	47.2%
9. Teaching experience	Nil	Nil	Nil	Nil
10. Teaching subject	One social studies	One social studies	Hindi and social studies	Hindi and social studies
11. Experimental Class	VIII N = 45	VIII N = 45	VIII N = 35	VIII N = 35

A. Traditional Practice Teaching

As usual student-teachers admitted were divided into subject groups i.e. the subjects which they offered for practice teaching on the basis of the subjects studied at graduate level and the advice of the subject supervisor concerned. Subject groups received instruction in preparing a lesson plan, formulating objectives, planning the execution of the lesson alongwith the regular theory classes in Philosophy of Education, Educational Psychology, School Organization, Indian Education, General Principles of Teaching and Western Education Thought prescribed for B.Ed. syllabus of Gorakhpur University. Subject groups met the method master i.e. lecturer-in-charge of the subject twice in a week for each subject for a period of 50 minutes each day. The student-teachers were required to offer two teaching subjects. After six weeks of theoretical instruction in the subject groups, demonstration lessons by subject in charges were arranged where all student-teachers whether they offered the subject or not were required to attend. Each demonstration lesson was followed by a discussion period when the student-teacher could clarify his ideas by putting a question. Then arrangement for practice teaching was announced after a week and student-teachers were required to go to practising schools. All the student-teachers were not sent to schools together due to the paucity of

practising schools. Only a batch could go and others remained waiting for their turn. Supervisors supervised the lessons not necessarily related to their subject. His remarks were noted in the criticism book. If the supervisor and the trainee liked to discuss they could do so in their leisure time. For more details Palsane and Ghanchi (1967) may be referred.

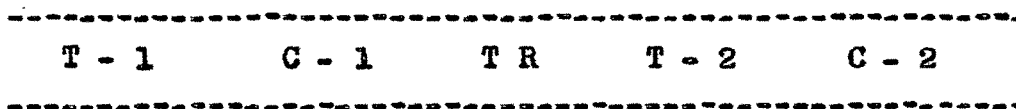
This traditional practice teaching training was ^{by} gone through/all the groups, namely control and experimental in the pilot study and control, experimental groups I and II in the final stage of the study along with other student-teachers who were under B.Ed. training. For comparing the performance with the other groups as well as studying the improvement, observation through FIACS was taken in the separate periods extending from 20 to 30 minutes in each period.

B. Micro-Teaching

Micro-teaching derives its name from the fact that it is an approach to training teachers in which "a sealed down teaching encounter in class size and class time is established". (Allen and Bush, 1966). Micro-teaching is based on the assumption that there are certain patterns of behaviour, to be more accurate, strategies which are crucial to effective classroom instruction. By concentrating on these strategies in

teacher training programme it is possible to improve teaching by practising certain phases of teaching one phase at a time. The trainee teaches a lesson to a small group of four to six pupils in front of a video camera, a supervisor and often some trainees peer. The pupils are dismissed after filling out a short rating form, and the video recordings are replaced and criticized by those present. Then the trainee is given time to think about this criticism and to make modifications which involve only one or two changes. He then reteaches the lesson with a different group of pupils, under the same conditions and with the same opportunities for feedback. A single teacher-reteach cycle can be accomplished in less than 30 minutes, but it is the reteach cycle to which micro-teaching owes its success. A typical micro-teaching ~~over its success~~ training sequence designed to improve a teacher's competence in the use of a particular skill may be diagrammatically described as below:

FIGURE 3.1
Training Sequence



The teacher teaches a brief lesson to a small number of students and tries to highlight a relevant teaching skill (T-1). The teacher through supervisor and

the replay of videotape of his performance receives feedback on how successfully he performed the teaching skill (C-1). He has a time to plan his next lesson, incorporate the feedback from his previous teaching lesson, or receive training (T R). He then teaches the lesson over again to a different group of students highlighting the same skill in an attempt to improve on his previous use of the skill (T-2). Again he receives feedback by watching the videotape of his second teaching performance, again with some kind of supervision (C-2). The sequence of teaching, critique, and training can be repeated as many times as necessary to bring the teacher upto pre-set standard of performance of the skill being trained. The skills of stimulus variation, set induction, closure, questioning and reinforcement, etc. are considered to be representative of the skills to be tried to develop in student-teachers as described by Allen and Ryans (1969). The indirect behaviour and reinforcement of student participation were to be taken up in this experiment.

As the present study was conducted for the purpose of gathering data relevant to the issue of whether student-teachers trained by micro-teaching change their classroom verbal behaviour significantly different compared to those trained by traditional training alone or with Flanders Interaction Analysis, the procedure of the study differed in some respects from the procedure

employed by Allen and Fortune (1966). Some of the features are:

1. The major objective was to train student-teachers to have more classroom participation and student involvement and indirect behaviour. With this end in view two skills viz., indirect behaviour and reinforcement of student participation were taken up for training strategies.

2. In the beginning a simulated situation was used where the student-teachers formed the class. Each student-teacher in the experimental micro-teaching group was given a chance to practise the skills, receive feedback from the participating student-teachers as well as the investigator working as supervisor. The cycle of training followed in simulated situation was:

Teach - Critique - Plan - Reteach - Critique

For each class a seven minutes period was observed which was followed by ten minutes critique and ten minutes plan period before the student-teacher was asked to reteach.

3. After two weeks of simulated training of student-teachers, the practice was arranged in the real classroom situation where students of class VIII were involved in the classroom. Periods were extended beyond the regular class period to complete the cycle and the

school teachers were requested to engage the students other than the micro-class. The micro-teaching cycle was:

Teach - Critique - Plan - Reteach - Critique - Plan - Reteach.

Started with seven minutes of teaching period, followed by ten minutes of critique and ten minutes of plan and then again the cycle continued. In each period ten students formed the micro-class and a small concept of social studies lesson as an unit of teaching which was decided the previous day in consultation with the supervisor was taught. Each student-teacher gave two lessons in complete cycle - one for skill of indirect behaviour and skill of reinforcement of student participation.

4. No gadget like C.C. T.V. or Videotape recording was used. The stress was on the controlled and structured observation of the lesson by fellow student-teachers as well as supervisor who then took part in discussion and analysis of the lesson to give feedback to the micro-teacher concerned.

5. Teaching performance was assessed in micro-teaching situation through Flanders Interaction Analysis Category System to assess the change in teacher verbal behaviour.

6. For comparing the performance with the other

groups, viz. control and experimental group II the observation in a real classroom situation was taken through FIACS after some days for ^{Twenty} 20 minutes as was done in the other groups viz. control and experimental group II.

7. As stated earlier micro-teaching group of student-teachers also attended the class with other groups in the beginning in which skills in the areas of lesson preparation and presentation were discussed in the general class.

C. Flanders Interaction Analysis
Category System (FIACS)

Of the several observational tools available the system developed by Flanders (1960(b)) is found suitable for use in India where costly electrical and electronic gadgets for use in the process of observation and subsequent analysis, which are essential in respect of some other tools of observation cannot be afforded in the present circumstances. A number of studies have been conducted using this instrument in India. It was, therefore, felt that the tool could be used with a fairly good degree of confidence. Buch and Santhanam (1970) reported that the ten category system of classroom observation developed by Flanders can be used conveniently in Indian conditions. Further, it is this tool which seems to be capable of being used without ^a need for any sophisticated gadgets in the process. Although it is a well known and

popularly used, Interaction Analysis Category System is being given below in Table 3.4 for ready reference.

TABLE 3.4

Interaction analysis concerned itself primarily with verbal behaviour. This could be observed with higher reliability than most of non-verbal behaviour. The assumption is that the verbal behaviour of an individual is an adequate sample of his total behaviour. For details of the categories and ground rules 'Analyzing Teaching Behaviour' (Flanders, 1970) may be referred.

The Observation Procedures

An observer sits in the classroom in the best position to hear and see the participants in the interaction process. Almost as often as possible, he decides to which category the communication just completed should be kept. He then writes down this category number while simultaneously assesses the continuing communication. Observation continues at a rate of 20 to 25 tallies per minute. This usually works out to about one tally every three seconds. The observation notes are merely a sequence of numbers written in columns, top to bottom, so that the original sequence in which the events occurred is preserved. Marginal notes are used to be recorded for

TABLE 3.4

Flanders Interaction Analysis Category System* (FIACS) @

T E A C H E R	1.	Accepts feeling - Accepts and clarifies an attitude or the feeling tone of a pupil in a non-threatening manner. Feelings may be positive or negative. Practising and recalling feelings are included.
	2.	Praises or encourages - Praises or encourages pupil action or behaviours. Vokes that release tension, at not at the expense of another individual, nodding head or saying "Umm" or "go on" are included.
	3.	Accepts or uses ideas of pupils - Clarifying, building or developing ideas suggested by a pupil. Teacher extensions of pupil ideas are included but as the teacher brings more of his own ideas into play, shift to category five.
T A L K	4.	Asks questions - Asking a question about content or procedure, based on teacher ideas, with the intent that a pupil will answer.
	5.	Lecturing - Giving facts or opinions about content or procedures, based on teacher ideas, giving his own explanation, or citing an authority other than a pupil.
	6.	Giving directions - Directions, commands, or orders to which a pupil is expected to comply.
S T U D E N T	7.	Criticizing or justifying authority - Statements intended to change pupil behaviour from non-acceptable to acceptable pattern; bawling some one out; stating why the teacher is doing what he is doing, extreme self reference.
	8.	Pupil-talk - response - Talk by pupils in response to teacher. Teacher initiates the contact or solicits pupil statement or structure, the situation. Freedom to express own ideas is limited.
	9.	Pupil-talk - initiation - Talk by pupils which they initiate. Expressing own ideas; initiating a new topic; freedom to develop opinions and a line of thought, like asking thoughtful questions; going beyond the existing structure.
T A L K	10.	Silence or confusion - Pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

* The category numbers are purely nominal, no scale is implied.

@ Taken from "Analyzing Teaching Behaviour by Flanders, Ned A., Addison Wesley Publishing Company, 1970, p.34.

any information that would later aid reconstruction efforts by an analyst or the observer himself. Whenever there is a major change in communication pattern or a remarkable event, a double line is drawn and it is written down along with the time of occurrence.

Observer Training and Reliability

In matters of observer training and reliability, it is essential that not only should a prospective observer be trained systematically in the process of observation and the reliability of observations made by him established through accepted procedures of estimating reliability, but also it is to be ensured that such trained observers remain consistent and reliable over time. A knowledge of the ten categories is just a preliminary requirement. A thorough knowledge of the ground rules which serve as the guidelines at coding stage for controversial situation is yet more important. The training procedure requires repeated observation performances by trainee observers such that the inter-observer reliability could be struck at 0.85 or more Scott's Reliability Coefficient, according to Flanders 1960(b)).

3.5 Tabulation and Interpretation of Matrix

Tabulation of the category code numbers begins

with the verification whether the series begins and ends with the number ten. As a convention, a ten is to be added to the beginning and end of the series unless the ten is already there present. Now the numbers are tallied in a ten by ten matrix. A form of the matrix along with their address is shown in Figure 3.2.

FIGURE 3.2

Tallying is done by taking one pair at a time. The first number of the pair designates the row and the second number the column. In this way, every pair serves as the address of a particular cell in the matrix. The pairs are determined such that they are overlapping, when all the observations are entered on the matrix, the load in each cell is calculated and marked in Arabic numerals in the cell which then signifies the frequency with which the sequence occurred in the classroom interaction observed. The row totals and the column totals are struck and the corresponding totals should agree.

Interpreting a Matrix

A large number of interpretations could be made from a matrix, that are directly relevant to assessing teacher influence. The ten by ten matrix with one hundred cells to preserve the frequencies of an equal number of

FIGURE 3.2

Cell Address in a 10 x 10 Matrix

Category	1	2	3	4	5	6	7	8	9	10	Row Total
1	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10	
2	2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10	
3	3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9	3-10	
4	4-1	4-2	4-3	4-4	4-5	4-6	4-7	4-8	4-9	4-10	
5	5-1	5-2	5-3	5-4	5-5	5-6	5-7	5-8	5-9	5-10	
6	6-1	6-2	6-3	6-4	6-5	6-6	6-7	6-8	6-9	6-10	
7	7-1	7-2	7-3	7-4	7-5	7-6	7-7	7-8	7-9	7-10	
8	8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8	8-9	8-10	
9	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	9-10	
10	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10	
Column											Matrix
total											total

sequential occurrences of verbal event offers a scope for meaningful interpretations.

Principal Components of Communication

The total classroom interaction is made up of three principal components - teacher-talk, student-talk and silence or confusion. Talking about the respective occurrence measures of teacher-talk and student-talk would not be as revealing as the discussions would be when the two dimensions are viewed in their joint context. The index that is useful in this regard is called 'Teacher Talk/Student Talk' (T/S) ratio.

Flexibility of Communication

The design of the ten by ten matrix is such that the occurrence of any one of the ten category events in a sustained fashion for spells of over three seconds each is all indicated in what one knows as diagonal cells from the upper left of the matrix to the lower right. There are ten such steady-state cells along the diagonal of the matrix. The combined cell load in all these cells together can be yet another general feature of classroom interaction that help interpretation. The index that represents this feature is called steady-state ratio (SSR).

The SSR reflects the tendency on the part of

the teacher and pupils to remain, in the course of their communication, in the same category for spell of longer than three seconds. It is, therefore, clear that a higher SSR ratio would imply ^{to what extent} as the communication between the teacher and pupils has been flexible to move from one category to another.

Flow of Communication

Category ten in the tool points to occurrence of both silence and confusion whether the tallies in the different cells constituting the row ten and column ten relate to silence or confusion can best be judged only in the light of the rest of the matrix. While the distribution pattern of tallies in the first nine cells in column ten would indicate the sequences that terminate in spells of silence/confusion, the first nine cells in row ten would reflect the transitional sequences 'from' spells of silence/confusion. The steady-state cell (10-10) indicates the incidence of silence/confusion for spells of over three seconds. Every tally in the cell 10-10, therefore, indicates a sequence 'from' 10 to 10.

Teacher Talk

Different terminology has been used in studying the teacher classroom behaviour in the context of his democratic authoritarian behaviour. Anderson called them

"Integrative and Dominative patterns while to Withall they were "Learner-Centred" and "Teacher-Centred", Lippitt designated them as "Democratic" and "Autocratic", and Flanders, whose system of observation is used in this study, named as "Indirect" and "Direct" behaviour patterns.

In the past, authors writing about the Flanders Interaction Analysis Category System have referred to categories 1, 2, 3 and 4 as indicative of "indirect teacher influence" and categories 5, 6 and 7 as "direct teacher influence". Flanders (1970) who considers that interaction is indeed interactive and hence it requires more skills to maintain an indirect pattern with comparatively little able pupils. He cites a few more common measures of indirectness in teacher behaviour which are I/D, i/d, I/I+D, i/i+d, frequency of the (3-3) cell and also the frequency in certain indirect categories. He proposed a more parsimonious way to conceptualize this aspect of classroom interaction, concepts of interaction and response applicable to both the teacher and student talk and develops a new set of indices to describe the concept of indirectness.

The Teacher Response Ratio (TRR): It is defined as an index which corresponds to the teacher's tendency to react to the ideas and feelings of the pupils. The TRR can be found by adding category frequencies 1 + 2 + 3, multiplying by 100 and dividing by the sum of

1 + 2 + 3 + 6 + 7. TRR is a measure of teacher's tendency to respond to the ideas and feelings of the pupils.

The Teacher Question Ratio (TQR): It represents the tendency of the teacher to use questions, which is an unequivocal means of initiation, in the context of guiding the content - oriented part of the classroom discourse. TQR is a percentage of all categories 4 and 5 statements which are classified in category 4. It is calculated by multiplying the category 4 frequency by 100 and dividing by the sum of categories 4 and 5.

The Pupil Initiation Ratio (PIR): It proposes to indicate what proportion of pupil talk was judged by the observer to be an act of initiation. The PIR can be calculated by multiplying the frequency in category 9 ^{multiplying} by 100 and dividing by the sum of all pupil talk.

These three ratios in combination with the percentage of teacher and student talk, describe the situational settings for the interaction. In one situation the teacher may be responsive to pupil talk, ask an above average number of questions, and the pupils show very high initiative in introducing their own ideas into the classroom discourse. In another the teacher may lead the discussion by asking many questions in response to pupil talk and produce another pattern.

In order to study the immediate reaction of teachers to the termination of pupil talk two additional ratios can be calculated on the basis of the TRR and TQR. Both of these ratios TRR 89 and TQR 89 can be calculated as they were before, except that the cell frequencies in row 8 and 9 are combined by addition and substitution for column totals.

Instantaneous Teacher Response Ratio (TRR 89) - It is the tendency of the teacher to praise or integrate pupils' 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, 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) - It is the tendency of the teacher to respond to pupil talk with questions based on his own ideas compared to his tendency to lecture. TQR 89 is calculated by adding the frequencies in cells (8-4) and (9-4) multiplying by 100, and dividing by the total tallies in the four cells (8-4) + (8-5) + (9-4) + (9-5).

Constructive Integration

A sensitive area of the matrix revealing the positive aspects of social skill in the teacher-pupil

relationship is designated by the nine cells in rows 1 through 3, columns 1 through 3, collectively called "Extended indirect cells". All possible two way sequences involving acceptance of pupils' feelings, praise and acceptance and clarification of their ideas usually indicate teacher's concern with positive motivation and reward. Integrated in an effective manner they constitute a constructive approach to harnessing the social emotional climate in the classroom. The extent of constructive integration or extended indirect may be found out with reference to the total interaction.

Vicious Circle

In quite contrast to constructive integration indicating the promotion of positive motivation by the teachers in his classroom communication is what is called 'vicious circle'. The area in the matrix which exhibits the recourse to this negative side of motivation is the cellular conglomerate called the 'Extended Direct' influence. It is the group of four cells (6-6), (6-7), (7-6) and (7-7). This phenomenon refers to sequences involving orders/commands and criticism. The extent of vicious circle may be found with reference to the total interaction.

Teacher Steady State Talk

There are seven steady-state cells signifying teacher's sustained talk. In accordance with the

suggestions by Flanders (1970) it may be developed and discussed in terms of Teacher Steady-State Ratio (TSSR). There are three principal constituents of this. They are constructive integration component (1-1, 2-2 and 3-3), vicious circle component (6-6 and 7-7) and content-oriented component (4-4 and 5-5). A further analysis of the content-orientation component of steady-state teacher talk may be a useful extension of the discussions. There are two cells that go into the component and they are 4-4 and 5-5.

Content Emphasis

The totality of content emphasis, as seen in columns 4 and 5 together, could be conceived as composed of three segments - content emphasis buried in teacher talk, content emphasis in the context of student talk and content emphasis following silence/confusion. The part of the communication which is primarily concerned with content delivery is revealed in the group of cells constituting the cross. Therefore, the name content cross is derived from the relative arrangement of cells which form themselves into a 'cross'. A clue to the extent of emphasis on subject matter, as distinct from emotional aspects, comes from the sum of columns 4 and 5. Perhaps, concern with subject matter to some extent spreads over the columns 3 and 6 too. Since it is the columns and rows 4 and 5 that exhibit the

emphasis on content one may consider the sum of category 4 and 5 totals only for a measure of the content emphasis. The measure of the concern with the content is the Content Cross Ratio (CCR).

The Use of Praise

Praise as a means of reward and reinforcement can be very effective in classroom communication. The extent and the manner of the use of praise by teachers can be gathered from the sequential distribution of tallies in the cells in column 2. The category 2 stands not only for praise but also for encouragement and jokes cut by the teacher. The cell in row supplies some information relating to the event immediately following praise may be looked upon as the effect of praise/encouragement from the teacher. The area of the matrix containing the information about the use of praise may be found out by multiplying the column 2 tallies with 100 and dividing it by grand total of tallies. More fundamental details regarding the use of praise may be found out by computing the indices with reference to the total use of praise.

Teacher Reaction to Student's Statement

Teacher's constructive reaction by way of appreciating their feelings, praising/encouraging them and accepting/clarifying their ideas, shown in the content of

teacher - controlled student talk is gathered from the sum of cell totals (8-1), (8-2) and (8-3) while such constructive reaction shown in the context of students' self-initiated talk, which reaction might be more for reading in their implications, is revealed by the sum of cell totals in (9-1), (9-2) and (9-3). An above average frequency in the 3-3 cell often means that the teacher develops the ideas of students with considerable care - a mark of a truly indirect pattern of influence. The 3-3 cell is most important in estimating the teachers support of student participation. A high loading in the 9-9 cell often indicates student to student communication and greater self-direction.

Student-Talk

Student talk is recorded under only two categories, one representing their 'response' behaviour and the other 'initiation' behaviour. Because of the fewer number of the categories recording pupil talk the amount of information that can be obtained from the matrices is relatively limited. Certain conventional indices or dimensions of student talk lend themselves to easy calculation and help the interpretation.

Pupil Initiation: The index which serves as a measure of pupil initiation is given by the Pupil Initiation Ratio (PIR) which indicates the proportion of pupil talk

judged by the observers to be acts of initiation.

Pupil Steady-State Talk: The tendency of the pupil to remain in the same category for a longer spell i.e. more than 3 seconds is given by the index, Pupil Steady-State Ratio (PSSR) which may be calculated by multiplying 100 to the sum of tallies in 8-8 and 9-9 and then dividing by the sum of column totals 8+9.

Prompt to Pupil Talk: It is the teacher talk, more often than not, that is either immediately or ultimately responsible for pupil talk in the classroom. Therefore, it would be significant information to find out how the pupil talk is sometimes immediately prompted by the teacher talk. Another item of significant information would be how much percentage of pupil talk is of the self-initiated type that is directly prompted by the teacher talk. A measure of pupil talk directly piloted by teacher talk is given by an estimate of pupil talk arising in the context of teacher talk.

Sequential Patterns of Pupil Talk: Some significant sequential patterns of pupil talk could be identified on further analysis of the columns 8 and 9. Information regarding the following sequences from pupil talk may be obtained: (i) pupil responsive talk, (ii) pupil responsive talk following teacher praise/encouragement, (iii) pupil

responsive talk following teacher questions, (iv) pupil responsive talk following teacher directions, (v) pupil self-initiated talk, (vi) pupil self-initiated talk following teacher question, direction or criticism and (vii) pupil self-initiated talk developing from pupil responsive talk, etc.

Silence/Confusion: Analysis of the incidence of silence/confusion may shed light to a limited extent on the communication patterns in classroom situation, particularly because the provision of category ten covers both silence and confusion and some classroom non-verbal activities like black-board work. But even then a general perusal of the patterns of the incidence of category ten may throw some light on the sequence of teacher talk and pupil talk. A discussion on the relative extent of silence/confusion following the principal communication components may throw some light on the patterns of behaviour. While the distribution of tallies in column 10 of the matrix would give information regarding the events preceding the incidence of silence/confusion, the distribution patterns in row 10 would give ample information regarding those that followed the incidence of silence/confusion throwing light on the effect of the incidence of silence/confusion.

C. Flanders Classroom Interaction Analysis as a Teacher Training Tool (FIACS - Treatment II)

In the present study the investigator has used

FIACS as a training tool as well as an observation tool.

In the pilot study the experimental group which was to be given the treatment of providing knowledge of FIACS received instruction in preparing a lesson plan, formulating objectives, planning the execution of the lesson as well as the regular theory classes in philosophy of Education, Educational psychology, School organization, and Indian Education etc. along with the control group. A week before going for student teaching, the experimental group was given a theoretical knowledge of Flanders Classroom Interaction Category System by providing a copy of the 10 categories, explaining them, giving role playing as a direct or indirect teacher. The whole training was confined to 5 periods each of 50 minutes in a week.

As stated earlier in the final study also FIACS group of student-teachers attended the class with micro-teaching group and traditional group in the beginning in which skills in the areas of lesson planning, presentation of lesson and general method were discussed in regular classes. Experimental treatment was given to the group by employing Flanders Interaction Analysis Category System. Student-teachers were taught the category system so that they were able to: (i) observe and tabulate a 10 minute lesson in actual situation, (ii) compute and interpret the meaning of main components of the observed lesson as 'teacher talk', 'student talk', 'silence/confusion', teacher

-student talk ratio', 'indirect-direct ratio', and the 'revised indirect-direct ratio', and (iii) read and interpret meaning of cell loadings in major regions of the matrix. In addition to the skills of observation, tabulation and matrix interpretation of course with a minimum proficiency each student-teacher observed a class for 10 minutes, prepared the matrix and discussed its implications in the group. This training was given during a two week course after the student-teachers had undergone the preliminary training of teaching principles along with other groups. While they were teaching, another student-teacher trained in FIACS could observe his teaching and discuss among themselves.

3.6 Observation and Data Collection

In the pilot study the control group and FIACS experimental group were observed at post-treatment stage. Post-treatment observations were taken in actual classroom situation. Teaching of each student-teacher was observed for a period of one hour in two instalments of 30 minutes each at two different stages of his practice teaching programme, namely one in the beginning of the teaching practice programme after he had settled, and another after the student-teacher had taught 15 to 20 lessons in actual classroom situations.

In the final experiment all the three groups:

traditional practice teaching control group, experimental micro-teaching group I and FIACS group II were subjected to observation for pre-treatment data. Each student-teacher was observed while teaching in class VIII a lesson on social studies for a period of 20 minutes.

Post-treatment data was gathered by observing each student-teacher for a period of 40 minutes in two instalments of 20 minutes each, one in the beginning of the student-teaching programme after he has settled by teaching a few lessons and another after he had taught 10 to 20 lessons. For experimental micro-teaching group I, wherein the skill training was provided in the beginning in real classroom situation observation was taken for each micro-class of 7 minutes through FIACS to assess the change in teaching behaviour. For comparing the performance of teaching behaviour of experimental group I student-teachers with the performance of student-teachers in the control and experimental group II, each student-teacher was observed in the classroom for 20 minutes towards the end of his practice teaching programme when he had taught at least 15 to 20 lessons.

3.7 Measures for Analysis

1. Observer Reliability

The training procedure required observation performance to result into the inter-observer reliability (with

a 'trained' observer) at 0.85 or more (Scott's Reliability Coefficient), according to Flanders (1960(b)). The study was conducted by the investigator after due training and after establishing inter-observer reliability consistently at levels or above 0.85. The procedure of estimating reliability can be done either through the graphic method or the computational one recommended by Flanders (1960(b)). The latter is described below:

Scott calls his coefficient "pi" and it was determined by the formula below:

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

P_o is the percentage of agreement and P_e is the percentage of agreement expected by chance which is found by squaring the proportion of tallies in each category. Summing these overall categories, and multiplying by 100, the procedure is used as follows:

Step one: the original tallies are recorded as "hash marks" (*||||* etc.) for quick summing on a sheet containing ten columns, one for each category.

Step two: add column totals, divide each by the grand total, and multiply it by 100 to convert into per cent.

Step three: While one observer finds the total per cent disagreement by subtracting the per cent figures corresponding to each category -- summed overall categories, the other observer estimates P_e by entering the largest and second largest categories as determined by either distributing or averaged from both.

Step four: P_o is determined by subtracting the total per cent disagreement from 100.

Step five: P_i is found by entering figure two with P_o and P_e .

2. Matrix

The matrix interpretations proposed to be made in the study are those suggested by Flanders (1960(b) and 1970). The interpretations are based on tally concentration in specified areas of the matrix. The specific indices aiding interpretation and corresponding areas of the matrix which have been taken as variables to be compared have been discussed earlier, their computational details are given below:

Principal Components of Communication

$$\begin{array}{lcl} \text{Teacher Talk} & = & \frac{\text{Sum of column totals } 1+2+3+4+5+6+7}{\text{Grand total of tallies}} \times 100 \\ \text{Student Talk} & = & \frac{\text{Sum of column totals } 8 + 9}{\text{Grand total of tallies}} \times 100 \end{array}$$

$$\text{Silence/Confusion} = \frac{\text{Column 10 total}}{\text{Grand total of tallies}} \times 100$$

Teacher-Talk - Student-Talk Balance

Index in this regard is known as 'Teacher Talk/Student Talk' (T/S) ratio.

$$\text{T/S ratio} = \frac{\text{Sum of column totals } 1+2+3+4+5+6+7}{\text{Sum of column totals } 8 + 9}$$

Flexibility of Communication - An Overall View

This indicates the instances of sustained occurrence of the event for spells of over three seconds each. There are ten such steady-state cells along the diagonal of the matrix. The combined cell load in all these ten cells together can be another general feature of classroom interaction that would help interpretation. The index that describes this feature is called Steady-State Ratio (SSR).

$$\text{SSR} = \frac{\text{Sum of the tallies in } (1-1)+(2-2)+(3-3)+(4-4)+(5-5)+(6-6)+(7-7)+(8-8)+(9-9)+(10-10)}{\text{Grand total of tallies}} \times 100$$

Measures of Indirect Behaviour

The formula followed in the present study are given below:

$$I/D = \frac{\text{Sum of column totals } 1+2+3+4}{\text{Sum of column totals } 1+2+3+4+5+6+7}$$

$$1/d = \frac{\text{Sum of column totals } 1+2+3}{\text{Sum of column totals } 1+2+3+6+7}$$

Constructive Integration

The area collectively is called 'extended indirect' cells. Index is worked out as follows:

$$\text{Extended Indirect} = \frac{\text{Sum of the tallies in } (1-1)+(1-2)+(1-3)+(2-1)+(2-2)+(2-3)+(3-1)+(3-2)+(3-3)}{\text{Grand total of tallies}} \times 100$$

Vicious Circle

The area in the matrix exhibiting negative side of motivation is also called 'extended direct'. The index is worked out by the formula given below:

$$\text{Extended Direct} = \frac{\text{Sum of the tallies in } (6-6)+(6-7)+(7-6)+(7-7)}{\text{Grand total of tallies}} \times 100$$

Teacher Support to Student Participation

The index found in (3-3) cell is computed in percentage as against the total tallies:

$$3-3 \text{ cell} = \frac{\text{Sum of } 3-3}{\text{Grand total of tallies}} \times 100$$

Student-Initiation

It indicates whether or not the students had the opportunity to initiate their ideas or communicate among themselves, indice is calculated as:

$$\text{9-9 cell} = \frac{\text{Sum of the total of (9-9)}}{\text{Grand total of the tallies}} \times 100$$

3. Use of 't' Test

Students 't' tests were carried out on all the 11 variables namely 'teacher talk', 'student talk', 'silence or confusion', 'teacher-student talk ratio', 'steady state cell', 'I/D', and 'i/d' ratios, 'extended indirect', 'extended direct', categories in '3-3 cell' and '9-9 cell' with a view to identifying whether the measures obtained were significantly different from group to group and pre-treatment and post-treatment dimensions. For the procedures followed in the calculation, Garrett (1969, pp. 223 and 226-228) may be referred.

4. Comparing Matrices for Statistical Significance

To find out whether two or more interaction sequences are significantly different from each other one has to compare the concerned matrices. Flanders (1960(b)) had adopted and recommended the following procedure for this purpose.

Darwin (1959) developed a likelihood ratio criterion to test the hypothesis that the frequency distributions in two or more matrices are the same. He proceeds on the verified conclusion that the Chi-square test is insensitive to sequence analysis. His assumption is that interaction sequences are one-dependent or mark^v or chain which is a much better approximation than the zero-dependent assumption of Chi-square. Communication events are in fact, more than one dependent, but the additional dependence of three or more events is small in comparison to the dependence between two events. For comparing two or more matrices, the null hypothesis concerning the matrix distributions can be tested by a likelihood ratio criterion suggested by Darwin:-

$$2 \left(\sum_{(K)} n_{jkl} \log_e n_{jkl} - \sum_{(L)} n_{j..} \log_e n_{j..} - \sum_{(M)} n_{.jk} \log_e n_{.jk} + \sum_{(N)} n_{j..} \log_e n_{j..} \right)$$

~~Adopt~~ in place of a Suffix means that summation has been carried out over the replaced variable. The procedure for applying the likelihood ratios to test the null hypothesis concerning two matrices A and B is given below:

Step one: Prepare a 10 x 10 matrix 'A' and the second matrix 'B'. Check to see that the sums of the corresponding rows and columns within each matrix are equal.

Step two: Prepare a third matrix 'C' which is a combination of $A + B$. The addition is performed cell by cell. The check is $C = A + B$ for all cells, row totals and column totals.

Step three: The first term 'K' is found by multiplying each cell frequency by its own natural logarithm ($n \log_e n$), adding these 100 products from A to the 100 products from B, and the sum will then equal the first term 'K'.

Step four: The second term 'L' is found by multiplying each row total by its own natural logarithm, adding the ten products from A to ten products from B, and the sum will then equal term 'L'.

Step five: The third term 'M' is found by multiplying each cell frequency in the C matrix by its own natural logarithm, adding the 100 products, and the total will then equal term 'M'.

Step six: The fourth term 'N' is found by multiplying each row total of matrix C by its own natural logarithm adding the ten products, and the total will then equal term 'N'.

Step seven: The terms are combined as indicated, that is $2K - L - M + N$. If logarithm to the base ten are used, the formula becomes $4.605 K - L - M + N$.

Step eight: For two 10 x 10 matrices, this criterion has a sampling distribution of Chi-square at 90 degrees of freedom. Since Chi-square approaches a normal distribution for higher degrees of freedom, the above criterion can be converted to a Standard Score "Z" as follows:

$$Z = \frac{\sqrt{2 K^2}}{\sqrt{2n - 1}}$$

where $n = S(S-1)$ and S is the number of categories. For two 10 x 10 matrices, this formula becomes, when Z is 2.58 or larger, the null hypothesis is rejected at the 0.01 level of confidence.

The application of this ~~test~~ to more than two matrices is straight forward. Term 'K' will include the ^{cell} cell by addition of all matrices. Term 'L' includes the row by row addition of all matrices. Term 'M' is calculated from a single combined matrix in which the cell totals are determined by the addition of frequencies in the corresponding cells of the individual matrices. Term 'N' follows the same procedure with the row total of the combined matrix. The degrees of freedom are $S(S-1)(r-1)$; S is the number of categories and r is the number of matrices.