

CHAPTER - THREE

PROBLEM AND PROCEDURE

PROBLEM AND PROCEDURE

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 a new procedure and tool for observation and training in Indian conditions. The present study therefore is an attempt to assess the usability of Analysis of Classroom Transactions System (Roy Harris, 1975) in our teacher training programme as well as its effectiveness in improving teaching on the basis of classroom performance as the criterion variables.

3.1 STATEMENT OF THE PROBLEM

Thus the problem selected by the investigator is being specifically stated as follows :

" A STUDY OF THE EFFECT OF TRANSACTION TRAINING ON
CLASSROOM BEHAVIOUR OF SCIENCE STUDENT TEACHERS."

3.2 OBJECTIVES OF THE STUDY

The study purports to achieve the following objectives:

- (1) To provide transaction training to a group of science student-teachers based on Analysis of Classroom Transactions.

- (2) To find out significant difference on classroom behaviour patterns of student-teachers between pre-test and post-test stages.
- (3) To see the feasibility of Analysis of Classroom Transactions Category System in teacher training programme to modify the student-teacher classroom verbal behaviour.

The present study seeks to evaluate the efficacies of Analysis of Classroom Transactions Category System (Roy Harris, 1975), in the Modification of teacher behaviour in the classroom. Teacher behaviour in the classroom is defined as the teacher verbal behaviour in the classroom on the variables of -

Teacher response positive	Trp
Teacher response negative	Trn
Teacher information	Tin
Teacher question open	Tqo
Teacher question closed	Tqc
Teacher direction	Td
Teacher does not direct	Tdt
Pupil response open	Pro
Pupil response closed	Prc
Pupil information	Pin
Pupil question	Pq
Silence, and	Sil
Disruption	Dis

3.3 HYPOTHESES

Keeping in view the objectives of the study cited above, the following hypotheses were framed :

- (1) Student-teachers trained through transaction training, in post-test, will score higher on Trp, Tqo, Tqc, Td, Pro, Prc, Pin, Pq, than in pre-test stage.
- (2) Student-teachers trained through transaction training, in post-test, will score lower on Trn, Tdt, Sil and Dis than in pre-test stage.
- (3) There will be significant difference in transaction patterns of student-teachers between pre-test and post-test stages.

3.4 DELIMITATION OF THE STUDY

Both verbal and non-verbal classroom behaviour mark transactions in the classroom. The present study, however, is confined to verbal behaviour only. One reason, guiding the decision refers to the reliability with which verbal classroom behaviours can be observed, recorded and measured. Secondly, the classroom transactions are pre-dominantly verbal. Seventy to eighty per cent of the teaching is covered by teacher or student talk (Anderson and Hunter, 1966).

Classroom observation being a time consuming process, the study limits to twelve pre-service science student-teachers studying for their B.Ed. degree of Gorakhpur University in Gandhi Smarak Degree College Samodhpur, Jaunpur, U.P. in the

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it be*

session 1983-84. All the students of classes VII and VIII of Samodhpur Inter College, Jaunpur, U.P. worked as experimental classes. The pilot study was conducted on only five science student-teachers studying for their B.Ed. degree in Faculty of Education and Psychology, M. S. University of Baroda, Baroda.

3.5 DEFINITION OF THE TERMS USED

3.5.1 Transaction

A transaction is an exchange of two or more strokes between two persons. There are two main types of strokes i.e. positive and negative strokes.

3.5.2 Positive Strokes

These strokes are given in a manner that make whoever receives them "feel good" and which help to bring that person closer to me on the "feeling" level. Thus when a teacher says to student - "I like being with you", or "you are great", or "you are correct", then teacher is giving positive strokes.

3.5.3 Negative Strokes

These strokes take you away from me on the relational level and help to set up walls that inhibit meaningful and warm communication. Thus "you are stupid", or "cannot you ever do anything right", all constitute negative strokes.

3.5.4 Transactions in the Classroom

A transaction is an exchange of strokes between teacher and student. So, if teacher asks, "Who was the first president

of India?" and if student answers, "Dr. Rajendra Prasad", then teacher has given a stroke to student and student has given a stroke to the teacher. That is a transaction. Supposing in the classroom situation, students are busy in drawing a diagram and teacher asks question to the student and student is totally unaware that teacher had asked question, then teacher has given a stroke to the student but since student has not heard teacher's question, he can not give a stroke to the teacher in return. So there is no transaction. But it is different if teacher is teaching and a student asks a question to the teacher and teacher heard that question but deliberately ignored student's question and student is aware of teacher's deliberate action, then teacher has given a negative stroke to the student. There is a transaction in that case.

(1) Transactional Analysis

Transactional Analysis is, "The study and interpretation of verbal and non-verbal interactions between two or more people in a social situation (e.g. teacher and pupils) especially in terms of the meanings that participants attach to one another's behaviour". (A dictionary of Education).

(2) The Analysis of Classroom Transactions

Transactions which take place in the classroom involve both verbal and non-verbal. In normal classroom situation it is verbal transaction which is predominant. A single transaction, on its own, becomes meaningful only when viewed within a sequence of other transactions which proceed and follow it. For example,

a teacher may start a lesson by asking a question and a pupil responds by answering it orally. The teacher tells the pupil that he is correct and proceeds to give the class some information and then asks another question. Here there has been a sequence of oral transactions between teacher and pupil.

The "Analysis of Classroom Transactions" (ACTs) is an instrument which is designed to record categories of oral transactions and assigns a literal code to each e.g., if a teacher asks a question, to which there is a predictable correct conventional answer, the transaction is recorded as "cq" short for "closed question".

3.5.5 Training

Training is an organised procedure which brings about a semi-permanent change in behaviour, for a definite purpose. The three main areas involved are skills, knowledge, and attitudes, but always with the objective of a definite purpose in mind. For all practical purposes training is aimed at specific, job-based objectives rather than the broader society based aims of education. In the present study training is teaching and practice in order to bring a desired standard of behaviour or efficiency.

3.5.6 Science Student-Teacher

The term 'student-teachers' refers to a group of students who are preparing to enter the profession of teaching. In this study, they are science graduates and undergoing one year degree course in the theory and practice of education at the secondary level.

3.5.7 Classroom

Classroom is a place in which practically all teachers and most pupils expect "to do school work".

3.5.8 Teacher Behaviour

Teacher behaviour includes the activities done by the teacher in the classroom to stimulate certain responses from the pupils which result in learning on their part.

3.6 DESIGN OF THE STUDY

The present study employed pre-test - post-test single group design. 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.

3.6.1 Stage-1 : Pilot Study

The pilot experiment aimed at seeing the efficacy of the transaction training treatment as well as visualising the administrative difficulties in the process of treatment being given to student-teachers and their assessment. A simple design pre-test - post-test single group (N=5) was executed. In pre-test the group was given the treatment of acquainting them with Analysis of Classroom Transactions in theory only. No practical training in practice of different categories of transactions, coding, preparing matrix and interpretation of classroom behaviour was given. In the post-test, transaction training based on Analysis of Classroom Transactions was given. ACTs was employed to observe classroom behaviour twice for 24 minutes each for each student-teacher. The final data of the

pre-test and post-test were compared. The design of the study is given in Table 3.1.

Experimentation was done in class VIII and IX of the same school through the medium of English in the teaching of science.

Table 3.1 : Pilot Study: Pre-test - Post-test Single Group Design (N=5).

Time	Items of Transaction training	Data collection
9 days	Theoretical orientation of class-room transaction.	
2 days	Having theoretical knowledge about classroom transaction - each student-teacher delivered two lessons in classrooms.	Classroom observation through ACTs category system, each for 24 minutes per student teacher (pre-test observation).
16 days	Discussion about lesson planning based on ACTs, practice in use of classroom transaction categories through teaching in simulation and feedback based on ACTs.	
15 days	Practice in use of classroom transaction categories through teaching in real classroom situation and feedback based on ACTs.	Classroom observation of last two lessons through ACTs category system each for 24 minutes per student-teacher (Post-test observation)

3.6.2 Stage-II: The Final Experiment

The data of pilot study showed significant difference in some of the components of the classroom behaviour like TT, PT, Tin, Tgo, Pro, and Prc, indicating that the transaction training has produced significant effect, nevertheless to be more sure, the final experiment was planned to be conducted in more detailed and systematic way.

For the final experiment a simple pre-test post-test single group design was executed. The study included 12 student-teachers. The study was organised in three phases: (i) theoretical orientation about transaction training, (ii) Practice in use of transaction categories in simulation, and (iii) Practice in use of learnt skills in real class-room situation. The design of the study may be described diagrammatically as in table 3.2.

Table 3.2 : Final Experiment : Pre-test - Post-test single group design (N=12)

Phases	Time	Treatment	Data collection
1	23 days	Theoretical orientation of classroom transaction.	
	2 days	Practice-teaching for two lessons in real classroom.	Classroom observation through ACTs category system, each for 20 minutes per student-teacher (Pre-test observation)

Table 3.2 (contd.)

Phases	Time	Treatment	Data collection
2	35 days	Classroom observation based on ACTs, discussion about lesson planning based on ACTs, and practice in use of transaction categories in simulation.	
3	45 days	Practice in use of classroom transaction categories through teaching in real classroom situation with feedback based on ACTs.	Classroom observation of last two lessons through ACTs category System each for 20 Minutes per student-teacher (Post-test observation).

The entire experiment was conducted in Class VII and VIII of Samodhpur Inter College, Jaunpur, U.P., in science teaching classes through medium of Hindi.

3.7 SAMPLE

Two sets of sample were used, one for the pilot study and the other for the final experiment. A sample of 5 student-teachers was drawn out of total science student-teachers admitted for B.Ed. training in the year 1983-84 in the Faculty of Education and Psychology, the M.S. University of Baroda, Baroda.

The total number of science student-teachers admitted in Gandhi Smarak Degree College, Samodhpur, Jaunpur, U.P. in the session 1983-84 for B.Ed. training was selected, an information sheet was filled in by each student-teacher. Data collected through an information sheet represented that student-teachers selected were male from rural areas having middle class family background, passed their B.Sc. Examination in the session 1980-81-82 and secured per-centages of marks ranging 48-55 and were in the age-group of 23-26 years.

3.7.1 Student Sample

The experimental classes in pilot study were VIII and IX in the year 1983-84 at Sanskar Vidya Vihar School, Baroda, where science was one of the subjects. Classes VII and VIII of Samodhpur Inter College in the year 1983-84 were selected for the final experiment.

3.8 TOOLS AND TREATMENT

An information sheet was prepared and administered to the student-teachers under training. For training the student-teachers, the transaction training based on Analysis of Classroom Transactions (ACTs) developed by Roy Harris (1975) was used. Teacher behaviour was measured by observing and analysing the classroom transactions of concerned student-teachers using ACTs category system. Details of the tool are being reported as below:

3.8.1 Analysis of Classroom Transactions (ACTs)

Among several observational tools available the system developed by Roy Harris (1975) is found suitable for use in Indian

condition. Shukla (1979) found that ACTs developed by Roy Harris 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.

Transaction analysis is concerned 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. The "Analysis of Classroom Transactions (ACTs)" is an instrument which is designed to record categories of oral transactions during, or from recorded, teaching-learning sessions. It identifies specific oral transactions and assigns a literal code to each e.g., if a teacher asks a question, to which there is a predictable correct conventional answer, the transaction is recorded as "cq" short for "closed question".

A pre-requisite for a teacher who aspires to control his teaching behaviour to bring about defined pupil-learning objectives is an awareness of the nature of transaction, and the study of the Analysis of Classroom Transactions with practice in its use, will contribute to the development of such awareness. It was, therefore, felt that the Analysis of Classroom Transactions could be used for training purpose as well as tool for observation purpose with a fairly good degree of confidence.

Transactions fall into four main areas within the oral domain :

- (1) Talk initiated by teacher
- (2) Talk initiated by pupil
- (3) Response of Teacher
- (4) Response of Pupil

Definition and Literal Coding Symbol
for Each Category of Oral Behaviour:

TEACHER

I. Initiation

- | | | |
|-------------------------|--|-----|
| Substantive | - Expository Talk - Statements of Facts -
Explanation - Description, etc. | -s |
| Personal | - Teacher talks about own personal experiences,
opinions, feelings. | -i |
| Orientation | - Reference to future learning e.g.,
"In this lesson we shall be.. | -or |
| Review | - Reference to previous learning, either
in a previous lesson or in the
immediate past during the current
lesson. | -re |
| Knowledge of
Results | - Feedback to pupils individually or in
groups about their achievements -
specific information such as grades,
marks etc. | -kr |

II. QUESTIONING

Closed	- Asking for simple recall of facts names of things, places, persons, processes, etc. reproductive from memory e.g. "What is the capital of France?"	- cq
Open	- Asking for divergent, original, creative answers (in contrast to conventional factual replies)	-oq
Procedural	- Asking about methods of doing some- thing e.g. "How did you do that?" "What is the first thing to do?"	-Pq
Descriptive	- Asking for a description of something e.g. "What can you see in that picture?"	-dq
Explanatory	- Asking for reasons - causal relations 'Why' type questions.	-yq
Evaluative	- Asking for a judgement - a comparison - an assessment.	-eq
Personal	- Asking about experience, feelings.	-iq
Modified	- A question repeated in a somewhat different form..	-mq
Repeated	- A question repeated exactly	-rq
Rhetorical	- Questions which are really statements, no answer being expected	-rhq
Elaborative	- Asking for a more detailed answer.	-elq

Knowledge of results - Asking pupils about their learning
 e.g. "Any questions?" Do you understand?" -krq

III. DIRECTION

Procedural - Directions how to do something -pd

Commands - Orders related to norms of behaviour obeying rules - disciplinary in nature

- Do's -d

- Don'ts -dt

Prompting - Cues to help pupils answer a question or do something. -cu

Exhortation - Encouraging pupils to raise their motivation e.g., "Let's see how well we can work today?" -ex

IV. RESPONSE

Recognition of feeling - Accepting and clarifying an attitude or the feelings of a pupil or class in a warm and friendly manner -f

Acceptance - Indicating a pupil's answer is correct or acceptable. - ✓

Rejection - Indicating that an answer is wrong or unacceptable - x

Praise	- Giving credit to a pupil or class: more than just acceptance	- +
Blame	- Criticizing a pupil or class- derogatory remarks - ridicule - deflating.	- -
Elaboration	- Enlarging upon a pupil's answer - developing a pupil's idea.	- el
Closed response	- Short conventional answer to a question	- c
Open response	- Elaborated answer to a question	- o

PUPIL

I. INITIATION

Substantive	- As for teacher	- s
Personal	- As for teacher	- i
Knowledge of Results	- Feedback to teacher about their learning	- kr

II. QUESTIONING

	As for teacher : cq, oq, pq, dq, eq, iq, elq, krq.	
Permission	- Asking the teacher for permission to do something.	- can

III. RESPONSE

As for Teacher : or, cr

- Don't know - A response admitting ignorance - dk
- Silence - Pauses - short periods of silence - sil
- Disruption - Periods when smooth flow of the lesson is upset - chatter-shouting out by pupils - dis

Using all the coded categories of the ACTs instrument separately in a matrix would make it too large and unwieldy for an initial analysis and it is recommended that the transactions be grouped as shown below:

Table 3.3 : Analysis of Classroom Transactions grouped into 13 categories.

TEACHER							PUPIL				SIL	DIS
RESPONSE		INITIATION					RESPONSE		INITIATION			
+ive	-ive	Inf.	Question	Direction					Inf	Qu		
f/		si	o	c	pd	pdt	o	c	si	c		
tel	-	or			d	dt		dk	kr	o		
c.o.		re			ca					can		
X		kr			ex					kr		
Teacher Response positive	Teacher Response negative	Teacher information	Teacher question open	Teacher question closed	Teacher Do's	Teacher Don'ts	Pupil Response open	Pupil Response closed	Pupil information	Pupil question	Silence	Disruption
Trp	Tm	Tin	Tqo	Tqc	Td	Tdt	Pro	Prc	Pin	Pq	Sil	Dis

The ACTs transactions have thus been grouped into 13 categories which yields a reasonably sized matrix for analysis.

3.8.2 Recording Transaction

Method

For the period of observation during which oral transaction is occurring, a code symbol is written down at the end of each 3-second interval to record the specific transaction taking place during this short period. If a particular transaction continues over the 3 second, it is recorded again for the next 3-second interval, and continued in this manner until another transaction takes place. It is not necessary to keep writing the code each 3-second interval; having written the code once, a dot can be marked after it for each succeeding 3-seconds interval. For example, if a teacher talked for 12-seconds giving instructions how to do something, it would be recorded as tpd... The letter 't' indicates that the teacher is talking 'pd' is the coding for procedural directions.

When a pupil starts talking, write the letter 'p' followed by the recorded codings.

The record is written across the page from left to right; here is an example:

Teacher : In this lesson we are going to learn how to add fractions together. Open your books at page 20.

Pupil : Please, Sir, I know how to add fractions.

Teacher : Don't shout out, do as you are told. So far we have learned what a half, a quarter and a third are. We are now going to find out how to add a half and a third. Write the sum down in your book as I have done on the blackboard ...

What do you think we have to do now?

Record

t or pd, pi t dt re or pd pq.

Alternatively separate teacher and pupil comments by oblique strokes as follows:

Or pd/i/dt re or pd. pq/. If a pupil talks immediately after another pupil a 'p' must be prefixed to the second boy's comments. If another pupil then speaks, another 'p' must be prefixed.

3.8.3 Observer Training and Reliability

The observer familiarises himself with the thirteen categories. He also gets training in observation and establishes reliability of observation with already trained observer using Scott's coefficient of inter-observer agreement. An inter-observer reliability of .80 and above is desirable. 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 a period of time. A thorough knowledge of the ground rules which serves as the guidelines at coding stage for controversial situation is yet more important.

The investigator had already established an inter-observer reliability of .88 with the researchers in the Centre of Advanced Study in Education, Baroda. Before starting the experiment, the

sample selected for final experiment was trained in observation. They achieved inter-observer reliability .89 with the investigator.

3.8.4 Preparation of an Analysis of Classroom Transaction Matrix

Frequency of different categories in the class observed can be obtained by writing symbols. This can provide frequency of occurrence of different categories. But more information can be obtained from a 13 x 13 matrix. The preparation of a matrix involves following steps:

Suppose investigator had the following sequence of transaction in a lesson :

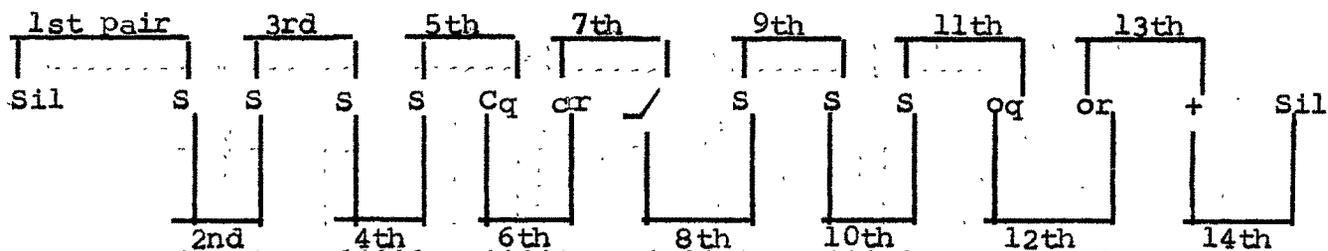
S... cq/cr/C/s...Oq/or/+/

Step 1

Add silence (Sil) in the beginning and in the end of the sequence of transaction.

Step 2 : Forming Pairs

In forming pairs of observation, each symbol is used twice, excepting the first and the last observations. The second symbol of the first pair forms first symbol of the second pair, second symbol of the second pair forms first symbol of the third pair, and so on. The sequence of transactions obtained above is broken down into adjacent pairs as shown below:



Step 3 : Tabulating Transaction Analysis Matrix.

The first symbol of any pair designates the row and the second symbol designates the column. This way all the 169 cells in the 13 x 13 matrix have their respective addresses. Table 3.4 gives addresses of each of the cells.

Once sequence of transactions have been grouped into pairs, the pairs can be transferred to the matrix according to their respective cell addresses as shown in the table 3.4. It is better, if more space is provided to the categories Tin, Tqo, Tqc, Pro, and Prc in rows as well as in columns, as these categories usually carry higher frequencies than others and consequently forms more pairs. For example, the pairs formed in this section can be transformed to the cell in the table 3.5.

Step 4 : Interpreting a matrix.

When the matrix has been completed by registering all the paired transactions, various aspects of the pattern may be considered.

Table 3.4 : Cell addresses in a 13 x 13 matrix

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	Trp	Tm	Tin	Tqo	Tqc
Trp	Trp-Trp	Trp-Tm	Trp-Tin	Trp-Tqo	Trp-Tqc
Tm	Tm-Trp	Tm-Tm	Tm-Tin	Tm-Tqo	Tm-Tqc
Tin	Tin-Trp	Tin-Tm	Tin-Tin	Tin-Tqo	Tin-Tqc
Tqo	Tqo-Trp	Tqo-Tm	Tqo-Tin	Tqo-Tqo	Tqo-Tqc
Tqc	Tqc-Trp	Tqc-Tm	Tqc-Tin	Tqc-Tqo	Tqc-Tqc
Td	Td-Trp	Td-Tm	Td-Tin	Td-Tqo	Td-Tqc
Tdt	Tdt-Trp	Tdt-Tm	Tdt-Tin	Tdt-Tqo	Tdt-Tqc
Pro	Pro-Trp	Pro-Tm	Pro-Tin	Pro-Tqo	Pro-Tqc
Prc	Prc-Trp	Prc-Tm	Prc-Tin	Prc-Tqo	Prc-Tqc
Pin	Pin-Trp	Pin-Tm	Pin-Tin	Pin-Tqo	Pin-Tqc
Pq	Pq-Trp	Pq-Tm	Pq-Tin	Pq-Tqo	Pq-Tqc
Sil	Sil-Trp	Sil-Tm	Sil-Tin	Sil-Tqo	Sil-Tqc
Dis	Dis-Trp	Dis-Tm	Dis-Tin	Dis-Tqo	Dis-Tqc
T					

Table 3.5 : Tabulation of the 14 pairs

Cate- gories	Trp	Tin	Tin	Tin	Tqo	Tqc	Td	Tdt	Pro	Prc	Pin	Pq	Sil	Dis	T
Trp	1												1		3
Tin		1													8
Tin		5	1	1											1
Tqo			1												1
Tqc				1											1
Td															
Tdt															
Pro															
Prc															
Pin															
Pq															
Sil													1		1
Dis														1	14
T	3														

3.8.5 Principal Components of Transaction

The total classroom transactions fall into four main areas within the oral domain. They are: (i) talk initiated by teacher, (ii) talk initiated by pupil, (iii) response of teacher, and (iv) response of pupil. The thirteen by thirteen matrix with one hundred sixty-nine cells to preserve the frequencies of sequential occurrences of verbal event offers a scope for meaningful interpretations. Following are some ratios which may be calculated.

1. Ratios :

$$1.1 \text{ Ratio of } \frac{\text{Teacher talk}}{\text{Pupil talk}} = \frac{Trp+Trn+Tin+Tgo+Tgc+Td+Tdt}{Pro+Prct+Pin+Pq}$$

Talking about the respective occurrence measures of teacher talk and pupil-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/Pupil Talk' (T/P) ratio. Suppose this ratio gives 75/30, then this can be expressed as a decimal viz., 2.5 which means that the teacher talked 2 1/2 times as much as the pupils did.

$$1.2 \text{ Ratio of } \frac{\text{Teacher closed questions}}{\text{Teacher open questions}} = \frac{Tqc}{Tqo}$$

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.

Suppose this ratio gives 10/20, then this is 0.5 as a decimal which means that half the teacher's questions were closed or, the teacher asked twice as many open questions as he did closed questions.

$$1.3 \quad \text{Ratio of } \frac{\text{initiated pupil talk}}{\text{initiated teacher talk}} = \frac{P_{in}+P_o}{T_{in}+T_{co}+T_{oc}+T_d+T_{dt}}$$

It proposes to indicate what proportion of pupil and teacher talks were judged by the observer to be an act of initiation. Suppose this ratio gives 10/45=0.22, then this means that pupils showed about one-fifth of the initiative of the teacher. Or that the teacher showed about 4 1/2 times the initiative of the pupils.

$$1.4 \quad \text{Ratio of } \frac{\text{Positive response of teacher}}{\text{Negative response of teacher}} = \frac{T_{rp}}{T_{rn}}$$

It is a measure of teacher's tendency to respond to the ideas and feelings of the pupils. Suppose this gives 10/5, then this is 2 which means that teacher used twice as many positive responses as he did negative responses.

$$1.5 \quad \text{Ratio of } \frac{\text{Pupil closed questions}}{\text{Pupil open questions}} = \frac{P_{rc}}{P_{ro}}$$

It represents the tendency of pupils to ask questions. Suppose this ratio gives 2/4, then this is 0.5 as a decimal which means that half the pupil's questions were closed or, pupils asked twice as many open questions as they asked closed questions.

2. Percentages :

Different kinds of statements in terms of percentages were computed by reporting the tallies in each of the column. This was done by dividing each of the column total by the grand total number of tallies in the matrix and multiply by hundred. This computation gives a clear picture of the proportion of the total transaction in the observed classroom situation found in each category. The percentages computed are as follows.

2.1 Teacher talk :

For this total teacher talk is divided by total transactions happened in the classroom and multiplied by hundred i.e.

$$\text{teacher talk} = \frac{\text{Trp} + \text{Trn} + \text{Tin} + \text{Tgo} + \text{Tgc} + \text{Td} + \text{Tdt}}{\text{Total transactions}} \times 100$$

2.2 Pupil Talk :

To find out the percentage of total pupil talk out of the total transactions happened in the class, total pupil talk is divided by total transactions and multiplied by hundred i.e.

$$\text{Pupil Talk} = \frac{\text{Pro} + \text{Prc} + \text{Pin} + \text{Pg}}{\text{Total transactions}} \times 100$$

In the same way, the percentages of each category of the transactions of each student-teacher's matrices were calculated by the same method.

3. Graphic Presentation :

Student-teachers classroom transactions patterns are shown in graphic form. A trend of classroom behaviour and its modification is clearly marked in graph.

3.8.6 Sequence of Events in Transaction Training

In the present study the investigator has used ACTs as a training tool as well as an observation tool.

3.8.7 Stage-1

PILOT STUDY

In the pilot study the group under study which was to be given treatment of providing knowledge of ACTs received instruction in preparing lesson plan, formulating objectives, and other preparatory works for practice teaching as well as the regular theory classes along with other students. After preparatory theoretical background for teaching, the group was separated from other students and they were told to follow only transaction training programme.

The investigator started theoretical orientation about transaction training. The components of theoretical orientation were : concept of teaching-teaching as a transactive process - classroom behaviour patterns as basis for explaining teaching, classroom transactions, teacher influence and teaching style, analysis of classroom transactions category system and detailed discussion about different categories. The methods adopted for orientation were: Lecture, group discussion and self study by providing a typed copy of ACTs system (see Appendix 2 and 3). The entire theoretical orientation took nine days (three hours per day).

After successful completion of theoretical orientation, student-teachers were assigned to school for delivery of two lessons each. Each student-teacher was observed twice for 24 minutes to collect data (pre-test).

The real transaction training started after pre-test stage. The training includes: discussion about lesson planning based on ACTs, practice in use of classroom transactions categories through, teaching in simulation (each lesson for 15 min) the situations representing different categories were created by investigator through role play and strategy of changing one's own classroom behaviour. This took about sixteen days.

Student-teachers were allotted school as well as classes for practice in use of categories in real classroom situation. They were assigned to practice for fifteen lessons in classes VIII and IX for science teaching. Every student-teacher was observed every day for 24 minutes by investigator, peers as well as by supervisors. Feedback based on ACTs was provided just after completion of lessons. The last two lessons of each student-teacher were observed for post-test data.

3.8.8 Stage-2

THE FINAL EXPERIMENT

As stated above, the final experiment group selected for the study, also attended the theory classes as well as preparatory instructions for teaching along with other students. The transaction training programme was divided into three phases. They are:

(a) Phase - I :

Theoretical Orientation

Theoretical orientation was started by giving a lecture on concept of teaching and that was followed by a sequence of lectures, group discussions on teaching as an transactive process, classroom behaviour patterns as basis for explaining teaching-classroom transaction, and teaching style and teacher influence. Analysis of classroom Transactions, transactional analysis. Typed materials were supplied to every student teacher for self study (see Appendix 2). Having this background on transactions, every student-teacher was given an opportunity to analyse a science lesson i.e. 'Air Pressure' on the basis of ACTs category system (See Appendix 4). Discussions were went on each category and step of the lesson for common agreement. The entire theoretical orientation took 23 days (three hours perday) time. With the satisfaction that student-teachers have sufficient theoretical background, they were asked to plan any two lessons based on the science syllabus of class VIII and IX. Student-teachers were assigned their classes in school for teaching for two lessons. Each student-teacher was observed twice for 20 minutes based on ACTs category System (pre-test observation).

(b) Phase - II

Classroom Observation Training and Practice in

Use of Transactions Categories in Simulation

This phase started with the review of the previous phase for an hour. The typed material about different categories of

ACTs and method of recording transactions were supplied for self study (See Appendix 3). Student-teachers were told to go in school and observe two lessons of any regular science teacher. Based on student-teachers observation, certain things were discussed specially on controversial situations when it was confusing to decide in which category teacher is or pupil is. Student-teachers were clarified and introduced, with ground rules of observation. This was followed by preparation of matrix based on observation. Again student-teachers were sent to the school for observation and arrangements were made so that they can observe at least two lessons every day in the school in their leisure time. Side-by-side practice of categories of transactions in simulation was going on. Every student-teacher was asked to prepare one lesson plan based on ACTs and teach in simulation. In simulation also other student-teachers were observing the teaching. Feedback was provided based on observations of investigator, and peers. In that way student-teachers practised transactions categories through teaching in simulation and at the end they were perfect in observation also. The entire phase-2 took thirty-five days (three hours per day).

(c) Phase - III

Practice Teaching in Classroom :

Phase-2 was followed by phase-3. Student-teachers were allotted their classes VII and VIII and they were given the units for teaching. There were two sections in each class. The entire sample was divided into three groups to make practice

teaching convenient according to the classes. In a day only four student-teachers taught classes and rest others observed the classes. Just after delivery of all the four lessons, feedback and discussion sessions were arranged for two hours every day. Under forty-five days practice-teaching programme, every student-teacher finished his units through fifteen lessons. The last two lessons were observed each for 20 minutes (post-test observation).

3.9 MEASURES FOR ANALYSIS

3.9.1 Observer-Reliability

The inter-observer reliability was calculated through Scott's coefficient method. Different steps of this method are described below:

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

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

"Po" is the percentage of agreement and "Pe" 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 total tallies in each category were recorded for both the observers.

Step two

Percentage of tallies in each category were determined for both the observers.

Step three

While one observer finds the total percent disagreement by subtracting the percent figures corresponding to each category - summed overall categories, the other observer estimate 'Pe' by entering the largest and second largest categories as determined by either distributing or averaged from both. The percentage points by which two observers differed in each category were determined.

Step four

'Po' is determined by subtracting the total per cent disagreement from 100.

Step five

'Pi' is found by entering figure two with Po and Pe.

3.9.2 Matrix

The matrix 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 in this chapter under the subheading principal components of Transaction.

3.9.3 Use of 't' Test

't' tests were carried out on all the fifteen variables namely 'Teacher Talk' (TT), 'Pupil Talk' (PT), 'Teacher response positive' (Trp), 'Teacher response negative' (T_m), 'Teacher information' (Tin), 'Teacher question open' (T_{qo}), 'Teacher question closed' (T_{qc}), 'Teacher direction' (Td), 'Teacher does not direct' (T_{dt}), 'Pupil response open' (Pro), 'Pupil response closed' (Prc), 'Pupil information' (Pin), 'Pupil question' (Pq), 'Silence' (Sil), and 'Disruption' (Dis), with a view to identify whether the measures obtained were significantly different from pre-test to post-test. For the procedure followed in the calculation, Garrett (1969, pp.223 and 226-228) may be referred.

The problem, objectives, hypotheses, definition of terms used, the design, procedure, and sequence of events have been outlined in this chapter. The results, discussion and interpretation follow in subsequent chapter.