

## C H A P T E R    T H R E E

### PROBLEM, PLAN AND PROCEDURE

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#### I. THE PROBLEM AND THE VARIABLES

The preceding review has underscored the need for research in the area of teacher behaviour to bring to light the relationship, inter alia, between some demographic variables relating to the teacher and teacher influence.

The present study is, therefore, directed towards studying the relationship between some chosen demographic variables on the part of the teacher and a particular criterion of teacher influence.

The problem taken up for investigation is as follows:

"A STUDY OF THE PATTERNS OF TEACHER  
INFLUENCE IN SOME SELECTED SCHOOLS".

The investigation would be of a descriptive type

of survey. Efforts would be made to study the teacher influence patterns in the schools coming in the sample. The investigation, therefore, undertaken with the chief purpose of identifying the distinctive patterns of teacher influence and their relationship with the variables chosen is perforce analytical and exploratory.

The study being basically exploratory, there is not much of earlier research to guide the selection of variables. The scanty work done in this respect also is the work done and reported abroad. In this connection, it is recalled how under 'Review of Literature' earlier this fact was explained by the investigator while quoting the scanty literature on the variables.

While, therefore, earlier research work guiding the selection of variables being ruled out it is only careful judgment and meaningful discretion which should help the investigator select the variables.

Of the several conceivable variables which could significantly affect in one way or another the teacher's classroom behaviour a few could be hypothesized.

The investigator seeks to study the patterns of teacher influence as affected by: (1) age, (2) recency of training, (3) experience, (4) sex and (5) marital status, of the teacher and also (6) the subject matter being taught by him.

It may be seen that all the first five independent

variables are teacher characteristics which are non-personality-oriented while the last - mentioned independent variable, 'the subject being taught' is a non-teacher variable. It may be called a curricular variable.

Again all the six independent variables listed above partake of the nature of 'presage' variables while the teacher influence which is the dependent variable is a 'process' variable. The relationships between presage and process variables, as has been discussed earlier under 'Review of Literature' is a promising vista of inquiry.

Flanders and Anita Simon (1969), as has been quoted earlier, feel that the snag to progress in this area is the difficulty of relating teacher traits to process variables. They, however, do not remain as doubting Thomases but reasonably hope that significant strides of research here are in the offing, especially in the realm of research linking some training experiences (presage variables) and process variables.

#### Operational Definitions

Teacher influence: Teacher influence is defined as teacher verbal behaviour in the classroom. By measuring and studying teacher verbal behaviour it is possible to describe the patterns of teacher influence in the classroom since, as discussed earlier in Chapter Two, it is the type

of teacher verbal behaviour that conditions the classroom climate which is associated with pupil learning.

Age: Age of the teacher is defined as the number of years completed.

Experience: Experience is defined as the number of years of regular service put in as teacher following formal training.

Recency of Training: Recency of training is defined as the number of years that elapsed since the acquirement of formal training. Evidently, the greater the index of recency of training the more remotely trained the teacher would be. This fact is taken into consideration while interpreting the results.

Sex and Marital Status: These two variables do not warrant any special operational definition.

Subject Taught: Subject taught is defined as the major curricular material taught by the teacher. The curricular materials studied comprised Tamil, English, Mathematics, History, Geography and Science.

## II. RATIONALE OF THE PROBLEM

As has already been repeatedly pointed out the disturbingly diminutive quantum of earlier research cannot be banked upon for an explanation of the rationale of the problem vis-a-vis the variables.

The significance of the variables has only to be appreciated in the wider perspective of some relatively more fundamental issues in the realm of teaching and teacher effectiveness.

The need to develop a theory of teaching as discussed earlier, is of utmost urgency in our country, especially in the context of our expansionist programmes of taking school education to our teeming millions. The poignancy of the problem in its general nature is highlighted by the eye-opening discussions by N. L. Gage (1962).

The task of developing a reliable theory of instruction perforce warrants extensive explorative studies in the area of classroom interaction analysis and teacher behaviour with a view to identifying all the important variables at play. It is with this end in view that the present investigation is undertaken.

Development of a conceptual framework the need for which has been emphasised earlier, perhaps is a forerunner to a reliable theory of instruction.

Also the task of improving classroom teaching is of utmost urgency. This points to the need for something to be done, without any further loss of time, so as to enable the teachers in actual service <sup>to</sup> become more effective in their teaching function. This problem, evidently, cannot wait until an acceptable theory of

teaching is developed and incorporated in the teacher training programmes. The more immediate problem, therefore, is of an inservice type.

If we could decipher the significant relationships, if any, between teacher influence and the variables proposed to be studied, perhaps it would enable us to devise some special strategies of inservice programmes, so as to equip better the different groups of teachers.

Perhaps as regards a study like the present one bearing chiefly upon teacher characteristics of a 'presage' nature it may be said that the results would help the teacher-recruiting agencies to formulate some guidelines in the matter of selecting teachers, for service. This administrative advantage is also of a remarkable significance since it would in the long run facilitate optimum use of the human resources in the field of teaching for the right type of person might be posted to the right type of post.

Our logical thinking takes us further into the administrative advantages of the study with regard to the day-to-day internal management of the school affairs. The findings may help the heads of institutions to assign proper type of teachers for proper type of work, which would raise the quality of the output by the teachers.

In addition to the foregoing considerations let us turn our attention to some realities in the field of education which in a way help explain the significance of the variables. These are, however, to be appreciated more in the context of the area and scope of the study than otherwise.

### Age

Generally, 'ageing' is a process associated with gradual decline in the capacity for productive work. Even so is the case in teaching for teachers are asked to retire on reaching a particular age.

On the other hand, there is the opinion that "ageing" mellows people's temperament and attitudes. If that be the case, teachers as they become more and more aged, should be observed to increasingly become 'indirect' in their patterns of influence. What actually is the evidence?

Further, in some cases it is seen how only youngster's rather than older people are paying heed to the dictates of theory and believe in the efficacy of democratic approach, etc. while the latter some times develop an attitude of a cynic and grow sceptic about liberal and democratic behaviour at all. Could it be that older teachers are less 'indirect' than their younger counterparts?

Investigation of the patterns of teacher influence as a function of age, therefore, may be expected to shed some light on the relative need for periodic inservice training programmes for teachers of different age-levels.

#### Experience and Recency of Training

Perhaps, these two are to some extent correlated. It may be that where the teacher is more experienced the recency would be low (signifying remote training) and vice versa. But then, there may also be instances wherein teachers entered the profession long after acquirement of training, the intervening time lag altering the expected normal relationship between these two factors. Hence, it was thought fit to study them separately with reference to the criterion variable.

#### Sex

As in almost every other field of activity, here in education too, along with male teachers, a large number of female teachers are in service. Investigations in respect of sex, therefore, might throw some light on the contrasting patterns, if any, of influence of male and female teachers and the findings may be expected to guide accordingly the principles of admission for teacher training. Also they would indicate the relative extent of reorientation needed for the male and female teachers already in service.

### Marital Status

In the absence of extensive earlier research in this area, choice of variables is justifiably governed by considerations of personal judgment and some times even intuition. One feels that teacher behaviour being plausibly governed by one's attitudes and values is likely to be affected by one's marital status. It seems, therefore, worthwhile to probe the possible relation between the marital status of the teacher and his classroom behaviour.

### Subject

Pupils generally find the study of English difficult and show relatively poorer performance in English than in Tamil.

To some pupils while History and Geography are said to be relatively difficult to yet others Science and Mathematics are reported to be the Achilles' Heel. Could it be because of the varying teacher influence patterns in different subject areas? Do different subject areas affect the teacher influence patterns in different ways?

Whatever the subject, if instruction is imparted in a 'democratic' manner the indirect influence exerted by the teacher is believed to contribute to better learning. If that were to be so the results of investigations into the patterns of teacher influence in

different school subjects, might perhaps, indicate the areas of pronounced 'directness' or 'indirectness'. Remedial measures might help a large number of pupils.

### III. SCOPE

The present study seeks to investigate the patterns of teacher influence by means of observing, recording, quantifying and analysing teaching-learning process of interaction in the classroom. Attempt is made to find out the relationship chiefly of certain non-personality variables about the teacher to a criterion of teacher behaviour.

The variables studied are age, recency of training, experience, sex and marital status of the teacher and subject taught while the criterion variable is a measure of 'indirect' behaviour of the teacher.

The study has been conducted on a random sample of teachers from high schools in Gujarat and primary and upper primary schools in Madras.

The study is primarily exploratory and does not seek to establish norms.

The study is concerned with only the verbal interaction between the teacher and the students as also amongst the students themselves and does not take into account non-verbal communication in the classroom.

The interaction process analysis in the study is with reference to the affective domain of the teaching-learning process and not its cognitive or psycho-motor aspects.

For measuring teacher influence Flanders' Interaction Analysis System of ten categories has been used.

#### IV. HYPOTHESES

The research hypotheses to be set up for verification in an investigation should invariably be dictated by considerations emanating from earlier findings of related research. As has been earlier pointed out, there is very little past research, particularly bearing on the variables chosen for probe, that could guide formulation of hypotheses. In a way, therefore, the study itself is chiefly exploratory. Hence, the hypotheses in such an exploratory investigation like the present one should be inevitably governed by extraneous considerations of careful judgment. The considerations are called extraneous because they are not purely emanating from the guidelines of earlier research findings which, however, should be the case.

The research hypotheses set up are as follows:

1. Age of the teacher exerts an overall negative effect on his indirect influence.

This amounts to saying that younger teachers are more indirect in their influence than older teachers or conversely, older teachers are less indirect in their influence than younger teachers.

2. Recency of training of the teacher bears an overall negative effect on his indirect influence.

This amounts to saying that more recently trained teachers are more indirect in their influence than more remotely trained teachers or conversely, more remotely trained teachers are less indirect in their influence than more recently trained teachers.

3. Experience of the teacher bears an overall negative effect on his indirect influence.

This amounts to saying that less experienced teachers are more indirect in their influence than more experienced teachers or conversely, more experienced teachers are less indirect in their influence than less experienced teachers.

4. Women teachers are more indirect in their influence than men teachers.

5. Unmarried teachers are more indirect in their influence than married teachers.
6. Teachers differ in their influence patterns when the subject taught by them is altered.

In addition to statistically testing the above six major research hypotheses, attempt would be made to describe the significant details of the patterns of influence of teachers as mentioned below:

1. Male teachers versus female teachers.
2. Married teachers versus unmarried teachers.
3. The diverse teacher influence patterns as regards the six different subjects namely: English, Tamil, Mathematics, History, Geography and Science.

It may be mentioned here that the rationale behind the formulation of the hypotheses regarding age and experience can be to some extent appreciated in the light of the remarks by Byans (1958) cited earlier (page 30). However, these two hypotheses and one relating to recency of training were formulated based on the general observation that a teacher if young, is relatively less experienced and more recently trained or conversely, if old is relatively more experienced and more remotely trained. Hence, the question might arise

as to why these three variables which may be possibly correlated with each other are all chosen for investigation. The answer is that although this plausible correlation is likely to be the general rule there could be exceptions where it might be otherwise. A hypothetical example could be an old teacher with comparatively very little experience due to long but interrupted desertion from teaching avocation. Also there may be instances of graduates who intended entry into teaching profession long after their graduation with the result that their formal training would be relatively at an unusually old age. Due to the possibility of occurrence of exceptions like the above and others, it was thought fit to study the variables separately rather than to leave inferences to be drawn based on suppositions of dubious correlations among them.

As regards the hypotheses relating to sex and marital status, again, the rationale behind their formulation can be explained somewhat in the context of Ryans' (1958) review comments cited earlier (page 30).

In sharp contrast to the nature of the first five hypotheses relating to age, experience, recency of training, sex and marital status which are definitive the nature of the hypothesis relating to subject taught is non-committal.

The non-committal nature of the hypothesis is

dictated by almost a complete lack of research evidence pointing to any possible relationships in this regard. Flanders (1967) as mentioned earlier, while reporting the finding that Mathematics and Science are associated with higher proportion of direct influence sounds a note of scepticism and warns us against drawing generalizations based on this finding.

Hence due to the patently exploratory nature of investigation as far as the subject taught is concerned a non-committal, but nonetheless potentially significant, hypothesis has been formulated. Once the hypothesis of dissimilar effects of the different subjects on teacher influence is verified then the nature of the dissimilar effects could be investigated.

#### V. TOOLS OF RESEARCH

The tools used in the study are two.

For gathering information relating to the independent variables an 'Information Proforma' was prepared and administered to the teachers observed (Appendix A ).

Teacher influence was measured by observing and analysing the classroom interaction of the teachers concerned by using Flanders' Interaction Analysis System which is given below in Table I.

TABLE I

Flanders' Interaction Analysis Categories\* (FIAC)\*\*

T	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. Predicting and recalling feelings are included.
E	2. Praises or encourages. Praises or encourages pupil action or behaviour. Jokes that release tension, but not at the expense of another individual, nodding head, or saying "Umhm?" or "go on" are included.
A	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.
C	
H	
E	
R	4. Asks questions. Asking a question about content or procedure, based on teacher ideas, with the intent that a pupil will answer.
T	5. Lecturing. Giving facts or opinions about content or procedures; expressing his own ideas, giving his own explanation, or citing an authority other than a pupil.
A	6. Giving directions. Directions, commands, or orders to which a pupil is expected to comply.
L	7. Criticizing or justifying authority. Statements intended to change pupil behaviour from non-acceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
K	
P	8. Pupil-talk - response. Talk by pupils in response to teacher. Teacher initiates the contact or solicits pupil statement or structures the situation. Freedom to express own ideas is limited.
U	
I	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.
L	
TALK	
SILENCE	10. Silence or confusion. Pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

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

\*\* Taken from 'Analyzing Teaching Behaviour' by Flanders. Ned A., Addison Wesley Publishing Company, 1970, p. 34.

rare; probably because teachers find it difficult to accept negative emotional behaviour. However, it may be just as difficult for them to accept positive feelings. Feelings expressed by students may also be ignored by the teacher if he considers the classroom to be a place where people are concerned primarily with ideas rather than feelings.

Category 2 - Praise or encouragement: Included in this category are jokes that release tension, but not those that threaten students or are made at the expense of individual students. Often praise is a single word; 'good', 'fine', or 'right'. Sometimes the teacher simply says, "I like what you are doing". Encouragement is slightly different and includes statements such as, 'Continue', 'Go ahead with what you are saying', 'Uh, huh; go on; tell us more about your idea'.

Perhaps the distinction between the categories 2 and 1 needs specific clarification. In the latter there is an element of objective diagnosis which is missing in category 2. Both categories are used for statements which have overtones of warmth and friendliness; but in category 2 they are capped with teacher approval as well.

Category 3 - Acceptance of ideas: This category is quite similar to category 1; however, it includes only acceptance of student ideas not acceptance of expressed

emotion. When a student makes a suggestion, the teacher may paraphrase the student's statement, restate the idea more simply, or summarize what the student has said. The teacher may also say, "well, that's an interesting point of view. I see what you mean". Statements belonging to category 3 are particularly difficult to recognize; often the teacher will shift from using student's idea to stating the teacher's own idea.

Statements belonging to category 3 can be identified by asking the question, "Is the idea that the teacher is now stating the student's or is it the teacher's?" If it is the student's idea, then this category is used; if it is the teacher's, another category perhaps 5 or so depending upon the verbal event must be employed.

Flanders (1971) feels that conservative and restrained use of category 3 by an observer would enhance its diagnostic utility. This category, he says, should be used most frequently when the cognitive orientation of the teacher incorporates the ideas expressed by the pupils.

Category 4 - Asking question: This category includes only questions to which the teacher expects an answer from the pupils. If a teacher puts a question and then follows it up immediately with a statement of opinion, or if he begins lecturing, obviously the

question was not meant to be answered. It is like a rhetorical question. A rhetorical question is not categorised as a question. An example of another kind of question that should not be classified in category 4 is the following: "What in the world do you think you are doing out of your seat, John". With proper intonation the question is designed to get John back in his seat. If such is the case, it must be categorized as criticism of the student's behaviour (category 7).

Questions that are meant to be answered are of several kinds. There are questions that are direct in the sense that there is a right and wrong answer. The question "What is 2 plus 2?" is a question that limits the freedom of the student to some extent. Although he can refuse to answer, give a wrong answer, or make a statement of another kind, in general, this kind of question focuses on the student's answer more than does a question like, "What do you think we ought to do now". Questions, then, can be very broad and give the student a great deal of freedom in answering. All questions, however, broad or narrow, which require answers and are not commands or criticism, fall into category 4.

Questions in general are usually fairly easy to recognize, even when they are open. In the context of a rapid drill, perhaps, 4's will look like 6's and are indeed to be categorized as 6's only since they come

almost with the force of commands/orders.

Flanders says:

...teacher questions can be coded in one of the seven teacher categories - in category 1 if they are objective, non-threatening inquiries involving attitudes or emotions and designate the feeling or emotions; in category 2 if they are intended to praise; in 3 if they are based on ideas previously expressed by pupils; in 5 if they are categorical and no answer is expected; in 6 if they are directions; and in 7 if they are critical, or designed to catch pupils who are day-dreaming. (Flanders, 1970, p.45)

#### Teacher Behaviour (Direct)

Category 5 - Lecture: Lecture is the form of verbal interaction that is used to give information, facts, opinions, or ideas to children. The presentation of material may be used to introduce, review, or focus the attention of the class on an important topic. Usually information in the form of lecture is given in fairly extended time periods, but it may be interspersed with children's comments, questions, and encouraging praise.

Whenever the teacher is explaining, discussing, giving opinion, or giving facts of information, category 5 is used. Rhetorical questions are also included in this category. Category 5 is the one most frequently used in classroom observation and shifts from 3 to 5 are common in classroom communication.

Category 6 - Giving directions: The decision about whether or not to classify the statement as a direction or command must be based on the degree of freedom that the student has in response to teacher direction. When for example the teacher says, "will all of you stand up and stretch?" he is obviously giving a direction. If he says, "John, go to the board and write your name", he is giving a direction or command.

Category 7 - Criticizing or justifying authority: A statement of criticism is one that is designed to change student behaviour from non-acceptable to acceptable form. The teacher is saying, in effect, "I don't like what you are doing. Do something else". Another group of statements included in this category are those that might be called statements of defence or self-justification. These statements are particularly difficult to detect when a teacher appears to be explaining a lesson or the reasons for doing a lesson to the class. If the teacher is explaining himself or his authority, defending himself against the student, or justifying himself, the statement falls in this category. Other kinds of statements that fall in this category are those of extreme self-reference or those in which the teacher is constantly asking the children to do something as a special favour to the teacher.

Both the categories 6 and 7 are used for

statements which are intended to bring about compliance. They tend to enhance the authority of the teacher. Mostly these categories are used to indicate close supervision and direction by the teacher.

Categories 1 through 4, those of indirect teacher influence, and categories 5 through 7, those of direct teacher influence, have been described. They are all categories of teacher talk. Whenever the teacher is talking, the statements must be categorized in one of the first seven categories. If the observer decides that with a given statement the teacher is restricting the freedom of the children, the statement is tallied in categories 5, 6, or 7. If, on the other hand, the observer decides that the teacher is expanding freedom of children, the category used is either 1, 2, 3 or 4.

#### Student Behaviour

Category 8 - Student talk-response: This category is used in the context of the teacher having initiated the contact or having solicited student statements. It is used when the student answers a question asked by the teacher, or when he responds verbally to a direction the teacher has given. Anything that the student says that is clearly in response to initiation by the teacher belongs to category 8.

Category 9 - Student talk-initiation: In

general, if the student raises his hand to make a statement or to ask a question when he has not been prompted to do so by the teacher, the appropriate category is 9.

Distinguishing between categories 8 and 9 is often difficult. But then there are several dimensions which help to separate response from initiation. Predicting the general kind of answer that the student will give in response to a question from the teacher is important in making this distinction. If the answer is one that is of a type predicted by the observer (as well as the teacher and class), then the statement comes under category 8. When in response to a teacher question the student gives an answer different from that which is expected for that particular question, then the statement is categorized as a 9.

Another dimension that aids the distinction process is the voluntary embellishment or enlargement of a topic. The pupil, here, comes up with information discernibly more than was required by the question.

Yet another aspect of such distinction is the contrast of indifference or conformity versus the expressions of will through independent judgment.

Such identification is also aided by the element of creativity and higher mental processes as opposed to non-creative and lower mental processes.

Incidentally, it may be mentioned here that one of the drawbacks of the Flanders' system is that category 9 is the only category available for any off-target remarks made by pupils. In other words both cooperative as well as non-cooperative initiation of the pupils falls into this only category.

#### Other Behaviour

Category 10 - Silence or confusion: This category includes anything else not included in the other categories. Periods of confusion in communication, when it is difficult to determine who is talking, are also classified in this category.

However, when long spells of silence occur, it is pointless to keep recording a series of 10's. In fact, Flanders' system, it may be recalled, is only intended for situations in which a verbal interchange exists between the teacher and pupils or at least such an exchange is imminent. Spells of silence, therefore, while occurring, can more conveniently be noted by drawing a pair of double lines and recording the time duration for which it occurred.

Again, in conformity with some ground rules, 10's may be marked and deemed appropriate, as will be discussed later under 'ground rules'.

Here again, incidentally, it may be mentioned

that Flanders' category 10 does not provide for distinguishing non-productive silence/confusion from productive silence/confusion.

Of contextual interest it would be if one recalls here that Flanders' system was not designed to answer detailed questions relating to pupil talk and different kinds of pauses/confusion. The system, on the other hand, is avowedly meant chiefly for the study and analysis of teacher talk in the classroom.

#### VI. 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. The poignancy of the problem is accentuated by the seemingly unending variety of judgments that arise and require consistent treatment. Constant consultations and discussions of controversial items of observation defying easy coding should help sustain reliability over time.

A knowledge of the ten categories is perhaps just the preliminary requirement. A thorough knowledge of the ground rules which serve as the guidelines at coding

stage for controversial situations is yet more important.

The training procedure requires repeated observation performances by trainee observers such that the inter-observer reliability (with a 'trained' observer) could be struck at 0.85 or more (Scott's reliability coefficient), according to Flanders (1960). The study was conducted by the investigator after due training and after establishing inter-observer reliability consistently at levels above 0.85.

The procedure of estimating reliability can be done either through the graphic method or the computational one commended by Flanders (1960).

It may be mentioned here that the reliability struck in this way relates only to the proportional distribution of tallies under the different categories.

Perhaps, we do not have as yet any technique to verify the exact sequence of occurrence of events as recorded by different observers. But then the frequent discussions by observers and resolutions of problems of situations involving defiant verbal events would help mitigate the consequence of this lacuna by helping all observers code correctly.

## VII. GROUND RULES

Our concern with the categories should immediately lead us to the question of ground rules that are used

in observations of classroom communication episodes. While the categories are committed to robust memory to facilitate prompt and accurate flash of the code number, a set of well-defined and meaningful ground rules are also assimilated so that the encoding is consistent. While accuracy is kept up by a thorough and living memory of the categories, consistency both between different observers and different observations by the same observer, is heightened by scrupulously following the guidelines. That incidentally, would help decoding in an effective manner by any analyst even if he had not been there at the scene of observations.

The need for some ground rules which would aid spontaneous consistent codification arises from the fact that observation categories involve concepts which are generally related to some theory, as is also the case here, and that interaction analysis through observation of classroom communication is nothing but a process of abstracting the intent of a verbal act from the act itself. It goes without saying that it is the intent rather than the verbal act that matters more in the context of codification-whether an act increases or decreases the student's freedom of action (which issue is relevant to the concerned theory here) and decide upon the category code to be recorded.

Due to judgmental scope of the observational

process there clearly arises the need for a set of ground rules which while serving as guidelines during times of difficult choices would heighten the consistency of observations, as mentioned earlier.

The following ground rules as given by Amidon and Flanders have been followed in the course of the observations:

Rule No. 1: When not certain in which of two or more categories a statement belongs, choose the category that is numerically farthest from category 5. This is true except when one of the two categories in doubt is category 10, which is never chosen if there is an alternate category under consideration. Because those categories farthest from the center (5) of the category system occur less frequently, the observer maximizes information by choosing the less frequently occurring category (except 10) when there is a choice. For example, if the observer is not sure whether it is a 2 or a 3, he chooses the 2; if in doubt between a 5 and a 7, he chooses a 7.

Rule No. 2: If the primary tone of the teacher's behaviour has been consistently direct or consistently indirect, do not shift into the opposite classification unless a clear indication of shift is given by the teacher. The trained observer is in the best position to judge whether or not the teacher is restricting or expanding the freedom of action of class members. If the observer feels that the teacher's pattern of behaviour is generally one of expanding the freedom of students to act, a slightly more direct statement in a very indirect pattern may tend to look, in contrast, like a more direct statement than it actually is. On the other hand, he must remain alert to momentary shifts to one of the more direct categories. Conversely, if the observer feels that the teacher has been consistently restrictive in his behaviour, he is particularly careful in his use of the indirect categories.

In observing this rule, the observer is reacting to the general tone of the teacher's influence, either direct or indirect, and does not use the opposing categories unless it is clear that the teacher has shifted from this more general pattern. He must, of course, be certain that the teacher has established a direct or indirect pattern before he categorizes consistently in either of the two areas. Clearly he must also be ready to change when the teacher obviously moves all the way up the system; that is, to 1 or 2 from 6 or 7, or when the teacher moves all the way down to a 6 or 7 from a 2 or a 3. This rule is often called the rule of the unbiased observer; that is, the observer is operating in a climate of general direct or indirect influence, and although he is ready to move to the opposite set of categories, he must feel that the teacher has definitely moved to the opposite type of influence before he is willing to grant a change in interaction pattern.

Rule No. 3: The observer must not be overtly concerned with his own biases or with the teacher's intent. Rather, he must ask himself the question, "What does this behaviour mean to the pupils as far as restriction or expansion of their freedom is concerned?" If when the teacher attempts to be clever, pupils see his statements as criticism of a pupil, the observer uses category 7, rather than category 2. If the teacher in being sarcastic says how good the children are, again category 7 is used. If a statement intended as a question has the effect of restricting students' freedom so that it becomes a direction, then it must be classified as a direction. The effect of a statement on the pupils, then, and not the teacher's intent, is the crucial criterion for categorizing a statement.

This rule has particular value when applied to the problem of helping teachers to gain insight into their own behaviour. In trying to categorize their own tapes, teachers comment, "But I meant...", or "I was really trying to get the pupils to talk more," or "I think that I wanted them to answer that question," or "I was trying to praise them", or "I meant to use that child's idea". All these protests indicate that the teacher is thinking about his intent rather than the effect of his behaviour on the class members.

The meaning and value of this category system for an individual teacher come from the attention it gives to the effect of teacher behaviour on the freedom of the class. Use of this criterion requires a great deal of training, particularly when a teacher is categorizing a tape of his own teaching. He must learn to be non-defensive about categorizing the behaviour, recognizing that there is absolutely no evaluation or good-bad orientation implicit in the category system. The question is simply, "What category best describes this particular bit of interaction?"

Rule No. 4: If more than one category occurs during the three-second interval, then all categories used in that interval are recorded; therefore, record each change in category. If no change occurs within three seconds, repeat that category number. This rule is concerned with the situation in which statements from two categories occur during a three-second period. Generally, an observer writes down a category number every three-seconds. The pace of recording is generally maintained at a constant level so that only one category number is written during this period.

However, if there is a change in categories during this interval, the observer records the change. Within the three-second interval, for example, the teacher may ask a question, the child answers, and the teacher praises the child. The observer attempts to record all three of the categories. The fourth rule, therefore, is that a category number is recorded every three seconds unless the teacher changes categories within the three-second interval. If he changes categories, or if more than one category occurs during the three-second interval, then all categories used in the time period are recorded.

Rule No. 5: Directions are statements that result (or are expected to result) in observable behaviour on the part of children. Examples of directions are "Go to the board, read question 3, go to your seat etc." Some teacher statements sound like directions but cannot be followed by observed student compliance. These statements often precede the actual direction; for example, "Let's get ready now to go to recess" (Orientation,

category 5), "Now row five get their coats" (category 6).

Rule No. 6: When the teacher calls on a child by name, the observer ordinarily records as 4.

Rule No. 7: If there is a discernible period of silence (at least 3 seconds), record one 10 for every 3 seconds of silence, laughter, board work etc.

Rule No. 8: When the teacher repeats a student answer, and the answer is a correct answer, this is recorded as a 2. This tells the student he has the right answer and, therefore, functions as praise.

Rule No. 9: When the teacher repeats a student idea and communicates only that the idea will be considered or accepted as something to be discussed, a 3 is used.

Rule No. 10: If a student begins talking after another student (without the teacher's talking), a 10 is inserted between the 9's or 8's to indicate the change of student.

Rule No. 11: Statements such as "uh huh, yes, heah, all right, okay", which occur between two 9's are recorded as 2 (encouragement). These statements function as encouragement (the student continues talking after the 2) and are, therefore, classified as 2.

Rule No. 12: A teacher joke, which is not made at the expense of the children, is a 2. If the joke makes fun of a child, then it is coded as a 7.

Rule No. 13: Rhetorical questions are not really questions; they are merely part of lecturing techniques and should be categorized as 5's.

Rule No. 14: A narrow question is a signal to expect an 8. If the student gives a specific predictable answer, this is an 8. If the child expands, documents, or justifies his answer, the observer should begin tallying 9's.

Rule No. 15: An 8 is recorded when several students respond in unison to a narrow question.

Use of these ground rules has been found to improve reliability. Observers considered to be ready for classroom observation need to be checked to determine the extent of the reliability of their observations. This reliability can be defined in terms of inter-observer reliability (the agreement between two observers observing a period of classroom interaction or tallying a tape of that interaction) or in terms of self-reliability (agreement between recordings of two separate hearings of one tape session by a single observer). Use of the Scott coefficient (1960) affords an approximation of observer agreement, although it does not reflect the extent to which two observers agree on the sequence of categories they have recorded. What the Scott coefficient does give is a general idea of the extent to which two observers agree on the amount of a particular category a teacher employs. For training purposes, of course, the observers need to have as much information as possible about their progress. Higher Scott coefficients, after increased practice, indicate progress. No method is yet available for dealing with the problem of the reliability of sequential ratings. (Amidon and Flanders, 1967, pp. 24-30)

Since classroom interaction is exceedingly complex and frequently involves nuances, even exhaustive category definitions, ground rules and their explanations can sometimes fail to cover all the possible classification problems that may arise.

Hence, the investigator and other observers met as reasonably often as possible in order to discuss controversial choices in codification and arrived at some common guidelines which are given below. These guidelines were followed in addition to the ground rules cited above.

Guidelines Followed

- (1) Teacher reading from the book is put in category 5.
- (ii) Pupil reading from the book is put in category 8.
- (iii) Teacher or student writing on the blackboard is to be treated as 'no verbal interaction period' and hence, is to be ignored. However, a marginal note instead of a clumsy and useless series of 10's is to be made. This guideline is to be invoked when the blackboard work continues for very long spells of time and when, therefore, the ground rule 7 will be superseded by this guideline.
- (iv) Also are ignored, after making necessary marginal notes likewise, the occasions when a visitor enters the class, a circular is brought, the teacher excuses himself away for a while from the class and pupils write either from the book or the blackboard.
- (v) Other 'ignored' types of events would include students' silent reading and teacher dictating as students take down.

### VIII. THE PROCEDURE OF OBSERVATION

The observer, on entering the classroom, sits in the best possible position to hear and see the participants. Almost as often as possible or at the end of about every three-second-period, he decides which category best represents the communication events just completed. He then writes down that category code number, while he simultaneously however, continues to be alive to the on-going communication. Observation proceeds at the rate of about 20 to 25 tallies per minute, on average, keeping the tempo as steady as possible.

Having a regular tempo is far more important than achieving a particular rate of tallying because most conclusions rest on rate consistency and not on speed of coding. Human observers can never be perfect metronomes; but then it is the steady rhythm that the observers should seek to develop and it is possible of accomplishment through sustained practice.

The observation notes are merely a sequences of numbers written in columns, top to bottom, so that the original sequence in which the events occurred is preserved.

Marginal notes are, as often as needed, used to record 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.

A hypothetical episode given by Flanders (1960, p. 30 ) may be considered and the encoding procedure discussed.

The school bell rings and the following interaction occurs. The numbers written down by the trained observer are indicated in brackets.

- Teacher - "Class! The bell has rung. May I have your attention please! (6)
- During the next three-seconds talking and noise diminish. (10)
- Teacher - "Jimmy, we are all waiting for you." (7) pause.
- Teacher - "Now, today we are going to have a very pleasant surprise, (5) and I think you will all find it very exciting and interesting. (1). Have any of you heard anything about what we are going to do? (4)
- Pupil - "I think we are going on a trip in the bus that's out in front". (8)
- Teacher - "Oh! You've found out! How did you learn about our trip?" (4) etc.

At the end of this spell of observation the observer would have written down in a column the code numbers which are 6, 10, 7, 5, 1, 4, 8 and 4. As the interaction proceeds the observation would continue and the verbal interaction would be reduced to series of code

numbers which would later be entered in the form of tallies on a ten-by-ten matrix.

#### IX. TABULATION AND INTERPRETATION OF MATRIX

Techniques for analysing classroom interaction are based on the notion that the classroom communication which is a two-way one, can be perceived as a series of verbal events which occur in a meaningful succession. They can be spaced along a time continuum.

The communication events that occur in the classroom are interdependent and as soon as the first statement is made a better than average prediction can be made about the next event.

Thelen's metaphoric description of our quest of life, as quoted by Flanders, though not referring to the chain of small events occurring in a classroom, is nevertheless an appropriate analogy.

The most fascinating question in the world is, How does one thing lead to another? Here we are, standing in the present but this is merely one tiny event in a long series that began with time and will end in the unforeseeable future. Time is a mountain whose peak is the present. The past slopes off one side and the future off the other. Looking in one direction we make explanations - looking in the other, predictions. People then, now, and in time to come will always be on the peak, midway between explanations and predictions; caught in both, both overlapping and each giving its unique flavor to the quest that is life. In looking backward we start with facts and then build an image;

in looking forward we build an image and then, through action, make the facts. To the extent that we do both we are able to be wise. (Flanders, 1970, p. 2)

It is in the very nature of classroom communication that category five invariably receives an especially high loading because the teacher communicates information.

Not only are the probabilities unequal within the ten categories, but these same probabilities keep changing with each event. When a teacher is lecturing, the probability that a student will talk next is quite low; when a teacher asks a question, the probability that a student will talk next suddenly increases.

This interdependence renders the statistical problems vexatious. The solution to the statistical problems makes use of ten-by-ten matrices.

In this connection, perhaps, it would be appropriate to mention a relatively newer technique that Flanders (1970) has commended more recently.

The time-consuming, tedious clerical work of plotting events two at a time into a ten-by-ten matrix is loathsome but inevitable in Indian conditions since the cost of computer services might be prohibitively high and also the gadgets that can be used for recording the observations in the classroom itself have not made their way into India as yet.

Further a ten-by-ten matrix fails to provide an exact picture of how interaction varied during the elapsed time of observation. That is to say, a tally in a matrix cell indicates, only the particular 'sequence pair' of events and one cannot say what particular 'sequence pair' preceded or what particular sequence pair followed the tally under reference. The preservation of 'sequence' in a matrix, therefore, is only to the extent of recording, 'pairs'. This limitation can be noticed while 'decoding' the matrix. This drawback is inevitably associated with the ten-by-ten matrix technique.

We are, therefore, noticing two drawbacks associated with matrix construction - namely, the 'tedium' going with matrix construction and the 'limitation' of reconstruction of an observed event during 'decoding' stage.

To obviate these two difficulties, at least, one could think of an alternative which the 'time line display' patently is.

In fact, the goal towards which Flanders, as he says, (1970) has been striving to progress was to achieve a level of technology, especially for applications involving feedback to teachers, whereby behaviours of interest are coded accurately, and the code symbols are tabulated directly into a display which highlights particular, desired comparisons. The entire process must

keep up with the tempo of the spontaneous behaviour so that at the moment the observation ceases, we have a complete display of summarized data which could provide instant feedback, if this is desired<sup>10</sup>.

The chief purpose of single event time line display which is not only a mode of display but is also an encoding procedure itself, is that it will provide a visual estimate of the proportion of time for which the teacher initiated and the pupils responded, versus the proportion of time for which the pupils initiated and the teacher responded.

The technique as developed by Flanders is a variation of a display format called "interaction sequence graph" innovated by Dr. Floyd Urbach (1966), who placed emphasis on categories 3, 4, 5, 8 and 9.

#### Tabulating a Matrix

Tabulation of the category code numbers begins with verifying if 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. This procedure is followed in order to produce a 'completed' matrix in which the sum of column one equals the sum of row one, the sum of column two equals the sum of row two, etc. In short, the 'completed' nature of the matrix would have it that the

sums of columns would equal the sums of the corresponding rows.

The number ten, it may be clarified, is added since it is this number which when added will affect the interpretation of teacher influence in the least. By the way, one of the less sympathetic critics, complains Flanders (1960), went to the extent of cynically remarking that this convention was necessary in order to begin and end an observation in confusion. But then, a saner look at the thing would reveal that the ten does not signify confusion only. It also stands for pauses and silence.

Incidentally, it may be noted that for completing the matrix it is always not necessary to add a ten at the beginning and end of the series. In fact, what is needed for ensuring a 'completed' matrix is that the same category number should be present both at the beginning and end of the series. If the condition is already present in the series there is no need whatsoever to supply a 10. It is only when such is not the situation a 10 is recommended.

The hypothetical observational data presented earlier ( p.106 ) may be considered here.

The series is 6, 10, 7, 5, 1, 4, 8 and 4. Since in this series there is no 'ten' at the beginning and at

the end of the series a 'ten' is added at both the ends. The series now becomes 10,6, 10, 7, 5, 1, 4, 8, 4 and 10.

Now the numbers are tallied in a ten-by-ten matrix. 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. For instance, the second number of the first pair would be the first number of the second number; the second number of the second pair would be the first number of the third pair; and so on.

The series being considered would break up into the following pairs, in order.

1st pair (10-6)  
 2nd pair (6-10)  
 3rd pair (10-7)  
 4th pair ( 7-5)  
 5th pair ( 5-1)  
 6th pair ( 1-4)  
 7th pair ( 4-8)  
 8th pair ( 8-4)  
 9th pair (4-10)

The total of 10 observations have yielded 9 pairs. Since, in this way, each pair overlaps with the

next pair there would be  $N-1$  tallies in the matrix for  $N$  observations.

The pairs are entered as tallies on a ten-by-ten matrix as shown in Figure 1 . In the figure, however, the observations and the successive pairs are given again by the side of the matrix for purposes of ready reference. The first pair is entered as a tally in the cell designated by row ten column six; the second pair, in the cell designated by row six column ten; the third pair, in the cell designated by row ten column seven and so on. The ninth pair is entered in the cell designated by row four column ten.

Once 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 as they do in the matrix given in the figure

Matrices can be developed from observations, according to the purpose on hand. They may be prepared for a simple activity period<sup>or</sup> for a given duration of time or the like.

Matrices can also be combined if the purpose so

	1	2	3	4	5	6	7	8	9	10	T
1				1							1
2											0
3											0
4								1	1		2
5	1										1
6									1		1
7					1						1
8				1							1
9											0
10						1	1				2
T	1	0	0	2	1	1	1	1	0	2	9

PAIRS

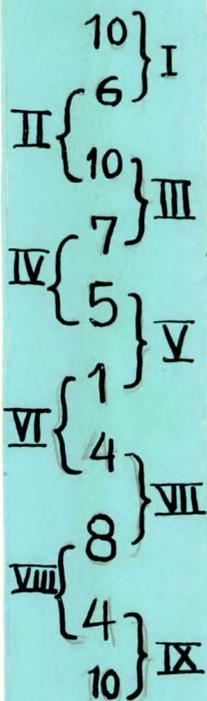


FIGURE 1

TABULATION OF SEQUENCE PAIRS IN MATRIX

demands, to yield one or more master matrices. Combining matrices is done <sup>cell</sup> by cell addition of the matrices and the cell loads would equal the sum total of the loads in the two or more basic matrices.

#### Comparing Matrices for Statistical Significance

Occasions there might be, as warranted by the purpose on hand, to compare two or more matrices. Flanders (1960) has adopted and recommended the following procedure for this purpose.

To find out whether two or more interaction sequences are significantly different from each other one has to compare the two concerned matrices. Perhaps the statistical problems in comparing the matrices are annoying. Each event affects the probabilities that a particular event will follow. This basic interdependence of interaction data renders the use of Chi-Square technique inappropriate for this purpose.

Dr. John H. Darwin, Department of Scientific and Industrial Research, Wellington, Newzealand 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 markov chains which is a much better approximation than the zero-dependent assumption of Chi-Square. But of course, communication events are in fact, more than one-dependent, but the additional dependence of three or more events is small by comparison to the dependence between two events.

Given two or more matrices the null hypothesis concerning the sequential distributions in them can be tested by the following likelihood ratio suggested by Darwin.

$$2 \left[ \sum n_{jkl} \log_e \frac{n_{jkl}}{n_{j.kl}} - \sum n_{j.l} \log_e \frac{n_{j.l}}{n_{j..}} - \sum n_{jk.} \log_e \frac{n_{jk.}}{n_{j.k.}} + \sum n_{j..} \log_e \frac{n_{j..}}{n_{..}} \right]$$

A dot in place of a suffix means that summation has been carried out over the replaced variable. If the logarithms to the base ten are used the value within the brackets will have to be multiplied by 4.605 instead of 2. The standard score "Z" is found by converting the above criterion as follows:

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

where  $n = s(s - 1)$  and  $S$  is the number of categories.

For two ten-by-ten matrices the formula becomes

$$Z = \frac{\chi^2}{2\chi^2} - 13.379. \text{ When } Z \text{ is } 2.58 \text{ or larger, the}$$

null hypothesis is rejected at 0.01 level of confidence.

When two matrices are found to be significantly different by the application of the Darwin's Likelihood Ratio criterion, as described above, it becomes clear that the matrices can be probed further for meaningful interpretations based on the sequential cell loadings. All further matrix interpretations gain statistical sanction from the verdict of Darwin's test.

#### Interpreting a Matrix

Interpretation of a matrix is an intellectually stimulating task. In fact, as has been mentioned earlier, the matrix technique facilitates reconstruction of the observed interaction phenomenon in such a way that not only the frequency but also the sequence, to some extent, of occurrence of verbal events are preserved. A careful and vigilant analyst or even the observer himself can effectively decode the matrix for a meaningfully revelatory interpretation. The reliability of the interpretation evidently depends as much upon the scrupulous and fastidious observance of ground rules by the observer at the time of observation as upon the careful and vigilant analysis by the analyst.

The ten-by-ten matrix with one hundred cells to preserve the frequencies of an equal number of sequential occurrences of verbal events offers a splendidly fecund

scope for meaningful interpretations. The rich data made available by the matrix technique can speak volumes about the nature and extent of the communication episode.

The matrix interpretations proposed to be made in the study are those suggested by Flanders (1960 and 1970). These interpretations are based on tally concentrations in specified areas of the matrix.

The specific indices aiding interpretation and the corresponding areas of the matrix are discussed below. The computational details are also given.

#### GENERAL FEATURES

- |  |   |  |
|--|---|--|
| 1.1 Total time of recorded interaction               | } | Grand total of tallies x 3<br>----- hrs.<br>60 x 60                      |
| 2.1 Per-Teacher interaction                          | = | Grand total of tallies<br>----- tallies<br>No.of teachers observed es    |
| 3.1 Per-hour interaction                             | = | Grand total of tallies<br>----- tallies<br>No.of hours of observation es |
| 4.1 Vacant cells are those that carry nil frequency. |   |  |

#### Principal Components of Communication

The total classroom interaction is made up of three principal components - teacher talk, student talk and silence/confusion as shown in Figure 2.

Teacher Talk



Student Talk



Silence/Confusion



	1	2	3	4	5	6	7	8	9	10	T
1	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
2	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
3	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
4	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
5	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
6	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
7	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
8	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
9	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
10	Teacher Talk	Student Talk	Student Talk	Silence/Confusion							
T											

FIGURE 2

PRINCIPAL COMPONENTS OF INTERACTION

$$5.1 \text{ Teacher Talk} = \frac{\text{Sum of column totals } 1+2+3+4+5+6+7}{\text{Grand total of tallies}} \times 100$$

$$5.2 \text{ Student Talk} = \frac{\text{Sum of column totals } 8+9}{\text{Grand total of tallies}} \times 100$$

$$5.3 \text{ Silence/Confusion} = \frac{\text{Column 10 total}}{\text{Grand total of tallies}} \times 100$$

#### Teacher Talk - Student Talk Balance

Perhaps, talking about the respective occurrence measures of teacher talk and student talk would not be as revelatory 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.

$$6.1 \text{ T/S ratio} = \frac{\text{Sum of column totals } 1+2+3+4+5+6+7}{\text{Sum of column totals } 8+9}$$

#### Flexibility of Communication - An Overall View

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 are known as the diagonal cells from the upper left of the matrix to the lower right.

Of contextual interest it is to note an inherent limitation of the ten-by-ten matrix analysis. It relates to the extent of reconstruction that is made possible.

Reconstruction of a steady-state or even a transitional event sequence is limited to time intervals of six seconds. In other words, by way of reconstruction one can say what event preceded what other event or followed what other event. The former is possible by scrutinising the rows while the latter can be deciphered by perusing the columns.

As an elucidation one can say that a sustained occurrence of an event for nine seconds, would be under-represented as two tallies in the particular diagonal cell. The two tallies, perhaps, to some extent, except in conjunction with recorded marginal notes and distribution pattern of tallies in the related cells, can never explain whether they relate to the sustained occurrence of the event for a spell of nine seconds or two different 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, as shown in Figure 3.

The combined cell load in all these ten cells together can be yet another general feature of classroom interaction that would aid 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 the pupils to remain, in the course of their

	1	2	3	4	5	6	7	8	9	10	T
1	■										
2		■									
3			■								
4				■							
5					■						
6						■					
7							■				
8								■			
9									■		
10										■	
T											

FIGURE 3

THE STEADY STATE CELLS

communication, in the same category for spell of longer than three seconds. It is, therefore, clear that a higher SSR ratio would imply that the communication between the teacher and the pupils has been less flexible to move from one category to another. This is so because the balance of interaction excluding the steady-state sequences is the interactive interchange containing all the transitions from one category to another. Naturally, therefore, a higher SSR would leave lesser tallies in the transition cells. The SSR thus becomes an indicator of flexibility in the communication episode.

$$7.1 \text{ SSR} = \frac{\text{Sum of tallies in } (1-1)+(2-2)+(3-3)+(4-4)+(5-5)+(6-6)+(7-7)+(8-8)+(9-9)+(10-10)}{\text{Grand total of tallies}} \times 100$$

#### Flow of Communication

Category ten in the tool points to occurrences 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.

Mostly, if not always, the spells of silence or confusion inject an element of discontinuity in the flow of communication. However, it is not implied here that all these spells as might even have indeed caused discontinuity to the flow of communication are despicable.

Occasions there are when spells of silence might have been deliberately engineered invariably by the teacher so that they would give the listeners breathing time to receive and digest the intake of information just received.

For instance, a question by the teacher might be followed by silence during which spell the student or students are retrieving the answer from their memory bed. Or, even the teacher might, in the process of delivering the answer, do so in such a fashion as to involve spells of 3 seconds intervals, in a bid to drive home the pivotal point in interrogation into the mind of the students.

Hypothetically, even sequences of content delivery followed by spells of silence, if deliberately caused by the teacher, can under no stretch of imagination, be summarily adjudged as a discontinuous flow of communication. It may be a strategy of teaching. Teaching may be punctuated with purposeful pauses.

Rather, in obeisance to a ground rule, the observers are to insert quickly a 'ten' after a student completes talk but before another begins his talk when students talk continuously. We note here how a 'ten' finds its way in the observations not because of any occurrence of silence etc., but because of the requirement by convention.



study, christened them as "Indirect" and "Direct" behaviour patterns.

The idea is that while the teacher has perforce, in the very nature of things, to exert influence, the question arises whether the influence is exercised in an indirect manner so as not to dispossess the students of their freedom of expression but rather to enlarge it, or in a direct manner with the inevitable curtailment of their initiative and freedom.

Perhaps, here one is by implication commending the use of indirect influence by the teacher in the classroom. This implication cannot be exonerated in toto because the question whether it is always the indirect influence of the teacher that causes more learning and positive attitudes on the part of students or alternatively, whether brighter students who can learn more and are more likely to have positive attitudes provide the teacher with the opportunity to be more indirect has inconclusively been debated and explored.

Turner (1967) opened up the interesting and edifying controversy with the suggestion that bright pupils are more likely to produce certain behaviour patterns which increase the probability that a teacher will appear indirect.

Flanders (1970) who concedes that classroom

interaction is indeed interactive and hence, perhaps, it requires more skill to maintain an indirect pattern with comparatively less able pupils, aptly warns that an investigation of the relative effects of pupil ability and teacher influence seems likely to provoke a kind of "hen-egg" argument. A constructive quietus to the controversy can be that it requires a fuller investigation of the various factors affecting the classroom interaction, particularly teacher's influence patterns, before a decisive answer can be found to the important question.

Just as the significance, causal and consequential, of teacher's indirect behaviour has sparked off an interesting controversy so also the quantification of indirectness has led many researchers to choose methods which are both mathematically varied and conceptually interesting.

Flanders (1970) cites a few of the more common measures of indirectness in teacher behaviour which are  $I/D$ ,  $1/d$ ,  $I/I+D$ ,  $1/1+d$ , frequency of the (3-3) cell and also the frequency in certain indirect categories. He feels that category systems are not well enough established to propose a single way to measure this feature of teaching behaviour. He proposes, as a more parsimonious way to conceptualize this aspect of classroom interaction, concepts of interaction and response applicable to both

the teacher's and the students' talk and develops a new set of indices to describe the concept of indirectness.

### Measures of Indirect Behaviour

The formulae followed in the present study are given below:

$$9.1 \quad I/D = \frac{\text{Sum of column totals } 1+2+3+4}{\text{Sum of column totals } 1+2+3+4+5+6+7}$$

$$9.2 \quad 1/d = \frac{\text{Sum of column totals } 1+2+3}{\text{Sum of column totals } 1+2+3+6+7}$$

### Teacher's Response - Initiation Nexus

In classroom discourse it is perhaps common that the teacher wields the wand of control. This means that much of initiation for communication comes from the teacher to which initiation the students respond. But then, what perhaps may be more desirable to occur would be that students initiate leaving to the teachers the more useful role of responding.

Whether it can always be that students can initiate and teachers respond in a large measure, questions of desirability apart, is perhaps, a moot point or at least an issue to be resolved through research (Flanders, 1970).

Categories 1, 2 and 3 signify teacher response,

as shown in Figure 4. A sensitive index that would patently portray the 'balance' of teacher response vis-a-vis pupil initiation should be based on the five categories - 1, 2, 3, 6 and 7. A ratio called Teacher Response Ratio (TRR) is computed from these five category totals as a percentage index.

$$10.1 \quad \text{TRR} = \frac{\text{Sum of column totals } 1+2+3}{\text{Sum of column totals } 1+2+3+6+7} \times 100$$

While TRR is a measure of teacher's tendency to respond to the ideas and feelings of the pupils there is an equally sensitive index to represent 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. It is called Teacher Question Ratio (TQR). TQR is a percentage of all category 4 and 5 statements classified in category 4. This aspect of teacher initiation is shown in Figure 5.

$$10.2 \quad \text{TQR} = \frac{\text{Column 4 total}}{\text{Sum of column totals } 4+5} \times 100$$

#### Instantaneous Teacher Response-Initiation Nexus

While TRR and TQR are useful indices of teacher's response and initiation patterns, perhaps, a still more sensitive index that would capture such teacher's reaction patterns occurring immediately at the cessation of pupil

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 4  
TEACHER RESPONSE

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 5

TEACHER INITIATION-QUESTIONS

talk would be far more useful. For one thing, an analysis of the first things that a teacher says at the moment a pupil stops talking is possible because the tallies required for the probe contemplated are isolated and tabulated clearly in the fourteen cells in rows 8 and 9 columns 1 through 7; and for another, the knowledge from an analysis of such instantaneous reaction of the teacher might be significant because each communication re-entry of the teacher would set expectations of what would follow and naturally would keep the highest proportion of the class attentive to him. The spontaneous impulses of the teacher are effective clues to his behaviour patterns.

The concerned cells are shown in the matrix in Figures 6&7. The isolation of these cells enables us to develop two more ratios similar to TRR and TQR. They are Instantaneous Teacher Response Ratio (TRR 89) and Instantaneous Teacher Question Ratio (TQR 89). The numerals in the address of the ratios identify the rows where this spontaneity lies buried.

TRR 89 shows the tendency of the teacher to praise or integrate pupil ideas and feelings into the classroom discussion, right at the moment the pupils stop talking. TQR 89 shows the tendency of the teacher to respond to pupil's talk immediately at its cessation with questions based on his own ideas, compared to his tendency to lecture.

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 6

INSTANTANEOUS TEACHER RESPONSE

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 7

INSTANTANEOUS TEACHER QUESTIONING

$$11.1 \quad \text{TRR } 89 = \frac{\text{Sum of tallies in } (8-1)+(8-2)+(8-3) \\ +(9-1)+(9-2)+(9-3)}{\text{Sum of tallies in } (8-1)+(8-2)+(8-3) \\ +(8-6)+(8-7)+(9-1)+(9-2)+(9-3)+(9-6) \\ +(9-7)} \times 100$$

$$11.2 \quad \text{TQR } 89 = \frac{\text{Sum of tallies in } (8-4)+(9-4)}{\text{Sum of tallies in } (8-4)+(9-4)+ \\ (8-5) + (9-5)} \times 100$$

### 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 as '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 area known as constructive integration is shown in Figure 8.

The extent of constructive integration may be found with reference to the total interaction. But then, it would seem that to measure the extent of constructive integration as a percentage of the total interaction may not throw instant light on the aspect. A better calculation may be to find the percentage with reference to the

	1	2	3	4	5	6	7	8	9	10	T
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7											
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9											
10											
T											

FIGURE 8  
CONSTRUCTIVE INTEGRATION

total occurrence of the three categories 1, 2 and 3. In fact, the constructive integration as measured is a part of the total occurrence of these three categories.

The indices are worked out as follows:

$$\begin{array}{l}
 12.1 \text{ Constructive inte-} \\
 \text{gration with refer-} \\
 \text{ence to total} \\
 \text{interaction}
 \end{array}
 = \frac{\begin{array}{l}
 \text{Sum of tallies in (1-1)} \\
 +(1-2)+(1-3)+(2-1)+(2-2) \\
 +(2-3)+(3-1)+(3-2)+ \\
 (3-3)
 \end{array}}{\text{Grand total of tallies}} \times 100$$

$$\begin{array}{l}
 12.2 \text{ Constructive inte-} \\
 \text{gration with refer-} \\
 \text{ence to categories} \\
 \text{1, 2 and 3}
 \end{array}
 = \frac{\begin{array}{l}
 \text{Sum of tallies in (1-1)} \\
 +(1-2)+(1-3)+(2-1)+(2-2) \\
 +(2-3)+(3-1)+(3-2)+(3-3)
 \end{array}}{\begin{array}{l}
 \text{Sum of column totals} \\
 1+2+3
 \end{array}} \times 100$$

### Vicious Circle

In sharp contrast to the promotion of positive motivation by the teacher in his classroom communication designated and discussed as 'Constructive integration' is what is called 'vicious circle'. This latter phenomenon refers to sequences involving orders/commands and criticism. The nomenclature, vicious circle may, in the first instance, suggest an element of contempt for the use of these two categories in the classroom discourse. However, resort to direct means cannot always be despicable and thus cannot warrant disapproval since orders/commands at least are often found unavoidable in classroom communication. The teacher in order to steer the discourse in the desired direction has perforce to

take recourse to directions which though mandatory to pupils are never deliberately intended to dispossess them of their freedom. One may, however, look askance at the resort to criticism/censure by teacher. It may be that an above-average recourse to orders/commands following criticism and vice-versa, in association with sustained orders/commands and sustained criticism unmistakably point to the prevalence of serious problems of classroom management and control.

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 the four cells (6-6), (6-7), (7-6) and (7-7) as shown in the figure 9.

The extent of vicious circle may be found either with reference to the total interaction or to the combined occurrence of categories 6 and 7.

13.1	Vicious circle with reference to total interaction	$\frac{\text{Sum of tallies in (6-6) + (6-7) + (7-6) + (7-7)}{\text{Grand total of tallies}} \times 100$
13.2	Vicious circle with reference to categories 6 and 7	$\frac{\text{Sum of tallies in (6-6) + (6-7) + (7-6) + (7-7)}{\text{Sum of column totals 6+7}} \times 100$

#### Teacher Steady-State Talk

There are seven steady-state cells signifying teacher's sustained talk, as shown in Figure 10. In

	1	2	3	4	5	6	7	8	9	10	T
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5											
6											
7											
8											
9											
10											
T											

FIGURE 9  
VICIOUS CIRCLE

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 10

TEACHER STEADY STATE TALK

the spirit of the suggestions by Flanders (1970) may be developed and discussed what may be called Teacher Steady-State Ratio (TSSR) which would be analogous to SSR (7.1) discussed above and Pupil Steady-State Ratio (PSSR) to be discussed shortly later.

$$14.1 \quad TSSR = \frac{\text{Sum of tallies in } (1-1)+(2-2)+(3-3) \\ +(4-4)+(5-5)+(6-6)+(7-7)}{\text{Sum of column totals } 1+2+3+4+5+6+7} \times 100$$

There are three principal constituents of teacher steady-state talk. 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). The respective indices are found as follows:

$$14.2 \quad \begin{array}{l} \text{Constructive inte-} \\ \text{gration component} \\ \text{of teacher steady-} \\ \text{state talk} \end{array} = \frac{\text{Sum of tallies in } (1-1) \\ +(2-2)+(3-3)}{\text{Sum of tallies in } (1-1) \\ +(2-2)+(3-3)+(4-4)+(5-5) \\ +(6-6)+(7-7)} \times 100$$

$$14.3 \quad \begin{array}{l} \text{Vicious circle} \\ \text{component of teacher} \\ \text{steady-state talk} \end{array} = \frac{\text{Sum of tallies in} \\ (6-6)+(7-7)}{\text{Sum of tallies in } (1-1) \\ +(2-2)+(3-3)+(4-4)+ \\ (5-5)+(6-6)+(7-7)} \times 100$$

$$14.4 \quad \begin{array}{l} \text{Content-orientation} \\ \text{component of teacher} \\ \text{steady-state talk} \end{array} = \frac{\text{Sum of tallies in} \\ (4-4)+(5-5)}{\text{Sum of tallies in } (1-1) \\ +(2-2)+(3-3)+(4-4)+(5-5) \\ +(6-6)+(7-7)} \times 100$$

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. The following indices would be useful in this connection.

$$14.5 \text{ Cell (5-5) component in steady-state teacher talk} = \frac{\text{Tallies in (5-5)}}{\text{Sum of tallies in (1-1) + (2-2) + (3-3) + (4-4) + (5-5) + (6-6) + (7-7)}} \times 100$$

$$14.6 \text{ Cell (4-4) component in steady-state teacher talk} = \frac{\text{Tallies in (4-4)}}{\text{Sum of tallies in (1-1) + (2-2) + (3-3) + (4-4) + (5-5) + (6-6) + (7-7)}} \times 100$$

#### Emphasis on Content

A useful aid to significant interpretation of any matrix is what is called 'Content Cross'. That part of the communication which is primarily concerned with content delivery is revealed in the group of cells constituting the 'Cross'. The nomenclature is derived from the relative arrangement of the 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 spills over to columns 3 and 6 too. But then, as a matter of fact, content orientation, in some measure or the other, is bound to be mixed up with every other teacher category. Since mostly 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.

Content emphasis is shown in Figure 11. A measure of the concern with content is the Content Cross Ratio (CCR).

$$15.1 \quad CCR = \frac{\text{Sum of tallies in columns 4+5}}{\text{Grand total of tallies}} \times 100$$

CCR evidently is made up of two principal component categories, teacher questions (category 4) and information delivery (category 5). Separate indices for these are the following:

$$15.2 \quad \begin{array}{l} \text{Question component} \\ \text{of content emphasis} \end{array} \left\{ \begin{array}{l} \text{Category 4 total} \\ \text{Grand total of tallies} \end{array} \right\} = \frac{\text{Category 4 total}}{\text{Grand total of tallies}} \times 100$$

$$15.3 \quad \begin{array}{l} \text{Information delivery} \\ \text{component of content} \\ \text{emphasis} \end{array} \left\{ \begin{array}{l} \text{Category 5 total} \\ \text{Grand total of tallies} \end{array} \right\} = \frac{\text{Category 5 total}}{\text{Grand total of tallies}} \times 100$$

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 useful indices in this regard would be the following.

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 11  
THE CONTENT CROSS

15.4	Content emphasis buried in teacher talk	$\begin{aligned} & \text{Sum of tallies in } (1-4)+ \\ & (2-4)+(3-4)+(4-4)+(5-4)+ \\ & (6-4)+(7-4)+(1-5)+(2-5)+ \\ & (3-5)+(4-5)+(5-5)+(6-5)+ \\ & (7-5) \\ & = \frac{\text{-----}}{\text{Grand total of tallies}} \times 100 \end{aligned}$
15.5	Content emphasis in the context of student talk	$\begin{aligned} & \text{Sum of tallies in } (8-4)+ \\ & (8-5)+(9-4)+(9-5) \\ & = \frac{\text{-----}}{\text{Grand total of tallies}} \times 100 \end{aligned}$
15.6	Content emphasis following silence/ confusion	$\begin{aligned} & \text{Sum of tallies in } (10-4) \\ & + (10-5) \\ & = \frac{\text{-----}}{\text{Grand total of tallies}} \times 100 \end{aligned}$

### 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. It should be remembered that category 2 stands not only for praise but also for encouragement and jokes cut by the teacher. When students are struggling for answers teachers are seen prompting and these are also instances of encouragement. When teachers deliberately repeat the answer given by a student the teacher's act involves a '2' and this serves, beyond any shadow of doubt, as an effective reinforcement. The cells in row 2 also supply some information relating to the events immediately following

praise which information, to some extent, 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 is shown in Figure 12. An overall index would be the following:

$$16.1 \text{ Total use of praise} = \frac{\text{Column 2 total}}{\text{Grand total of tallies}} \times 100$$

More fundamental details regarding the use of praise are given by indices computed with reference to the total use of praise. The following are the major such indices.

$$16.2 \text{ Praise buried in teacher talk} = \frac{\begin{array}{l} \text{Sum of tallies in (1-2)} \\ +(2-2)+(3-2)+(4-2)+(5-2) \\ +(6-2)+(7-2) \end{array}}{\text{Column 2 total}} \times 100$$

$$16.3 \text{ Praise in direct reaction to student talk} = \frac{\begin{array}{l} \text{Sum of tallies in (8-2)} \\ +(9-2) \end{array}}{\text{Column 2 total}} \times 100$$

$$16.4 \text{ Praise following silence} = \frac{\text{Tallies in (10-2)}}{\text{Column 2 total}} \times 100$$

Cell 8-2 gives an idea of the amount of praise/encouragement given in the context of pupil's responsive talk. Mostly it arises in situations of pupil reading

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10											
T											

FIGURE 12  
USE OF PRAISE

from the text book or from the blackboard when the teacher finds a need for helping or correcting the student, now and then. Cell 9-2 signifies praise given after student's self-initiated talk. This is clearly a compliment for their originality.

$$16.5 \quad \begin{array}{l} \text{Cell (8-2) compo-} \\ \text{nent of praise} \end{array} \begin{array}{l} \text{I} \\ \text{I} \\ \text{I} \end{array} = \frac{\text{Tallies in (8-2)}}{\text{Column 2 total}} \times 100$$

$$16.6 \quad \begin{array}{l} \text{Cell (9-2) compo-} \\ \text{nent of praise} \end{array} \begin{array}{l} \text{I} \\ \text{I} \\ \text{I} \end{array} = \frac{\text{Tallies in (9-2)}}{\text{Column 2 total}} \times 100$$

A further examination of the use of praise/encouragement as regards its effect or temporally succeeding event sequences can be made from a study of the row 2, as mentioned earlier. The useful indices here are as follows:

$$16.7 \quad \begin{array}{l} \text{Praise as launch-} \\ \text{ing pad for} \\ \text{teacher talk} \end{array} \begin{array}{l} \text{I} \\ \text{I} \\ \text{I} \\ \text{I} \\ \text{I} \end{array} = \frac{\begin{array}{l} \text{Sum of tallies in (2-1)} \\ \text{+(2-2)+(2-3)+(2-4)+(2-5)} \\ \text{+(2-6)+(2-7)} \end{array}}{\text{Row 2 total}} \times 100$$

$$16.8 \quad \begin{array}{l} \text{Praise as prompt} \\ \text{to student talk} \end{array} \begin{array}{l} \text{I} \\ \text{I} \\ \text{I} \end{array} = \frac{\begin{array}{l} \text{Sum of tallies in (2-8)} \\ \text{+ (2-9)} \end{array}}{\text{Row 2 total}} \times 100$$

$$16.9 \quad \begin{array}{l} \text{Praise leading to} \\ \text{silence} \end{array} \begin{array}{l} \text{I} \\ \text{I} \end{array} = \frac{\text{Tallies in (2-10)}}{\text{Row 2 total}} \times 100$$

$$16.10 \quad \begin{array}{l} \text{Cell (2-8) compo-} \\ \text{nent of praise} \end{array} \begin{array}{l} \text{I} \\ \text{I} \end{array} = \frac{\text{Tallies in (2-8)}}{\text{Row 2 total}} \times 100$$

- 16.11 Cell (2-9) component of praise  $\frac{\text{Tallies in (2-9)}}{\text{Row 2 total}} \times 100$
- 16.12 Cell (2-4) component of praise  $\frac{\text{Tallies in (2-4)}}{\text{Row 2 total}} \times 100$
- 16.13 Cell (2-5) component of praise  $\frac{\text{Tallies in (2-5)}}{\text{Row 2 total}} \times 100$

### Teacher Reaction to Student Statements

In a matrix there are two significant areas which give valuable clues regarding the critical manoeuvres carried out by teachers in the context of classroom communication. One of the two is teacher reaction to student statements for on these occasions when not only the whole class is likely to be keenly and anxiously attentive to the teacher to learn his reaction to their talk but also such immediate teacher reaction has an effect on the general trend of student talk to follow.

The concerned area in the matrix is shown in Figure 13.

The indices, TRR 89 and TQR 89 discussed (11.1 and 11.2) are some aspects of teacher reactions to student talk. What follows will be more concerned with other aspects of teacher reactions.

	1	2	3	4	5	6	7	8	9	10	T
1											
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6											
7											
8											
9											
10											
T											

FIGURE 13

TEACHER REACTION TO STUDENT STATEMENTS



(8-5) and (9-5).

17.4	Questions in the context of students' responsive talk	$= \frac{\text{Tallies in (8-4)}}{\text{Sum of column totals}} \times 100$ $1+2+3+4+5+6+7$
17.5	Questions in the context of students' self-initiated talk	$= \frac{\text{Tallies in (9-4)}}{\text{Sum of column totals}} \times 100$ $1+2+3+4+5+6+7$
17.6	Content delivery in the context of students' responsive talk	$= \frac{\text{Tallies in (8-5)}}{\text{Sum of column totals}} \times 100$ $1+2+3+4+5+6+7$
17.7	Content delivery in the context of students' self-initiated talk	$= \frac{\text{Tallies in (9-5)}}{\text{Sum of column totals}} \times 100$ $1+2+3+4+5+6+7$

The use of categories 6 and 7, by their very nature, is likely to be more significant when resorted to in the context of student talk than otherwise.

Category 6 occurs mostly as innocuous injunctions when teachers say 'stop', 'sit down', 'next', whereby they seek to guide the classroom proceedings. Student loud reading, by turns, and rapid short question-answer drill sequences are some of the instances in point. Criticism that follows students' responsive talk, though sometimes pertaining to such talk, on a fairly large number of occasions, is triggered by uncoded non-verbal occurrences in classroom, or even by verbal events that occurred earlier.

Teachers' non-encouraging and perhaps, hostile attitude to students' self-initiated and free talk is best portrayed through the build-up in the cell (9-7) while their apathy towards students' free talk is indicated by load in the cell (9-6) which sometimes is an indication of the teachers' impatience of the students' unforeseen and free expressions.

$$17.8 \text{ Orders and criticism following students' responsive talk} = \frac{\text{Sum of tallies in (8-6)+(8-7)}}{\text{Sum of column totals 1+2+3+4+5+6+7}} \times 100$$

$$17.9 \text{ Orders and criticism following students' self-initiated talk} = \frac{\text{Sum of tallies in (9-6)+(9-7)}}{\text{Sum of column totals 1+2+3+4+5+6+7}} \times 100$$

#### STUDENT TALK

Student talk is recorded under only two categories, one representing their 'response' behaviour and the other 'initiation' behaviour. But then, because of the matrix technique of tabulation and analysis of observational data, rich information can be dug out of the matrix and this can add further dimensions to the study of teacher behaviour for it is, in the ultimate analysis, teacher talk that is responsible for student talk in a classroom setting and study of student talk, ipso facto, is an indirect probe of teacher talk only.



However, because of the strikingly fewer number of categories for recording pupil talk the amount of information that can be deciphered from the matrices is relatively limited. Certain conventional indices or dimensions of student talk lend themselves to easy calculation and aid interpretation.

### Pupil Initiation

In a classroom setting, pupils' initiation is a significant phenomenon. Much of the relatively more constructive dialogue between the teacher and the student primarily involves pupils' self-initiated talk keeping the teacher with having to 'respond' to the pupils. A very sensitive index that serves as a measure of such 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 initiation area in the matrix is shown in Figure 14.

$$18.1 \quad \text{PIR} = \frac{\text{Category 9 total}}{\text{Sum of category 8+9}} \times 100$$

### Pupil Steady-State Talk

Analogous to TSSR (14.1) the tendency of the pupils to remain in the same category for spells of longer than 3 seconds is given by the index, Pupil Steady-State Ratio (PSSR). The pupil steady-state talk area in the

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2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 14  
PUPIL INITIATION

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 15

PUPIL STEADY STATE TALK

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 16

PROMPT TO PUPIL TALK.

matrix is shown in Figure 15.

$$19.1 \quad \text{PSSR} = \frac{\text{Sum of tallies in } (8-8)+(9-9)}{\text{Sum of column totals } 8+9} \times 100$$

### Prompt to Pupil Talk

As noted earlier, it is teacher talk, more often than not, that is either immediately or ultimately responsible for pupil talk in the classroom. Hence, it would be significant information to find out how the pupil talk is sometimes immediately prompted by teacher talk. The "immediate" prompt to pupil talk, as contained in teacher talk besides explaining the circumstances in which pupils began talking provides us a measure of the teachers' control over the generation of pupil talk.

The concerned area in the matrix is shown in Figure 16.

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.

$$20.1 \quad \begin{array}{l} \text{Pupil talk in the} \\ \text{context of teacher} \\ \text{talk} \end{array} = \frac{\begin{array}{l} \text{Sum of cells in } (1-8)+ \\ (2-8)+(3-8)+(4-8)+(5-8) \\ +(6-8)+(7-8)+(1-9)+(2-9) \\ +(3-9)+(4-9)+(5-9)+(6-9) \\ +(7-9) \end{array}}{\begin{array}{l} \text{Sum of column totals} \\ 8+9 \end{array}} \times 100$$

Yet another significant information would be how



- 21.5 Pupil responsive talk following silence/confusion =  $\frac{\text{Tallies in (10-8)}}{\text{Sum of column totals 8+9}} \times 100$
- 21.6 Pupil self-initiated talk =  $\frac{\text{Column 9 total}}{\text{Sum of column totals 8+9}} \times 100$
- 21.7 Pupil self-initiated talk following teacher response =  $\frac{\text{Sum of tallies in (1-9)} + (2-9) + (3-9)}{\text{Sum of column totals 8+9}} \times 100$
- 21.8 Pupil self-initiated talk following teacher questions =  $\frac{\text{Tallies in (4-9)}}{\text{Sum of column totals 8+9}} \times 100$
- 21.9 Pupil self-initiated talk following silence/confusion =  $\frac{\text{Tallies in (10-9)}}{\text{Sum of column totals 8+9}} \times 100$
- 21.10 Pupil self-initiated talk following teacher directions and criticism =  $\frac{\text{Sum of tallies in (6-9)} + (7-9)}{\text{Sum of column totals 8+9}} \times 100$
- 21.11 Pupil self-initiated talk developing from pupil responsive talk =  $\frac{\text{Tallies in (8-9)}}{\text{Sum of column totals 8+9}} \times 100$
- 21.12 Pupil self-initiated talk receding into pupil responsive talk =  $\frac{\text{Tallies in (9-8)}}{\text{Sum of column totals 8+9}} \times 100$
- 21.13 Pupil responsive talk followed by silence/confusion =  $\frac{\text{Tallies in (8-10)}}{\text{Sum of column totals 8+9}} \times 100$
- 21.14 Pupil self-initiated talk followed by silence/confusion =  $\frac{\text{Tallies in (9-10)}}{\text{Sum of column totals 8+9}} \times 100$

SILENCE/CONFUSIONThe Context of Silence/Confusion

Analysis of the incidence of silence/confusion may not, except to a limited extent, shed much light on the communication patterns in classroom situation, particularly because the provision of category ten covers both spells of silence and occurrence of confusion as also some classroom non-verbal activities like blackboard work done for small spells of few seconds intermittently. But still a general perusal of the patterns of the incidence of category ten may throw the sequences of teacher talk and pupil talk into some clearer perspective.

A discussion on the relative extents of silence/confusion following the three principal communication components would throw into relief the context of silence/confusion. The area in the matrix showing context of silence is given in Figure 17.

22.1	Silence/confusion following teacher talk	$\frac{\begin{array}{l} \text{Sum of tallies in} \\ (1-10)+(2-10)+(3-10)+ \\ (4-10)+(5-10)+(6-10)+(7-10) \end{array}}{\text{Column 10 total}} \times 100$
22.2	Silence/confusion following pupil talk	$\frac{\begin{array}{l} \text{Sum of tallies in} \\ (8-10) + (9-10) \end{array}}{\text{Column 10 total}} \times 100$
22.3	Sustained silence/confusion	$\frac{\text{Tallies in (10-10)}}{\text{Column 10 total}} \times 100$

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
T											

FIGURE 17  
CONTEXT OF SILENCE

	1	2	3	4	5	6	7	8	9	10	T
1											
2											
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4											
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6											
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10											
T											

FIGURE 18  
ROLE OF SILENCE



sets of observations (samples).

The first set of sample consists of observations of 174 teachers from secondary schools of Gujarat. This part of the sample is used for studying the independent variables age, experience, recency of training, sex and marital status of the teacher.

The second part of the sample consists of observations of 32 teachers from primary and upper primary schools in the city of Madras. It is noteworthy that while the number of teachers observed is 32 the number of observations in respect of each teacher was twelve ( $2 \times 6$ ), yielding a total of 384 observations of half-hour duration each. The scheme was such that each teacher in respect of each subject was observed for one hour made up of two half-hour spells. Hence, the 384 observations cited are of half-hour duration each.

As regards the first set of sample of 174 teachers, with random-orientation towards subject taught, likewise, each teacher was observed twice, of half-hour spells each yielding a total of  $(174 \times 2)$  348 observations of half-hour duration.

On the whole, the sample, therefore, actually consists of 732 ( $384 + 348$ ) observations of half-hour duration each.

The data collected in Madras are particularly in respect of the independent variable 'subject taught' by the teacher. The considerations leading to the decision to collect this part of the data from Madras require explication.

Classroom climate, which is sought to be measured through classroom observation, though chiefly decided by teacher behaviour is also, perhaps, in some measure at least, conditioned, *inter alia*, by the subject taught. When 'teacher' is teaching 'John', 'Latin', there would be three centres of relevance for the observer. There is the 'teacher' teaching and 'John' learning and 'Latin' being taught by the former and learnt by the latter. It is proverbial that the verbs of teaching govern two accusatives. For an effective and reliable study of the patterns of teacher influence, as affected by the independent variable, 'subject taught', the ideal situation would be to observe the teachers teaching, each one, the same cohort of students the same units in the subjects. This sort of situation, unless experimentally created, is difficult to obtain.

In Madras, mostly upto middle school level, i.e. upto standard VIII 'class teacher' method is followed. In this system the same teacher teaches all the six school subjects to the class assigned to him. This system is, in a way understandable since the teachers teaching

upto the standard\* - are all, as a rule, matriculates with professional training and hence having had no distinct specialization in their educational equipment. In the administrative matter of distribution of work in the school, there can be no claim from any of them to a particular subject being allotted to him. This, however, is in sharp contrast to what obtains in secondary schools where, invariably in higher standards - viz. standards IX to XI the teachers, being graduates with professional training are allotted the subjects in which they, in their collegiate courses specialized. 'Subject teacher' method in higher standards, therefore, becomes not only feasible and desirable but also justifiable as well.

The choice of the particular units in the different subjects to be taught in standards V and VIII has been governed by the following two principles:

- (1) Wherever there was a teaching unit in the prescribed syllabus, requiring for completion exactly two teaching periods, which facilitates collection of data for the uniform duration of one hour maintained for the whole study, such unit was chosen for

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\* More particularly from standard III to standard VIII, since English as a subject is introduced from standard III. Also teaching in the middle and lower middle schools are teachers with less than matriculation as general qualification and with professional training called junior grade or elementary grade. Since they are not as a rule, entrusted with English teaching which is, however, one of the subjects to be observed, they are excluded from the purview of the study.

the subject in respect of that standard.

- (ii) Wherever such small units were not available, units were selected at random.

In either case, however, in each subject the unit/units selected continued the same for all the teachers. The list of topics chosen for observation in respect of the two standards and for all the six subjects is shown in Appendix

Standards V and VIII were chosen because of the fact that they are the 'terminal stages' in primary and upper primary levels respectively.

The part of the sample collected in Gujarat, relates to high schools.

#### XI. THE SCHEME OF OBSERVATIONS

As was indicated by the random sampling procedure the particular schools and the particular teachers were fixed up.

After securing official permission from the respective managements or heads of institutions for making classroom observations, the investigator visited the schools. Heads of the institutions were contacted. Schedules of observation were discussed and fixed in consultation with the concerned teachers.

The scheme was designed such that each teacher was observed for two half-hour periods, and in the case of the second set of sample of 32 teachers for twelve such periods at the rate of two in every subject. The second observation was made when the teacher took the same class on the occasion immediately next to the first observed occasion. The second observation episode was, therefore, in content, the continuation of the first one.

Although the duration of the periods was nearly uniform, in the case of individual observations, "effective observation period" was computed and recorded by deducting the amount of time "to be disregarded" from the total time of observation. Certain happenings like a visitor coming to the class, a circular being brought, or even the teacher or the student "writing on blackboard", were disregarded as 'no verbal interaction periods'.

As a result, therefore, the duration of effective observation for each teacher varied.

## XII. METHODOLOGY

Since, as repeatedly stated earlier, the study is primarily exploratory in nature and descriptive and analytical in orientation, the design used in the investigation would chiefly deal with the teacher influence patterns, the criteria for which would be Indirect/Direct (I/D) and indirect/direct (i/d) indices,

spelt out by Flanders in the course of his earlier writings.

Ere we delve deeper into a discussion of the statistical design used in the investigation for the analysis of the data, perhaps, at this stage, a word may be said by way of dispelling a possible misgiving about the presumptions of the investigator. When the attempt is oriented towards probing the indirect behaviour patterns of the teacher it is not meant, even by implication, that indirect behaviour on the part of the teacher is always to be welcome and encouraged. With regard to this point, rather, the investigator would like to state that the investigation is desisting from making value judgments about the indirect behaviour of the teachers.

Of contextual importance here is an observation made by Flanders where he says that a widespread misinterpretation of research on classroom climate has been that direct influence should be avoided in the classroom. He goes on to say that research suggests that there will be no change in dependence when direct influence is exerted during periods when goals are clear. In fact, he continues, direct influence related to a clear goal may provide opportunities to challenge the ideas and conclusions of the pupil and to enrich the learning process (Flanders, 1967).

Smith (1965), reviewing four major studies notes that the value of these studies lies in their describing

what the teacher is doing rather than in trying to label the teacher with a global title such as autocratic or dominative. He points out that there probably are no pure types of teacher, and therefore, that teacher behaviours should be described so that the particular mixtures of teaching behaviours are not buried under broad category headings.

Hence, as would be in the light of the observations of Smith as well, the attempt of the investigator, chiefly, would be only to assess the relative extent of indirectness in the influence patterns of teachers and to treat the same as the criterion measure(s) with reference to the independent variables of the study.

Correlation - Partial Correlation: Three of the independent variables taken, namely, age, experience and recency of training of the teacher being 'continuous' their relationships with teacher influence were found by calculating Pearson's Product Moment Coefficients of Correlation. Subsequently, partial correlations were found from the obtained correlations.

Analysis of Variance - 2 x 2 Factorial Design: As for the next two non-continuous, independent variables, sex and marital status, of the teacher, which are dichotomies, Analysis of Variance - 2 x 2 Factorial Design was carried out.

Analysis of Variance and Student's 't' Tests:

While the aforesaid design were followed for studying the problem with regard to the five teacher variables, based on the data from the first part of the sample of 174 teachers, the curricular variables, subject taught, was treated through Analysis of Variance and Student's 't' Tests, basing the analysis on the data from the second part of the sample of 32 teachers. The analysis of variance technique was applied for the whole data of 32 teachers in all the six subjects simultaneously, to ascertain whether or not significant differences are indicated. Student's 't' tests were carried out subsequently on all the fifteen possible pairs of subject combinations with a view to identify the pairs that constitute the significantly different subject combinations.

All the aforesaid analyses were carried out with both I/D and i/d indices separately so as to facilitate more detailed inferences regarding the relationships probed.